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Curricula developed and implemented have relevance to the local, regional, national, and global developmental needs, which is reflected in the Programme outcomes (POs), and Course Outcomes (COs) of the Programmes offered by the University

List of Programme Outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the University

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Faculty of Science
Department of Microbiology
Program: PGDMLT

Program Objective:

1.	The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation
2.	This programme will enable students to acquire knowledge on the Microbiology, Cell Biology, Microbiology, Immunology, Bioprocess Technology and Molecular Biology to enable them to understand emerging and advanced concept in modern biology and help them to take their career in this field.
3.	After completion of the programme, the students will be able to acquire the necessary theoretical and practical competencies in Microbiology to enable them to undertake higher studies in recognized Institutions of advance learning and engage gainful self-employment.
4.	The Programme is intended to help the students to be the innovative and versatile personalities in the field of Life Science with quality education and provide the skilled manpower required by Research and Development, Institutions of Higher Learning and Industry

Graduate Attributes:

1.	Scientific knowledge: To utilize the deep discipline knowledge for practical application of socio-economic development
2.	Ability of critical analysis: Apply the critical ability in identification of key global and local problems through a scientific approach
3.	Development of solution: To suggest and plan solution through research and development for agricultural and healthcare problems in wellbeing of humankind keeping the safety concern in mind.
4.	Modern tool uses: Ability to choose and conception of appropriate tools and techniques to address the existing problems for further development of quality life considering its limitation
5.	Environment and sustainability: Ability to critically analyze and address the solution in context of environment and ability to express sustainable utilization



Program Educational Objectives (PEOs):

PEO1	Depth and breadth of knowledge: apply scientific principles and techniques to the vital role that laboratory science plays in the hospital and healthcare environment.
PEO2	Practice, Operation and usage of modern tools and technology: will contribute in the field of clinical laboratory and healthcare industries in designing, developing and providing solutions for product/processes/technology development.
PEO3	Professional capacity and passion of learning: Stays modernized of new developments and prepared to acquire, use and integrate them and are flexible and adaptable in different work
PEO4	Research, numeracy and scholarship: will exhibit ethical behaviour consistent with academic honesty and use of appropriate guidelines and procedures with responsible conduct of research.
PEO5	Global, moral and aesthetic sustainability: will have love for learning in pursuance of excellence in all domains of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:	
PO 1	Domain knowledge: Demonstrate technical skills, professional expertise and social behavior, imperative upon a medical laboratory technician
PO 2	Problem analysis: involves diagnosing the gap analysis, evaluation of the results in cutting edge medical issues.
PO 3	Conduct investigations of complex problems: Apply analytical and problem solving techniques for verifying the accuracy of laboratory results, identification of procedural errors, instrument malfunctions and its correction.
PO 4	Modern tool usage: Operate and maintain laboratory equipments utilizing appropriate quality control and safety procedures.
PO 5	Environment and sustainability: Demonstrate ability to plan and implement professional actions by applying suitable components and processes within the safety constraints for environmental and societal needs.



PO 6	Ethics: Understand professional and ethical responsibility in medical lab technology practices
PO 7	Individual and team work: Exhibit leadership quality and teamwork skills in the diverse professional areas.
PO 8	Communication: Communicate effectively by oral, written and graphical means along with digital and information literacy.
PO 9	Life-long learning: Recognize the need to engage in lifelong learning through continuing education and research

Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:	
PSO1	Perform routine laboratory procedures and tests with acceptable quality control parameters in the areas of hematology, biochemistry, immunohematology, and microbiology in clinical laboratory settings including hospital environment and diagnostic labs.
PSO2	Efficiently execute well-designed research experiments, along with correct analysis and interpretation of clinical data contributing to right treatment, patient safety and organizational proficiency.
PSO3	Apply safety and regulatory guidelines and quality assurance standards applicable to medical laboratory practice.
PSO4	Utilize information management systems to provide timely and accurate reporting of laboratory data.

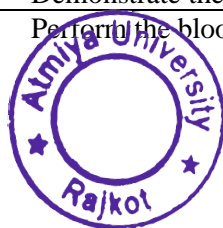


Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21DMLTC C101	Core-1 : Fundamentals of Medical Laboratory technology	<ol style="list-style-type: none"> Understand effective laboratory management system including important accreditation guidelines and patient safety. Comprehend important aspects of biomedical waste management and disinfection strategies, leading to better personnel and environmental safety. Describe the various methods and guidelines of better infection control and personal hygiene. Demonstrate good documentation practice and knowledge of LIMS to achieve this, and procurement and storage in medical labs. Apply better communication, social and interpersonal skills. 	4	40	60
I	21DMLTC C102	Core- 2: Hematology and Blood Banking	<ol style="list-style-type: none"> Understand the concepts of hematopoiesis and blood clotting disorders. Comprehend and compare the various kinds of anemic disorders and leukemia. Describe and demonstrate the techniques of venipuncture, bone marrow aspiration etc and use of diagnostic instruments like Hematology analyzer. Demonstrate good understanding about the storage of Blood and the functioning of a Blood Bank. Comprehend and apply important techniques in clinical therapy like blood transfusion, apheresis and HLA typing etc. 	4	40	60
I	21DMLTC C103	Core- 3: Clinical Biochemistry and Body fluid analysis	<ol style="list-style-type: none"> Understand the hormonal regulation of carbohydrate and interpret its abnormal metabolism with respect to disease 	4	40	60



			<ol style="list-style-type: none"> Compare the functions of lipid and proteins in healthy individual with that in the diseased individual Analyze liver and kidney function tests Summarize the tests of urine and interpret Analyse various body fluids with different tests 			
I	21DMLTD C101 or	DSE Core-1 : Analytical Techniques	<ol style="list-style-type: none"> Recall basic principles of instrumentation Classify and demonstrate various analytical techniques for biological applications Select and utilize appropriate instrumentation method for sample identification, analysis and problem solving Evaluate and interpret data according to application Compare and choose between various analytical methods for sample analysis 	4	40	60
I	21DMLTD C102	DSE Core -2: Biostatistics	<ol style="list-style-type: none"> Understand the concept of statistical parameters. Understand sampling and sampling distributions also measures of dispersion. Apply the techniques of correlation, regression, and Random Variables Understand the significance of analytical techniques of statistics. Test the hypotheses using various techniques and interpret the result. 	4	40	60
I	21DMLTC C104	Core practical-1: Blood Analysis Practical	<ol style="list-style-type: none"> Perform the blood collection techniques Perform experiment, analyze the data and explain its Significance Compare the various methods and select the appropriate method Understand various blood banking techniques, perform and interpret Demonstrate the experiment 	3	40	60
I	21DMLTC	Core practical-2 : Body	<ol style="list-style-type: none"> Perform the blood collection techniques. 	3	40	60



	C105	fluids and Biochemical Analysis Practical	<ol style="list-style-type: none"> 2. Perform separation of blood into serum and plasma. 3. Execute all the biochemical estimations. 4. Record, analyze and report the data along with correct explanation about its clinical significance. 5. Demonstrating the experiment to others. 			
II	21DMLTC C201	Core-4: Clinical Microbiology and Serology	<ol style="list-style-type: none"> 1. Describe the infection cycle and enumerate the causative agents, signs and symptoms of infectious diseases. 2. Interpret the diseases based on laboratory tests 3. Memorize the infectious agents and list of tests for infectious disease diagnosis and interpret the results 4. Understand the principle of antigen antibody reactions and apply in the diagnosis of diseases 5. Analyse the infections by using microbiological assay and serological tests 	4	40	60
II	21DMLTC C202	Core-5: Histotechniques and Laboratory Instrumentation	<ol style="list-style-type: none"> 1. Explain the tissue processing steps and routine staining procedure in histopathology laboratory 2. Describe the methods of cytotechniques and Immunohistochemistry in disease diagnosis 3. Understand the genetic basics of cancer and summaries the various tumor biomarker along with different form of cancer therapy 4. Utilize, calibrate and understand the principle of instruments used in sample identification and analysis. 5. Understand the principle and application of various advance molecular techniques in disease diagnosis 	4	40	60
II	21DMLTD C201	DSE Core 2: Advance Molecular Techniques	<ol style="list-style-type: none"> 1. Investigate DNA and Protein characteristics 2. Compare and select various techniques used in isolation and purification 3. Plan sequential steps in genome analysis 4. Evaluate various protein engineering steps 	4	40	60



			5. Produce gene copies using PCR and analyze biomolecule by blotting studies			
II	21DMLTD C202	DSE Core- 2: Immunology	1. Define and describe the cells and organs of immune system and summarize the role of antigen presenting cells, lymphocytes, and phagocytic cells in immune responses 2. Illustrate the molecular basis of transplantation immunology and summarize its success in different scenarios 3. Identify the molecular basis of transplantation immunology and predict the its success in different scenarios 4. Develop knowledge of the cellular and molecular basis for autoimmune and immunodeficiency diseases and allergic responses 5. Define and relate the principles, applications and methods used in vaccine development	4	40	60
II	21DMLTC C203	Core Combined practical-3: Clinical Microbiology and Molecular Diagnostic techniques	1. Recall principle of basic laboratory instruments 2. Perform various molecular biology practical like Plasmid isolation, DNA isolation, RFLP, PCR etc. 3. Isolate and identify the pathogen from various clinical samples like urine, pus, blood etc. 4. Identify the various disease using rapid detection kit 5. Operate the PCR instrument	6	40	60



Department of Microbiology
Program: M.Sc. Microbiology

Graduate Attributes:

1	Skills and Applications: Students should possess skills to apply theoretical knowledge to basic applications by Developing hypothesis, design, and execution of experiments and analysis of results on an individual basis.
2	Research and Innovation: Students should be independently able to formulate research projects through literature Search, finding research gaps and framing objectives in order to strive for innovation.
3	Collaboration and Cooperation: Students should be able to identify potential collaborators and know the art Of cooperation in working for common goals.
4	Communication: Students must be able to communicate scientific ideas as well as their beyond curriculum effectively Between peers and others through various modes of communication (verbal, written, presentation etc...)
5	Industry Preparedness: Students must be skilled with necessary technical domains and possess basic whereabouts Of related industry as a part of industrial preparedness.

Program Educational Objectives (PEOs):

1	The curriculum is designed to attain the following learning goals which students shall accomplish by the time of their post-graduation
2	This programme will enable students to acquire knowledge on the in-depth aspects of the Microbiology, Immunology, Bioprocess Technology and Molecular Biology to enable them to understand emerging and advanced concept in modern biology and help them to take their career in this field.



3	After completion of the programme, the students will be able to acquire the necessary theoretical and practical competencies in Microbiology to enable them to undertake gainful self-employment.
4	The Programme is intended to help the students to be the innovative and versatile personalities in the field of Life Science with quality education and provide the skilled manpower required by industries.

Our programme will produce Graduates who will attain following PEOs after few years of graduation:	
PEO1	: Research, Numeracy and scholarship: to inculcate scientific thinking, writing and application in light of sustainable goals
PEO2	: Practice, operation and usage of modern tools and technology: To equip the students with classical and modern tools for its application in thrust areas
PEO3	: Depth and breadth of knowledge: To build in depth clarity of reasoning in theoretical and practical knowledge
PEO4	: Professional capacity and love of learning: To develop professional capacity of students for its sustenance
PEO5	: Global, moral and aesthetic sustainability: To make students able to interpret principles of ethics for their social, economic and environmental responsibilities

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:	
PO 1	: Domain knowledge: In depth understanding of basic and applied aspects of microbiology
PO 2	: Problem analysis: Capability to contribute acquired knowledge leading to find a suitable solutions for an existing problem



PO 3	:	Conduct investigations of complex problems: Acquire skills specific to microbiology and allied fields for converting information to knowledge through hypothesis, design, execution and analysis
PO 4	:	Modern tool usage: Familiarized with latest and advanced tools and techniques of biological sciences.
PO 5	:	Environment and sustainability: Understand microbiology as a social endeavour in context to bringing about harmony with nature
PO 6	:	Ethics: Uphold the responsibility as a global citizen maintaining professional and ethical values
PO 7	:	Individual and team work: Capacity to develop, employ and integrate technical and professional skills as a member of team withholding the essence of collaboration, cooperation and integrity.
PO 8	:	Communication: Communicate effectively by oral, written and graphical means along with digital and information literacy.
PO 9	:	Life-long learning: Ability to upgrade knowledge independently and act upon means of improvement for lifelong learning

Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Be able to apply knowledge of microbiology for research, industrial applications and clinical assistance.
PSO2	:	Be able to apply the acquired skills specific to microbiology and allied fields for converting information to knowledge through hypothesis, design, execution and analysis
PSO3	:	Be able to understand microbiology as a social endeavour in context to bringing about harmony with nature



Course Outcomes (COs):

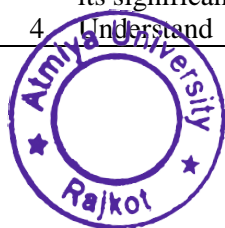
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21MMBCC101	Core 2: Biochemistry of Cell	<ol style="list-style-type: none"> 1. Analyze concept of biomolecules and biochemical processes 2. Relate chemical interactions between molecules in biological systems 3. Evaluate structure and role of various biological molecules 4. Interpret various phenomenon associated with bio molecules 5. Predict and determine the physiological problems related to bio molecules 	4	40	60
	21MMBCC102	Core 2: Microbial Cell Biology (F)	<ol style="list-style-type: none"> 1. Demonstrate the structures and functions of cell and sub-cellular organelles 2. Inspect energy generating mechanisms in bacteria 3. Elucidating the transport system of bacteria 4. Illustrate the adaptation process of microorganisms during different environmental conditions 5. Summarize the aspects of microbial interactions 	4		
I	21MMBCC103	Core 3: Microbial Systematics and diversity (F)	<ol style="list-style-type: none"> 1. Elucidating the concepts of evolution 2. Elucidating the diversity of different groups of microbes 3. Interpreting different microbial classification systems 4. Analyze and Compare diverse adaptive parameters of extremophiles 5. Employ the tools for studying the diversity of bacteria 	4	40	60
I	21MMBCC10	Core 4 : Cellular Metabolism (F)	<ol style="list-style-type: none"> 1. Relate different metabolic processes 2. Understand regulation of metabolic processes 	4	40	60



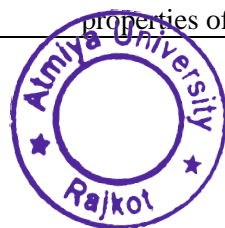
	4		<ol style="list-style-type: none"> Analyze and Interpret the basics of metabolism Experiment with various physicochemical parameters to determine their role in biochemical reactions Classify the enzymes 			
I	21MMBCC105	Core Combined Practical-1 Microbial and Biochemical Techniques	<ol style="list-style-type: none"> Define the principle, remember the protocol and demonstrate the result of an set of experiments Apply the basic concepts of microbiology in designing experiment and analyzing the obtained data Perform experiment and analyze the data to evaluate certain parameters and explain its significance. Construct an experiment based on requirements and analyze the result obtained in testing hypothesis or prediction for a well defined purpose. 	4	100	100
II	21MMBCC201	Core 6: Microbial Genetics	<ol style="list-style-type: none"> Recall and understand Mendalian and non Mendalian concepts, mechanism of linkage and population genetics Explain and apply various gene transfer methods and mutation techniques Explain and analyze mechanism behind DNA replication and repair systems Explain and compare mechanisms associated with various transcriptional and post transcriptional system with a brief understanding of various types of RNA Discuss and analyze mechanisms behind translation and gene regulation systems 	4	40	60
	21MMBCC202	Core 7: Virology and Mycology	<ol style="list-style-type: none"> Classify the fungi on the basis of its morphological characteristics Detailing of economic attributes of fungi in 	4	50	50



			<p>different sectors</p> <ol style="list-style-type: none"> 3. Employ an appropriate method for detection of viruses 4. Interpret the overview of disease causing viral agent 5. Explain growth controlling aspects of viruses 			
	21MMBCC203	Core 8: Clinical Microbiology	<ol style="list-style-type: none"> 1. Define and describe the cells and organs of immune system and distinguish between innate and adaptive immune responses 2. Understand the structure and function of antigens and antibodies, basis of their interaction and carry out diagnostic tests based on these interactions 3. Comprehend the molecular basis of transplantation immunology and predict its success in different scenarios 4. List out medically important microbes, understand mechanism of their pathogenesis 5. Choose prevention and control strategies for pathogens 	4	50	50
	21MMBCC204	Core 9: Instrumentation and techniques	<ol style="list-style-type: none"> 1. Recall basic principles of instrumentation 2. Classify and demonstrate various analytical techniques for biological applications 3. Select and utilize appropriate instrumentation method for sample identification, analysis and problem solving 4. Explain and interpret data according to application 5. Compare and choose between various analytical methods for sample analysis 	4	50	50
	21MMBCC205	Core -10 Core Practical-2 – Molecular Techniques	<ol style="list-style-type: none"> 1. Isolate and purify DNA, RNA, protein 2. Select different analytical tools to demonstrate various techniques 3. Perform experiment, analyze the data and explain its significance 4. Understand the different metabolic and 	4	100	100



			immunological interactions 5. Demonstrate the life cycle of viruses			
III	21MMBCC301	Core 11: Agricultural Microbiology (Ap)	<ol style="list-style-type: none"> 1. Extend the knowledge of organic farming techniques by improved ideation of composting and biodegradation processes 2. Survey and select the optimum preference of crop growth and soil nutrition improving agents 3. Illustrate the various interaction mechanisms and summarize physiological dynamics in soil microbial world 4. Apply in real time various agricultural practices, distinguish the principle of various practices with conventional types 5. Design and Infer the outcome of hands on practical outcome of agricultural experiments 	5	140	60
	21MMBCC302	Core 12: Industrial Microbiology (Ap)	<ol style="list-style-type: none"> 1. Apply the basics of fermentations; analyze the process of control systems; scale up operations; different upstream and downstream processes 2. Relate the constructional features of different types of fermenters; modes of sterilization; batch, continuous and fed batch fermentations 3. Apply the knowledge to choose important process parameters at its basic and statistical level with real time operation in any fermentation process 4. Analyze and compare the different types of fermentors; sterilization operations; fermentation modes; upstream and downstream processes on byproducts 5. Apply the practical skill & hypothesize the outcome for microbial fermentation 	5	140	60
	21MMBCC303	Core 13: rDNA technology and Bioinformatics (Ad)	<ol style="list-style-type: none"> 1. Describe and enlist the mechanisms and enzymes use for DNA modification and gene cloning and criteria for primer designing 2. Illustrate the stages of cloning techniques, properties of different vectors 	6	140	60

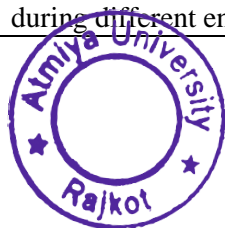


			<ol style="list-style-type: none"> 3. Compare various types of PCR and DNA sequencing strategies and explains the roles and applications of markers for varietal identification and differentiation 4. Perform different search and retrieve biological data from public repositories along with to compare various sequences 5. Analyzed different protein forms using various tools and softwares and interpret the results 			
	21MMBCC304	Core 14: Cellular Immunology (Self study) (Ad)	<ol style="list-style-type: none"> 1. Find out causative agent of known pathogens 2. Annotate mechanism of pathogenecity 3. Choose an appropriate method for diagnosis 4. Comment over therapeutical aspects of pathogen 5. Summarize the distribution pattern of pathogen 	4	50	50
	21MMBDC301/	DSE-Core 2: Food Technology (Ap)	<ol style="list-style-type: none"> 1. Describe interaction of microbes with food and define various food quality standards their control and safety regulations 2. Interpret the role of microbial activities in food and milk and to analysis and assess various techniques involved in food spoilage and food preservation. 3. Operate various food processing techniques and apply different packing technique 4. Estimate the quality of milk by various techniques and Formulate various dairy products 5. Evaluate, Design and explain different technical skills used for food and dairy related microbe cultivation, identification, and assaying of products by practical approaches. 	5	140	60
	21MMBDC302	DSE-Core-1: Applied Environmental Microbiology (Ap)	<ol style="list-style-type: none"> 1. Analyze source of pollutants in nature 2. Compare and present role of microbes in environment 3. Access the purification strategies for air and water 4. Select appropriate strategies for bioremediation 5. Test basic parameters for environmental monitoring 	5	140	60



IV	21MMBDC402	DSE-Core 2: Pharmaceutical Microbiology (Ap)	<ol style="list-style-type: none"> 1. Explain and differentiate role of different authorities in pharma industries 2. Explore different applications of pharmaceutical products 3. Choose differentiate sectors of pharma industries 4. Use different parameters for quality analysis 5. Apply and analyze standard operating procedures for different pharmaceutical products 	7	60	40
	21MMBDC403	DSE-Core 2: Advanced Molecular Techniques (Ap)	<ol style="list-style-type: none"> 1. Investigate DNA and Protein characteristics 2. Compare and select various techniques used in isolation and purification 3. Plan sequential steps in genome analysis 4. Evaluate various protein engineering steps 5. Produce gene copies using PCR and analyze biomolecule by blotting studies 	8	140	60

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	18MMBCC101	Core 2: Biomolecules	<ol style="list-style-type: none"> 1. Comprehend and analyze concept of biomolecules and biochemical processes 2. Relate chemical interactions between molecules in biological systems. 3. Evaluate structure and role of various biological molecules. 4. Interpret various phenomenons associated with biomolecules. 5. Predict and determine the physiological problems related to biomolecules. 	4	40	60
	18MMBCC102	Core 2: Microbial Cell Biology and Physiology	<ol style="list-style-type: none"> 1. Demonstrate the structures and functions of cell and sub-cellular organelles 2. Inspect energy generating mechanisms in bacteria 3. Elucidating the transport system of bacteria 4. Illustrate the adaptation process of microorganisms during different environmental conditions 	4		



			5. Summarize the aspects of microbial interactions			
I	18MMBCC103	Core 3: Microbial Systematics and diversity (F)	<ol style="list-style-type: none"> 1. Elucidating the concepts of evolution 2. Elucidating the diversity of different groups of microbes 3. Interpreting different microbial classification systems 4. Analyze and Compare diverse adaptive parameters of extremophiles 5. Employ the tools for studying the diversity of bacteria 	4	40	60
I	18MMBCC104	Combined Practical (Core) 1: Microbial and Biochemical Techniques Practical	<ol style="list-style-type: none"> 1. Define the principle, remember the protocol and demonstrate the result of an set of experiments 2. Apply the basic concepts of microbiology in designing experiment and analyzing the obtained data 3. Perform experiment and analyze the data to evaluate certain parameters and explain its significance. 4. Construct an experiment based on requirements and analyze the result obtained in testing hypothesis or prediction for a well-defined purpose. 5. Choose an appropriate method to analyze biomolecules 	6	100	100
II	18MMBCC201	Core 5: Microbial Genetics	<ol style="list-style-type: none"> 1. Recall and understand Mendalian and non Mendalian concepts, mechanism of linkage and population genetics 2. Explain and apply various gene transfer methods and mutation techniques 3. Explain and analyze mechanism behind DNA replication and repair systems 4. Explain and compare mechanisms associated with various transcriptional and post transcriptional system with a brief understanding of various types of RNA 5. Discuss and analyze mechanisms behind translation and gene regulation systems 	4	50	50



18MMBCC202	Core 6: Analytical Techniques	<ol style="list-style-type: none"> 1. Recall basic principles of instrumentation 2. Classify and demonstrate various analytical techniques for biological applications 3. Select and utilize appropriate instrumentation method for sample identification, analysis and problem solving 4. Explain and interpret data according to application 5. Compare and choose between various analytical methods for sample analysis 	4	50	50
18MMBCC203	Core 7: Immunology and Medical Microbiology	<ol style="list-style-type: none"> 1. Define and describe the cells and organs of immune system and distinguish between innate and adaptive immune responses 2. Understand the structure and function of antigens and antibodies, basis of their interaction and carry out diagnostic tests based on these interactions 3. Comprehend the molecular basis of transplantation immunology and predict its success in different scenarios 4. List out medically important microbes, understand mechanism of their pathogenesis 5. Choose prevention and control strategies for pathogens 	4	40	60
18MMBCC204	Core 8: Microbial Metabolism	<ol style="list-style-type: none"> 1. Relate different metabolic processes 2. Understand regulation of metabolic processes 3. Analyze and Interpret the basics of metabolism 4. Experiment with various physicochemical parameters to determine their role in biochemical reactions 5. Classify the enzymes 			
18MMBCC205	Combined Practical (Core) 2: Molecular Techniques	<ol style="list-style-type: none"> 1. Isolate and purify DNA, RNA, protein 2. Select different analytical tools to demonstrate various techniques 3. Perform experiment, analyze the data 4. Understand the different metabolic Demonstrate the 	4	100	100



			enzyme kinetics			
III	18MMBCC301	Core 10: Bioinformatics	<ol style="list-style-type: none"> 1. Browse, search, and retrieve biological data from public repositories 2. Upload new sequences onto GenBank, perform text and sequence-based searches, and analyze the results 3. Edit raw Sanger sequence data for phylogenetic analysis (edit chromatograms, identify Contamination, align sequences, remove ambiguously aligned sites) 4. Reconstruct phylogenetic analysis using various tools, interpret the result and produce publication ready trees 5. Use programs for visualizing and analyzing protein structures. 	5	90	60
	18MMBCC302	Core 11: Industrial Microbiology (Ap)	<ol style="list-style-type: none"> 1. Apply the basics of fermentations; analyze the process of control systems; scale up operations; different upstream and downstream processes 2. Relate the constructional features of different types of fermenters; modes of sterilization; batch, continuous and fed batch fermentations 3. Apply the knowledge to choose important process parameters at its basic and statistical level with real time operation in any fermentation process 4. Analyze and compare the different types of fermentors; sterilization operations; fermentation modes; upstream Apply the practical skill & hypothesize the outcome for microbial fermentation 	5	90	60
	18MMBCC303	Core 12: Gene Manipulation Techniques	<ol style="list-style-type: none"> 1. Describe and enlist the tools associated with gene cloning techniques; & application of genetic engineering in human welfare Illustrate the stages of cloning techniques, properties of different vectors 2. Illustrate the stages of cloning techniques 3. Differentiate gene insertion techniques by using DNA marker techniques 4. Design gene cloning techniques 	5	90	60



			5. Interpret the results , apply the experiments and develop skills for handling tools in genetic engineering			
	18MMBCC304	Core 13: Microbial Ecology (self-study)	<ol style="list-style-type: none"> 1. Differentiate various microbial interactions Annotate mechanism of pathogenicity 2. Express relationship of microorganisms with biotic and abiotic factors 3. Subdivide microorganisms as per ecological, morphological and reproductive characteristics 4. Choose the microbes in controlling of different environmental pollutions 5. List the name of microbes present in various biogeochemical interactions 	4	50	50
	18MMBDC301	DSE-Core 2: Environmental Microbiology and Biotechnology	<ol style="list-style-type: none"> 1. Infer the global issues of environment and their impact on society 2. Comply waste management system and apply the same in field 3. Summarize the process of biodegradation and remediation 4. Interpret existing and emerging technologies that are important in the area of environmental biotechnology 5. Design and explain practical approaches of environmental biotechnology 	5	50	50
	18MMBDC302	DSE-Core 2: Food and Dairy Microbiology	<ol style="list-style-type: none"> 1. Explain the interactions between microorganisms and the food and milk environment, and factors influencing their growth and survival 2. Interpret the significance and beneficial activities of microorganisms in food and milk 3. Distinguish the characteristic identifiable features of food borne diseases and spoilage microorganisms 4. Choose an appropriate method for food and milk preservation 5. Evaluate , explain & compare the different technical skills used for food and dairy related microbe 	5	50	50



			cultivation, identification, and assaying of products			
IV	18MMBCC401	Core 13: Agricultural Microbiology	<ol style="list-style-type: none"> 1. Show soil and its characteristic 2. Choose microorganisms in soil as per their role in agriculture 3. Produce biofertilizer and biopesticides 4. Differentiate Plant Microbe interaction 5. Summarize harmful interaction between plant and microbes 	5	90	60
	18MMBDC401	DSE-Core 2: Pharmaceutical Microbiology	<ol style="list-style-type: none"> 1. Explain and differentiate role of different authorities in pharma industries 2. Play a role in different sectors of pharma industries 3. Choose differentiate drug delivery systems 4. Use different parameters for quality analysis 5. Apply and analyze standard operating procedures for different pharmaceutical products 	5	50	50
IV	18MMBDC402	DSE-Core 2: Advanced Molecular Techniques	<ol style="list-style-type: none"> 1. Investigate DNA and Protein characteristics 2. Compare and select various techniques used in isolation and purification 3. Plan sequential steps in genome analysis 4. Produce gene copies using PCR and analyze bimolecule by blotting studies 	5	50	50



Department of Microbiology
Program: B.Sc. Microbiology

Program Objective:

1.	The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation
2.	This programme will enable students to acquire knowledge on the Microbiology, Cell Biology, Microbiology, Immunology, Bioprocess Technology and Molecular Biology to enable them to understand emerging and advanced concept in modern biology and help them to take their career in this field.
3.	After completion of the programme, the students will be able to acquire the necessary theoretical and practical competencies in Microbiology to enable them to undertake higher studies in recognized Institutions of advance learning and engage gainful self-employment.
4.	The Programme is intended to help the students to be the innovative and versatile personalities in the field of Life Science with quality education and provide the skilled manpower required by Research and Development, Institutions of Higher Learning and Industry

Graduate Attributes:

1.	Scientific knowledge: To utilize the deep discipline knowledge for practical application of socio-economic development
2.	Ability of critical analysis: Apply the critical ability in identification of key global and local problems through a scientific approach
3.	Development of solution: To suggest and plan solution through research and development for agricultural and healthcare problems in wellbeing of humankind keeping the safety concern in mind.
4.	Modern tool uses: Ability to choose and conception of appropriate tools and techniques to address the existing problems for further development of quality life considering its limitation
5.	Environment and sustainability: Ability to critically analyze and address the solution in context of environment and ability to express sustainable utilization



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1: Preparation	:	To prepare the students ready for industry, academics or entrepreneurship.
PEO2: Core competence:	:	Students should be felicitated with sound theory and practical aspects of microbiology and be nurtured to thronged upon core or allied research or pursue higher studies
PEO3: Breadth	:	To build in depth clarity of reasoning in theoretical and practical knowledge
PEO4 Professionalism	:	Communicative, team leading capacity, multifaceted task solver, outreach the product or active engagement form lab to land
PEO5 Learning environment	:	To capacitate with lifelong learning of microbiological skills and techniques, ethic and behavioral wellness

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO 1	:	Domain knowledge: Ability to observe and explore beneficial and harmful aspects of microorganism.
PO 2	:	Problem analysis: Identify scientific and societal issues across the spectrum of related disciplines
PO 3	:	Design/development of solutions: Acquire skills to identify possible solutions by data analytics and learn to verify and record data
PO 4	:	Conduct investigations of problems: Able to understand eause and problems related to biotic and abiotic factors
PO 5	:	Modern tool usage: Capable for samples collection ,isolation of microbes, preliminary identification and analysis
PO 6	:	Professional and society: Capacitate to expand the essence of awareness of microbiology to society



PO 7	:	Environment and sustainability: emphasizes the importance of understanding the environmental issues for sustainable development
PO 8	:	Ethics: Develop behavioural up-liftmen through inculcation of moral values, logical clarity of sense of aesthetics and ethical considerations.
PO 9	:	Individual and team work: Acquire skills of team leading, working with peers in coordination, and adopt the nature of commitment for fulfilling task
PO 10	:	Communication: Able to develop communicative skills and reasoning of defence
PO 11	:	Project management and finance: Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	:	Life-long learning: Able to pursue lifelong learning by In depth understanding of fundamental and few applied aspects

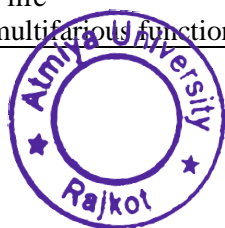
Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Understand the basic concepts of cell, microbes and its applications in various fields of microbiology
PSO2	:	Outline the pathogenesis and transmission of emerging bacterial, fungal and viral infections with its diagnosis and treatment attributes.
PSO3	:	Outline, appreciate and apply the principles of solid and hazardous waste management and appreciate various regulations enacted with respect to biosafety.



Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGMB101	Basic Microbiology	<ol style="list-style-type: none"> 1. Identify the pioneers of the subject and interpret their contributions that laid the groundwork for modern microbiology. 2. Demonstrate and relate the characteristic features of prokaryotic and eukaryotic cells and major groups of microorganisms and diversity of microbial world. 3. Interpret the flow of structural and functional differences among all the microbes and their nutritional requirements for the microbial growth. 4. Identify the influence of microbiology and 21st century challenges and opportunities that arise from our changing relationship with and understanding of microbes. 5. Relate the science of microbes and the social issues and concerns relevant to the field of microbiology. 	4	30	70
I	23UGMB102	Basic Microbiology Practical	<ol style="list-style-type: none"> 1. Identify the various microbiological instruments and explains their working principles. 2. Select and identify the various staining techniques for studying microorganisms 3. Understand the steps and procedure of growth phases of bacterial population and plot a bacterial growth curve 4. Compare and interpret the effect of physical parameters on growth of bacteria 5. Recognize the effect of antibiotic on microbial growth sensitivity 	2	50	50
II	23UGMB101	Core: Basics Biochemistry	<ol style="list-style-type: none"> 1. Understand various biomolecules which are required for development and functioning of a cell. 2. Define role, structural and functional components of carbohydrates 3. Elaborate about lipid and fat, and importance of lipid in cellular life 4. Enlist multifarious function, types and classification of 	4	30	70



			<p>proteins, nucleic acids and vitamins.</p> <p>5. Calculate enzyme activity and other quantitative and qualitative parameters of enzyme</p>			
II	23UGMB202	Core Practical :Basic Biochemistry Practical	<p>1. Differentiate between biomolecules by appropriate biochemical method</p> <p>2. Relate the principles of enzyme kinetics</p> <p>3. Determine the concentration of a specific biomolecule in a sample</p> <p>4. Analyze experiments to analyze enzyme activity</p> <p>5. Evaluate the experimental design and data interpretation from biochemistry experiment</p>	2	40	60
II	23UGMB050	Skill Course: Culture Handling and Preservation Techniques	<p>1. Explain various isolation techniques for microorganisms</p> <p>2. Demonstrate an appropriate media for cultivation of microorganisms</p> <p>3. Compare different bacterial preservation techniques</p> <p>4. Plan and experiment with microorganisms</p> <p>5. Choose an appropriate method for culture handling and preservation</p>	2	100	-
III	23UGMB301	Core:Microbial Diversity	<p>1. Explain knowledge of taxonomic ranking and grouping of microorganisms</p> <p>2. Compare structural and functional features of various group of prokaryotes</p> <p>3. Illustrate the fungal diversity</p> <p>4. Imply the different type of algal groups for the economical attributes</p> <p>5. Relate the structural and functional features of various virus</p>	4	30	70
III	23UGMB303	Core:Microbial Diversity Practical	<p>1. Operate selective microbial taxa</p> <p>2. Classifying the selective microbial taxa</p> <p>3. Differentiate selective microbial taxa</p> <p>4. Sketch morphological features of selected microbial taxa</p> <p>5. Prepare the medium</p>	2	50	50



Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21BMBCC 101	Core1: Introduction to Microbiology	Identify the pioneers of the subject and interpret their contributions that laid the groundwork for modern microbiology.	4	30	70
			Demonstrate and relate the characteristic features of prokaryotic and eukaryotic cells and major groups of microorganisms and diversity of microbial world with the cultivation and preservation methods of microorganisms.			
			To relate and describe the flow of structural and functional differences among all the microbes and their nutritional requirements for the microbial growth.			
			Identify the influence of microbiology and 21 st century challenges and opportunities that arise from our changing relationship with and understanding of microbes.			
			Relate the science of microbes and the social issues and concerns relevant to the field of microbiology.			
I	21BMBCC 102	Core 1: Fundamentals of Cell	State about cell theory, cell structure and Diversity of cellular life	4	30	70
			List about extra cellular organization of cell, cell membrane and cell wall, with cellular transport.			
			Demonstrate the structures and functions of cell and sub-cellular organelles			
			Describe the composition of cytoskeleton and extracellular matrix.			
			Relate cell cycle, cell division with cancer			
I	21BMBCC 103	Core Practical - 1- Microbial Techniques I	Demonstrate the use of aseptic techniques to prevent contamination	5	100	-
			Maintain pure cultures of microorganisms through proper sub-culturing, storage, and revival techniques			
			Prepare different types of growth media suitable for cultivating specific microorganisms			
			Demonstrate effect of various parameters on different types of cell			
			quantify microbial populations			
I	21BMBIC1 01	IDC 1: Biology	Effective communication and collaboration with other disciplines by effectively communicating the fundamental concepts of biology	4	30	70
			Inculcate interest in and love of nature with its immeasurable living forms.			



			Recognise the morphology, anatomy, physiology, reproduction, and life cycle pattern of plants.			
			Explain the types and functions of animal tissues and hormonal physiology.			
			Understand the types and functions of human reproductive organs and the different stages of human embryonic development.			
I	21BMBIC1 02	IDC Practical 1: Biology	Recognize morphology and anatomy of plant parts and compare the different plants			
			Demonstrate the animal body parts and identify the characteristic differences			
			Identify the different human embryo development stages			
			Explain the plant physiology and differentiate the various components parts ecosystem of various habitat			
			Illustrate and describe the different selected specimens of human body parts			
II	21BMBCC 201	Core 3: General Biochemistry	Understand various biomolecules which are required for development and functioning of a cell.	4	30	70
			Define role, structural and functional components of carbohydrates			
			Elaborate about lipid and fat, and importance of lipid in cellular life			
			Enlist multifarious function, types and classification of proteins and nucleic acids.			
			calculate enzyme activity and other quantitative and qualitative parameters of enzyme			
II	21BMBCC 202	Core3: Bioinstrument ation	Understand the instrument (microscope) to observing the tiny particles that cannot be seen with naked eyes and to encompass the control mechanisms of Microbes by Antimicrobial Agents & Technique.	4	40	60
			Demonstrate the staining techniques for the examination of microbes and principles which underlies sterilization of culture media, glassware and plastic ware to be used for microbiological work.			
			Apply the instrumentation technique like spectroscopy and electrophoretic, chromatography and centrifugation techniques into the various practical aspects.			
			Develop the technologies for the measurement and manipulation of parameters within biological systems, focusing on the application of			



			engineering tools for scientific discovery.			
			implement basic bioinstrumentation systems for specific applications			
II	21BMBCC 203	Core 5: Environmental Microbiology and Microbial Ecology	Express relationship of microorganisms with biotic and abiotic factors	4	40	60
			List the name of microbes present in various biogeochemical interactions			
			Generate an idea on varied microbial adaptations			
			Grow the concept of Air & water microbiology			
			Learn about purification of water and waste water treatments			
II	21BMBCC 204	Core6: Microbial Techniques II	Successfully operate a basic microbiological instrument	3	100	100
			Apply analytical and separation techniques for the differentiation of biomolecules			
			Classify staining methods for the identification of various pathogenic microorganisms			
			Identify the various microbiological instruments like microscope, spectrophotometer, centrifuge with the explanation of their working principles			
			Understand the steps and procedure guiding experimental design and data presentation			
III	21BMBCC 301	Core 6: Food and Dairy Microbiology	Differentiate types of foods and factors affecting microbial growth in food with its spoilage and infection	4	40	60
			Overview of food preservation techniques, food safety standards and genetically modified foods			
			Analysis of composition of milk through various estimations			
			Express composition of milk with its analysis			
			Overview of Pro- and pre- biotics, nutraceuticals, functional foods and production of popular milk products.			
III	21BMBCC 302	Core 7: Microbial Physiology and Metabolism	Use thermodynamic principles applicable to biological systems	4	40	60
			Classify the enzymes as per its reaction pattern			
			Outline the metabolic pathways			
			Explain energy generating mechanism			
			Predict adaptation of microbes in habitats as per its metabolism			
III	21BMBCC 303	Core 8: Plant Pathology &	Developed basic concepts of causation of diseases in plants by the different types of microorganisms namely bacterial, fungal and virus.	4	50	50



		Disease Management	Extend the knowledge of important plant diseases, their etiology, salient characteristics and control measures			
			Developed skills to analyze the diseased plant samples in the laboratory and are able to identify the salient features of the disease-causing microbe and the lesions produced on the plant parts.			
			Utilize various techniques for the identification of plant- pathogens and recognition of diseases			
			Determine the concepts and principles to inhibiting the plant pathogens towards molecular approach for disease management.			
III	21BMBCC 304	Core10:Extremophiles (Self study)	Explain extreme environment and effect of this diverse environment on cellular components and structure of extremophiles	4	40	60
			Characterize morphology, structure and phylogenetic groups of archaea			
			Analyze and Compare diverse adaptive parameters of Thermopiles and Psychrophiles			
			Analyze and Compare diverse adaptive parameters of Alkalophiles, Acidophiles and Halophiles			
			Understand potential application of extremozymes in various industries			
III	21UFSDE3 02	DSE 1: Food, Nutrition & Health	Apply basic nutrition knowledge in foods choice to obtain an adequate diet.	4	40	60
			summarize the functions and role of various food components			
			Predict the impact of over/ malnutrition on its health status			
			Present and communicate role of nutrients to society			
			Differentiate between health and non-healthy food			
III	21BMBCC 305	Core Practical 3:Applied Microbiology Practical-I	Estimate biomolecule from food sample	3	100	100
			Examine different parameters used for milk quality			
			Prepare various media and reagents required for experiment			
			Characterize plant disease symptom			
			Prepare industrially important food material			
IV	21BMBCC 401	Core 10:Microbial Genetics	Describes the structure of DNA, RNA and Protein and their molecular mechanisms in prokaryotes.	4	50	50



			Explains the microbial inheritance and mutations in microorganisms			
			Interprets the plasmid structure, phage biology and transposition.			
			Infers the regulation of gene expression in microorganisms			
			Demonstrates the advance techniques of microbial genetics and its applications			
IV	21BMBCC 402	Core 11:Medical Microbiology & Immunology	Define and describe the cells and organs of immune system	4	40	60
			Understand the structure and function of antigens and antibodies, basis of their interaction			
			Identify the interaction between host and pathogen			
			Recognize the response of immune cells to pathogen			
			List out medically important microbes, understand mechanism of their pathogenesis			
IV	21BMBCE 401	Core Elective 1: Biosafety and Intellectual Property Rights	Know about Biosafety, Guidelines and related issues while working with microorganisms. Risk assessment and analysis	4	40	60
			Evaluate Biosafety concerns in microbiology laboratory for all safety measures, handling of live bacteria, disposal of infectious waste, care of the equipment requiring safety audit			
			Developed knowledge of basic concepts related to different IPR.			
			Understand analyze patent filing, and some well-known/well-publicized case studies related to IPR			
			Justify and explain role of different agreement and treaties related to IPR			
IV	21BMBCE 402	Core Elective 1: Aquatic Microbiology	Evaluate the features of diverse aquatic microflora along with connecting various surrounding factors for the adaptation and diversify of aquatic flora of microbes			
			Classify the myriad freshwater microbial flora and compare the structural and functional properties in various niches of freshwater ecosystem			
			Differentiate the diversity of microbial life and summarize he features and functional properties with respect to abiotic components in different zones , niche of marine habitat			
			Analyze and Employ various methodologies for water sanitation and			



			purification			
			Compare the various waste water treatment methodologies and also categorize the toxicity of waste water pollution and its abatement process			
IV	21UFSDE4 02	DSE-C- 2: Quality Assurance and Quality Control	Understand industrial requirement of microbial technology	4	40	60
			equipped with standard operating procedures of auditing			
			equipped with various regulatory guidelines			
			Execute pharmaceutical microbiology standards			
			Relate food and pharma industries regulating bodies			
IV	21BMBTD 401	TDE 1: Science of Life	Understand various biomolecules which are required for development and functioning of a cell.			
			Define role, structural and functional components of carbohydrates			
			Elaborate about lipid and fat, and importance of lipid in cellular life			
			Enlist multifarious function, types and classification of proteins and nucleic acids.			
			Elaborate importance of vitamins for cell			
IV	21BMBCC 403	Core Practical 4 Applied Microbiology Practical-II	Identify the pathogen by an appropriate methods	2	40	60
			Predict the impact of some mutagens over cell			
			Differentiate the different tests in identification of pathogen			
			Estimate and perform various tests to monitor human health			
			Compare and interpret the results with standards			
IV	21BMBC R401	Core Enrichment 1: Concept to Practice	Understand problem identification, formulation and solution.	1	100	-
			Design an engineering solution to complex problems.			
			Communicate with the community at large in written an oral forms.			
			Demonstrate a sound technical knowledge of their societal problems.			
			Demonstrate the knowledge, skills, values and attitudes of professional graduates.			
V	21BMBCC 501	Core 13: Industrial Microbiology	Identify the historical development of industrial microbiology and fermentation processes	4	50	50
			Implementing the knowledge in practical aspects of media formulation and growth regulations and optimization process			
			Execute the fermentation designs, reactions, and control system			
			Understand the overview of the downstream process, separation			



			methods, and bioassay			
			Differentiate the various product development process and analyze the parameters of fermentation economics			
V	21BMBCC 502	Core 14: Agriculture and Veterinary Microbiology	Identify the role of soil in the sustenance of microbial life	4	50	50
			Differentiate the various crop growth and management measures			
			Developed skills to analyze the various biocontrol mechanisms used for crop protection			
			Developed knowledge of the common diseases of microbial etiology for animals especially the domesticated animals			
			Apply the information of vaccines available for animal immunization			
V	21BMBCC 503	Core 15: Molecular biology and Gene Manipulation Techniques	Explain and analyze mechanism behind DNA replication and repair systems	4	40	60
			Explain mechanisms associated with transcriptional, post transcriptional system and translational system with a brief understanding			
			Describe and enlist the mechanisms and enzymes use for DNA modification and gene cloning			
			Select an appropriate vector for cloning			
			Illustrate the stages of cloning techniques			
V	21BMBCC 504	Core Practical - 5- Microbial Techniques in Agriculture and Industrial Microbiology	Apply the practical skill for microbial fermentation	3	50	50
			Explore beneficial aspects of microbes in agriculture sector			
			Demonstrate various application of microbes in industry			
			Estimate genomic material from various biological sources			
			Operate and manipulate DNA for beneficial applications			
V	21BMBCL 501	Core Elective 2: Pharmaceutical Microbiology	Explain and differentiate role of different authorities in pharma industries	5	40	60
			Explore different applications of pharmaceutical products			
			Choose different assessment criteria for pharmaceutical products			
			Use different parameters for quality analysis			
			Apply and analyze standard operating procedures for different pharmaceutical products			
V	21BMBCL	Core Elective 2:	Understand industrial requirement of microbial technology	5	40	60



	502	Quality Assurance and Quality Control	equipped with standard operating procedures of auditing			
			equipped with various regulatory guidelines			
			Execute pharmaceutical microbiology standards			
			Relate food and industries regulating bodies			
VI	21BMBCC 601	Core 13: Good Laboratory Practices in Microbiology	Indicate the different types of hazardous materials	2	100	-
			Point out various biosafety levels			
			Use different types of sterilization practices			
			Identify and select applications of microbial culture preservation and collection centers			
			Summarize the concept of GLP in microbiology laboratory			
VI	21BMBCL 602	Discipline Specific Elective 3: Advances in Microbiology and Public Health	Categorize pathogens by Taxonomy, sign and symptoms	4	50	50
			Choose the appropriate diagnostic test			
			Summarize and interpret antimicrobials and possible modes of resistance			
			Compare different types of vaccines			
			analyze and interpret microbiological data, as well as effectively communicate their findings			
VI	21BMBCL 603	Discipline Specific Elective Practical 3: Advances in Microbiology and Public Health	Gain the knowledge and skills necessary to effectively isolate and detect strains of microorganisms	4	50	50
			comprehensive understanding of the impact of microorganisms on public health			
			Equipped with the ability to accurately perform antibiograms			
			Use of microbiological indicators in monitoring threats to public health			
			Demonstrate diagnostic and detection test based on conventional, immunological and molecular			



Faculty of Science
Department of Biotechnology
Program: M. Sc. Biotechnology

OBJECTIVES OF THE PROGRAMME:

The curriculum is framed to accomplish the following program objectives which students shall accomplish by the end of their post-graduation study.

1. To inculcate in-depth knowledge, scientific thinking and practical skills in biotechnology and allied fields so that students can pursue career in industry, academia or research at different capacities and address their contemporary problems.
2. To produce postgraduates with ability to design, plan and implement research projects and apply them to solve problems related to areas of biotechnology.
3. To develop ability to work safely, autonomously and effectively in biotechnology lab and undertake a suite of molecular biology methods and prepare scientific reports.
4. To instill a crucial awareness of advances at the forefront of biotechnology.

GRADUATE ATTRIBUTES (GA) OF BIOTECHNOLOGY DEPARTMENT

1. **Scientific knowledge:** To utilize the obtained biotechnological knowledge in welfare of socio-economical development
2. **Ability of critical analysis:** Apply the critical ability in identification of key global and local problems through a scientific approach
3. **Development of solution:** To suggest and plan solution through research and development for agricultural and healthcare problems in wellbeing of humankind keeping the safety concern in mind.
4. **Modern tool uses:** Ability to choose and conception of appropriate biotechnological tools and techniques to address the existing problems for further development of quality life considering its limitation
5. **Environment and sustainability:** Ability to critically analyze and address the solution in context of environment and ability to express sustainable utilization



Course Outcomes (CO)

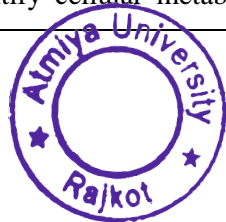
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21MBTCC101	Core 2: Cell Biology	<ol style="list-style-type: none"> 1. Recognize basic principles of signal transduction, protein sorting and trafficking mechanisms 2. Summarize recurrent themes of cell cycle regulation 3. Memorize apoptosis pathway, cellular organization and cytoskeleton 4. Interpret genetic basis of cancer; advanced diagnosis and treatment procedure 5. Memorize and relate the developmental aspects of in vivo and in vitro fertilization methods in humans 6. Recognize basic principles of signal transduction, protein sorting and trafficking mechanisms 	4	40	60
I	21MBTCC102	Core 2: Fundamental of Biochemistry	<ol style="list-style-type: none"> 1. Comprehend structure and role of various biological molecules. 2. Understand cellular metabolic processes and energy production and utilization in metabolic reaction. 3. Evaluate the function of specific anabolic and catabolic pathways and how these pathways are controlled. 4. Relate chemical interactions between molecules in biological systems. 5. Interpret various phenomenon associated with Biomolecules. 	4	40	60
I	21MBTCC103	Core 3: Basics of Microbiology (F)	<ol style="list-style-type: none"> 1. Explain the structure, function and application of microorganisms; List out different isolation, enumeration and preservation and cultivation methods used in microbiology; Differentiate between eukaryotes and prokaryotes 2. Memorize the basis of bacterial classification; Enlist different methods used for assessing microbial diversity, culture dependent and culture independent methods for studying microbial diversity 3. Describe the process of gene transfer methods and control of gene expression in bacteria; Solve problems on gene transfer and gene 	4	40	60



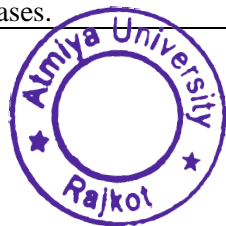
			<p>expression</p> <ol style="list-style-type: none"> Recognize the importance of understanding the disease cycle; List out different antibiotics and antifungal drugs, understand their mechanism of action, judicious use and the problem of antibiotic. Understand and explain the mechanism of Quorum sensing and its importance; Understand the basis of emerging and re-emerging diseases Explain the mechanism of survival of extremophiles and appraise their role and application in biotechnology; Classify viruses and understand their life cycle; List out various prion diseases and understand their molecular basis. 			
I	21MBTCC104	Core 4: Molecular Biology and Genetics (F)	<ol style="list-style-type: none"> Recall the basic concepts of Genes, Genetics and DNA. Explain and compare the replication and expression of DNA in eukaryotes and prokaryotes. Analyze the post transcription and post translational processes. Assess the various mechanisms for the regulation of gene expression Understand the role of molecular biology in stimulating research and progress in almost all the disciplines of life science 	4	40	60
I	21MBTCC105	Core 1: Techniques in Molecular Cell biology, Biochemistry and Microbiology	<ol style="list-style-type: none"> Demonstrate and apply basic biochemical and microbiological skills in different set ups. Analyze, interpret and trouble shoot problems arising during routine laboratory practicals or research experiments in cell biology, biochemistry and microbiology Design and execute small projects by integrating different practicals learnt. Communicate scientific concepts, experimental results and conclusions with more clarity both verbally and in writing Relate and reinforce the theoretical knowledge by performing hands on experiments. Relate the subject to day to day life and will be able to better to understand the importance of the subject. 	4	100	100



Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
II	18MBTCC201	Core 4: Molecular Biology and Genetics	<ol style="list-style-type: none"> 1. Recall the basic concepts of Genes, Genetics and DNA. 2. Explain and compare the replication and expression of DNA in eukaryotes and prokaryotes. 3. Analyze the post transcription and post translational processes. 4. Assess the various mechanisms for the regulation of gene expression 5. Remember and relate the process of protein targeting in cell 	4	50	50
II	18MBTCC202	Core 5: Analytical Techniques	<ol style="list-style-type: none"> 1. Recall basic principles of instrumentation 2. Classify and demonstrate various analytical techniques for biological applications 3. Select and utilize appropriate instrumentation method for sample identification, analysis and problem solving 4. Evaluate and interpret data according to application 5. Compare and choose between various analytical methods for sample analysis 	4	50	50
II	18MBTCC203	Core 6: Immunology	<ol style="list-style-type: none"> 1. Define and describe the cells and organs of immune system and summarize the role of antigen presenting cells, lymphocytes, and phagocytic cells in immune responses 2. Illustrate the molecular basis of transplantation immunology and summarize its success in different scenarios 3. Identify the molecular basis of transplantation immunology and predict the its success in different scenarios 4. Develop knowledge of the cellular and molecular basis for autoimmune and immunodeficiency diseases and allergic responses 5. Define and relate the principles, applications and methods used in vaccine development 	4	50	50
II	18MBTCC204	Core 7: Metabolism	<ol style="list-style-type: none"> 1. Identify cellular metabolic processes and energy production and 	4	50	50



			<p>utilization in metabolic reaction.</p> <ol style="list-style-type: none"> 2. Understand the function of specific Anabolic and Catabolic pathways and how these pathways are controlled. 3. Predict the range of Metabolic regulation, and how this is specifically achieved in different cells. 4. Interpret how these biochemical processes are not isolated but tightly integrated, with specific control sites and key junctions. 5. Relate the metabolic pathways with physiological disorder 			
II	21MBTCC201	Core 5:Genomics and Proteomics	<ol style="list-style-type: none"> 1. Understand the basics of genomics and proteomics 2. Summarize the various genome mapping strategies 3. Describe the various approaches functional genomics 4. Classify the different methods of proteomics 5. Interpret the application of genomics and proteomics in various areas of biology. 	4	50	50
II	21MBTCC202	Core 6:Instrumentation and Techniques	<ol style="list-style-type: none"> 1. Recall basic principles of instrumentation 2. Classify and demonstrate various analytical techniques for biological applications 3. Select and utilize appropriate instrumentation method for sample identification, analysis and problem solving 4. Evaluate and interpret data according to application 5. Compare and choose between various analytical methods for sample analysis 	4	50	50
II	21MBTCC203	Core 7:Immunology	<ol style="list-style-type: none"> 1. Define and describe the cells and organs of immune system and summarize the role of antigen presenting cells, lymphocytes, and phagocytic cells in immune responses 2. Illustrate the genetic basis of diversity in Antibody molecules and summarize its success in different scenarios 3. Explain the molecular basis of transplantation immunology and interpret its success in different scenarios 4. Develop knowledge of the cellular and molecular basis for autoimmune and immunodeficiency diseases and allergic responses 5. Define and relate the principles, applications and methods used in vaccine development as well as genetic basis of immune related diseases. 	4	50	50



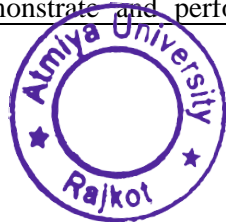
II	1MBTCC204	Core 8:Bioinformatics	<ol style="list-style-type: none"> 1. Understand the concepts of Bioinformatics and its significance in Biological data analysis. 2. Interpret the sequence analysis results. 3. Reconstruct phylogenetic analysis using various tools, interpret the result and produce publication-ready trees 4. Understand biological macromolecular structures and structure prediction methods. 5. Students will be able to learn the programming and problem solving in biological research 	4	90	60
II	21MBTCC205	Combined Practical Core 2: Molecular Techniques	<ol style="list-style-type: none"> 1. Isolate and purify DNA, RNA, protein and demonstrate blotting techniques and PCR amplification of DNA 2. Analyze, interpret and trouble shoot problems arising during routine laboratory practicals or research experiments in cell biology, biochemistry and microbiology 3. Upload, search, and retrieve biological data from biologicals database. 4. Reconstruct phylogenetic analysis using various tools, interpret the result and produce publication-ready trees. 5. Understand the different metabolic and immunological interactions 	4	100	100
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
III	18MBTCC301	Core 8: Recombinant DNA Technology	<ol style="list-style-type: none"> 1. Classify and illustration of various essential enzymes that are important in genetic engineering 2. Describe, demonstrate and compare various cloning vectors-plasmids, phages, artificial and expression vectors 3. Examine and design various cloning and screening strategies essential for experimental perspective and outlook 4. Design and compare various advanced molecular techniques employed for attaining the end modified product 5. Design and perform experiments from basics to advanced techniques that encompass the genetic engineering 	(4+1)	30	70



III	18MBTCC302	Core 9: Cell Culture Technology	<ol style="list-style-type: none"> 1. Compare and contrast the plant tissue culture with animal cell culture and construct the hypothesis for factors affecting success 2. Demonstrate and experiment with plant cell for successful isolation of plant protoplast 3. Analyze and differentiate serum and protein free defined medium for animal cell culture and identify the chemical, physical and metabolic functions of different constitution of animal cell culture media 4. Contrast upon characterization measuring parameter of growth and test of viability in animal cell line 5. Analyze and justify the role of different components of tissue culture medium for successful establishment of micropropagation protocol of plants. 	(4+1)	90	60
III	18MBTCC303	Core 10: Bioprocess Technology	<ol style="list-style-type: none"> 1. Describe and discuss important preliminary steps required in fermentation technology such as isolation and screening of microbial strains and their strain improvement 2. Describe and analyse the control of in vitro cellular growth processes (bacterial, fungal and mammalian) within the industrial-scale fermenter/bioreactor. 3. Describe and illustrate various essential growth parameters and mass transfer and material balance required in fermenters. 4. Discuss and critically analyze the downstream aspects of exemplar industry bioprocesses considering biopharmaceutical and industrial biotechnology applications. 5. Discuss and evaluate the operational considerations and relative advantages relating to the choice of techniques used in downstream processing of biotechnology products. 	(4+1)	90	60
III	18MBTCC304	Core 11: Bioethics and IPR (Self Study)	<ol style="list-style-type: none"> 1. Identify principles of bioethics and how to use these principles in practice. 2. Classify the principles, function and basic legal rules of all form IPR. 3. Interpret the criteria for granting and protecting intellectual works. 4. Predict the different forms of infringement of intellectual property rights. 5. Relate and develop basic skills of legal issue related to IPR. 	3	50	50



III	18MBTDC301	DSE core: Food and Dairy Technology	<ol style="list-style-type: none"> 1. Describe interaction of microbes with food and define various food quality standards their control and safety regulations. 2. Operate various food processing techniques and apply different packing technique. 3. Analysis and assess various techniques involved in food spoilage and food preservation. 4. Estimate the quality of milk by various techniques and Formulate various dairy products. 5. Design and explain practical approaches of food and dairy products. 	(4+1)	50	50
III	18MBTDC302	DSE-Core: Agriculture Biotechnology	<ol style="list-style-type: none"> 1. Analyze and evaluate the soil for its fertility and isolate beneficial microbes from it 2. Demonstrate and experiment with plant cell for successful isolation of plant protoplast 3. Demonstrate and apply the production of biofertilizers for higher crop yield 4. Develop the knowledge about methods of gene transfer and contrast upon its applications in crop improvement 5. Appraise or criticize the transgenic technology in reference to human welfare 	(4+1)	50	50
III	21MBTCC301	Core 9: Genetic Engineering	<ol style="list-style-type: none"> 1. Classify and illustration of various essential enzymes that are important in genetic engineering 2. Describe, demonstrate and compare various cloning vectors-plasmids, phages, artificial and expression vectors 3. Examine and design various cloning and screening strategies essential for experimental perspective and outlook 4. Examine various advanced molecular techniques employed for attaining the end modified product 5. Interpret and apply various molecular techniques employed for attaining advancement in genetic engineering 	5	140	60
III	21MBTCC302	Core 10: Plant and Animal Cell Culture Technology	<ol style="list-style-type: none"> 1. Compare and contrast the plant tissue culture with animal cell culture and construct the hypothesis for factors affecting success 2. Demonstrate and experiment with plant cell for successful isolation of plant protoplast 3. Demonstrate and perform aseptically the laboratory techniques 	5	140	60



			<p>essential for maintaining cell lines</p> <ol style="list-style-type: none"> 4. Comprehend and apply the animal cell culture experiments drug screening 5. Apply the knowledge of plant and animal cell culture technology in industries 			
III	21MBTCC303	Core 10: Fermentation and Bioprocess Technology	<ol style="list-style-type: none"> 1. Describe and discuss important preliminary steps required in fermentation technology such as isolation and screening of microbial strains and their strain improvement 2. Describe and analyse the control of in vitro cellular growth processes (bacterial, fungal and mammalian) within the industrial-scale fermenter/bioreactor. 3. Discuss and critically analyse the downstream aspects of exemplar industry bioprocesses considering biopharmaceutical and industrial biotechnology applications. 4. Discuss and critically analyse the downstream aspects of recovery and the purification of biosynthetic products, particularly pharmaceuticals industry. 5. Discuss and evaluate the operational considerations and relative advantages relating to the choice of techniques used in downstream processing of biotechnology products. 	5	140	60
III	21MBTCC304	Core 11: Introduction to IPR (Self Study)	<ol style="list-style-type: none"> 1. Understand the scope and limitations of IP, IPP & IPRs 2. Interpret the criteria for granting and protecting intellectual works 3. Apply the basic knowledge of IPR for the protection of creativity, idea and its expression 4. Predict the different forms of infringement of intellectual property rights 5. Relate and develop basic skills of legal issue related to IPR 	4	50	50
III	21MBTDC302	DSE-Core 2: Agriculture Biotechnology	<ol style="list-style-type: none"> 1. Analyze and evaluate the soil for its fertility and isolate beneficial microbes from it 2. Demonstrate and experiment with plant cell for successful isolation of plant protoplast 3. Demonstrate and apply the production of biofertilizers for higher crop yield 4. Develop the knowledge about methods of gene transfer and contrast upon its applications in crop improvement 	5		



Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
			5. Appraise or criticize the transgenic technology in reference to human welfare			
IV	18MBTCC401	Core 12:Bioinformatics	<ol style="list-style-type: none"> 1. Browse, search, and retrieve biological data from public repositories 2. Upload new sequences onto GenBank, perform text and sequence-based searches, and analyze the results 3. Edit raw Sanger sequence data for phylogenetic analysis (edit chromatograms, identify Contamination, align sequences, remove ambiguously aligned sites) 4. Reconstruct phylogenetic analysis using various tools, interpret the result and produce publication ready trees 5. Use programs for visualizing and analyzing protein structures. 	(4+1)	90	60
IV	18MBTDC401	DSE core: Environmental Biotechnology	<ol style="list-style-type: none"> 1. Infer the global issues of environment and their impact on society 2. Comply waste management system and apply the same in field 3. Summarize the process of biodegradation and remediation 4. Interpret existing and emerging technologies that are important in the area of environmental biotechnology 5. Design and explain practical approaches of environmental biotechnology 	4+1	50	50
IV	18MBTDC402	DSE Core 4:Pharmaceutical technology	<ol style="list-style-type: none"> 1. Explain and differentiate role of different authorities in pharma industries 2. Play a role in different sectors of pharma industries 3. Choose differentiate drug delivery systems 4. Use different parameters for quality analysis 5. Apply and analyzestandard operating procedures for different pharmaceutical products 	(4+1)	50	50
IV	21MBTCC401	Core13:Pharmaceutical technology (Ad)	<ol style="list-style-type: none"> 1. Explain and differentiate role of different authorities in pharma industries 2. Play a role in different sectors of pharma industries 3. Choose differentiate drug delivery systems 	5	140	60



			<ol style="list-style-type: none"> 4. Use different parameters for quality analysis 5. Apply and analyse standard operating procedures for different pharmaceutical products 			
IV	21MBTCC402	Core14: Environmental Biotechnology (Ad)	<ol style="list-style-type: none"> 1. Infer the global issues of environment and their impact on society 2. Summarize the process of biodegradation and remediation 3. Execute an action plan for disposal of solid waste 4. Comply waste management system and apply the same in field 5. Interpret existing and emerging technologies that are important in the area of environmental biotechnology 	5	140	60



Department of Biotechnology
Program: B. Sc. Biotechnology

Program Objective:

- The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:
- This programme will enable students to acquire knowledge on the Fundamentals of Biochemistry, Cell Biology, Microbiology, Immunology, Bioprocess Technology and Molecular Biology to enable them to understand emerging and advanced concept in modern biology and help them to take their career in this field.
- After completion of the programme, the students will be able to acquire the necessary theoretical and practical competencies in Biotechnology to enable them to undertake higher studies in recognized Institutions of advance learning and engage gainful self-employment.
- The Programme is intended to help the students to be the innovative and versatile personalities in the field of Life Science with quality education and provide the skilled manpower required by Research and Development, Institutions of Higher Learning and Industry.

Graduate Attributes:

1. Scientific knowledge: To utilize the obtained biotechnological knowledge in welfare of socio-economical development
2. Ability of critical analysis: Apply the critical ability in identification of key global and local problems through a scientific approach
3. Development of solution: To suggest and plan solution through research and development for agricultural and healthcare problems in wellbeing of humankind keeping the safety concern in mind.
4. Modern tool uses: Ability to choose and conception of appropriate biotechnological tools and techniques to address the existing problems for further development of quality life considering its limitation
5. Environment and sustainability: Ability to critically analyze and address the solution in context of environment and ability to express sustainable utilization



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO 1	:	Core competency: To develop the competency in the graduates to pursue higher education or successful career with synergistic combination of the knowledge and skills of biotechnology and allied sciences
PEO 2	:	Breadth of knowledge: To inculcate in graduates the capabilities of independently designing, executing and interpreting small research problems and handling basic laboratory instruments.
PEO 3	:	Preparedness: To impart communication skills for effectively comprehend and communicate domain knowledge to layman as well as qualified person.
PEO 4	:	Professionalism: To instill values and responsibilities in the character to make the graduates fit to work in a multidisciplinary team and to become socio-ethically responsible citizen.
PEO 5	:	Learning environment: To develop self-learning abilities by inculcating attitude to keep themselves abreast with new development in all spheres of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO 1	:	Demonstrate the knowledge of concepts, principles and applications of Biotechnology in various fields
PO 2	:	Acquire critical thinking skills to understand and solve contemporary problems with biotechnology
PO 3	:	Able to apply Fundamental knowledge of biotechnology and allied sciences in pursuing higher studies or research at any globally recognized organization
PO 4	:	Gain ability to design, conduct experiments, analyze and interpret data for investigating problems in Biotechnology and allied fields
PO 5	:	Understand standard operating procedures and acquire in-depth technical competence to handle the basic laboratory



		instruments
PO 6	:	Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large
PO 7	:	Understand requirement and principles of interdisciplinary domains for sustainable development
PO 8	:	Understand the implications of biotechnological solutions in societal and environmental context
PO 9	:	Able to function effectively as individual and as a member in multidisciplinary settings
PO 10	:	Able to recognize the need to undertake life-long learning and acquire the capacity to do so
PO 11	:	Apply the ethical principals in development of products and in research through biotechnology
PO 12	:	Gain the ability to lead a group and develop capabilities to assimilate and apply the acquired knowledge when and where required.

Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO 1	:	Be able to apply knowledge of Biotechnology to find innovative solutions for environment, agriculture, health related issues
PSO 2	:	Be able to explore problems related to life science and provide effective solution through industry-academia interactions
PSO 3	:	Deduce the possibilities and impression of biotechnological revolutions for finding sustainable ethical solutions to existing problem



Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21ULCEN101	AECC: Development of Functional English	<ol style="list-style-type: none"> 1. Understand and interpret text related to science, leading to cultivation of the reading habit. 2. Infer the true meaning of the text 3. Recall the essential grammatical aspects of the language 4. Articulate their ideas and thoughts through speaking 5. Execute the values received through literature 	3	40	60
I	21BBTCC101	Core 1: Cell Science	<ol style="list-style-type: none"> 1. Understand basic concept of cell and recognize the different levels of biological organization from molecules to organism. 2. Draw and correlate the structures of cell organelles to their functions and can also distinguish the structure of prokaryotic cells from the eukaryotic cells. 3. Explore the fundamental mechanisms of cell cycle & its regulation along with the mitotic & meiotic cell division and the contribution of cytoskeleton in the mechanisms of intracellular transport and cell locomotion. 4. Discuss the communication of the cells to each other and also able to Summarize the definition, sources, and applications of cancer biology and stem cells. 5. Enhance their interest and boost their communication skills, team work, management skill and problem solving approach through presentations and exhibitions as a part of assignment. 	4	30	70
I	21BBTCC102	Core 2: Basic Biochemistry	<ol style="list-style-type: none"> 1. Illustrate the chemical and physical properties of water 2. Discuss the structure and properties of Carbohydrates, Proteins, Nucleic acids and Lipids. 3. Examine and correlate the nutrition with Vitamin deficiency and Disorders. 4. Apply written and oral communication skills to effectively express in academia, research and industry. 5. Ability to correlate the scientific knowledge to everyday life. 	4	30	70



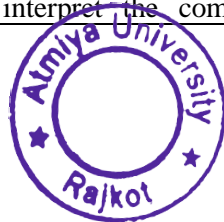
I	21BBTCC103	Core Practical 1: Cellular & Biochemical Techniques	<ol style="list-style-type: none"> 1. Observe and correctly identify different bacterial cell morphology, classify gram strains and using different microscopic techniques. 2. Get awareness of physiological processes of cell e.g. cell divisions, cell locomotion etc. 3. Isolate cell organelles including mitochondria and chloroplast from the eukaryotic cell 4. Operate pH meter and prepare buffer of specific pH 5. Qualitatively and Quantitatively analyze Carbohydrate, Protein, Lipid, Nucleic acid and Vitamins 6. Adopt the attitude, skills and values for self-directed lifelong learning 7. Develop skills of quality control practices applicable in their scientific or industrial career. 	4	100	-
I	23UGEN140	Functional English for Science	<ol style="list-style-type: none"> 1. Develop basic Reading skills. 2. Infer the true meaning of the text and execute values received through the literature. 3. Understand and interpret text related to science, leading to the cultivation of the reading habit. 4. Recall the essential grammatical aspects of the language. 5. Develop basic Writing skills. 		40	60
I	23UGBT101	Core 2: Cell Biology	<ol style="list-style-type: none"> 1. Understand basic concept of cell and recognize the different levels of biological organization from molecules to organism. 2. Illustrate the cells organelles and their functions. 3. Understanding the basics of cell-cell interactions. 4. Explore the fundamental mechanisms of cell cycle & its regulation along with the mitotic & meiotic cell division. 5. Develop the understanding the role and mechanisms of different cytoskeletons, and cell locomotion. Discussing the application of cell biology and stem cells. 	4	30	70



Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
II	21BBTCC201	Core 3: Introductory Microbiology	<ol style="list-style-type: none"> 1. Comprehend various methods for classification, diversity study and characterization of microorganism 2. Describe the nutritional, physical and chemical requirements of bacteria, growth characteristics, growth measurement and preservation techniques 3. Develop understanding about methods of control, microbial metabolism and microbial genetics 4. Demonstrate the application of microorganisms in day to day life 5. Illustrate the microbial model to study basic and applied biology in future 	3	30	70
II	21ULCEN201	Functional English	<ol style="list-style-type: none"> 1. Understand and analyze a text related to science, leading to the cultivation of the reading habit. 2. infer the true meaning of the text 3. Recall the essential grammatical aspects of the language 4. Articulate their ideas, perspectives and thoughts through speaking 5. Implement the morals and values received through literature 	3	30	70
II	23UGBT201	Plant Science	<ol style="list-style-type: none"> 1. Develop a profound interest in and admiration for the boundless diversity of life on Earth 2. Accurately interpretation of collected information and use taxonomical information to evaluate and formulate a position of plant in taxonomy with morphology 3. Recognize the anatomy 4. Identify types and functions of Plant tissues and hormonal physiology 5. Understand the mechanism of physiological processes of plants 	4	30	70



II	21BBTCC202	Core 4: Mathematics for Biologist	<ol style="list-style-type: none"> 1. Understand basic concept of set theory and permutation combination. 2. Correlate the concepts of matrix and determinants with respect to biological data. 3. Students will demonstrate an understanding of commonly used calculations in molecular biology. 4. Understand the concept of statistical parameters and sampling. 5. Understand measures of dispersion & probability. 	3	100	-
II	21BBTCC203	Core 5: Enzymology and Metabolism	<ol style="list-style-type: none"> 1. Describe the concept of Enzyme, Enzyme classification, kinetics and inhibition. Explain and categorize the steps of carbohydrate metabolism. 2. Explain the process of amino acid metabolism and the various inborn errors of metabolism. Memorize and analyze the process of lipid metabolism. 3. Describe and relate the process of signal transduction, plasma membrane and transport across the membrane and role of hormones. 4. Express the correlation between metabolic pathways and develop into independent thinkers. 5. Apply the learned aspects in various medical, food and pharmaceutical sectors 	3	40	60
II	21BBTCC204	Core Practical 2: Microbiology and Enzymology	<ol style="list-style-type: none"> 1. Demonstrate laboratory safety rules, biohazard procedures and apply aseptic technique. Developed good understanding to isolate, purify, enumerate and characterize different groups of microorganisms. 2. Demonstrate theory and practical skills to identify pathogenic microbes and perform antibiotic sensitivity test 3. Design and execute small projects by integrating different basic practical and scientific concepts 4. Develop skills of microbial and Biochemical laboratory practices applicable in their scientific or industrial career. 	4	50	50
II	23UGEN240	Advanced English & Correspondence	<ol style="list-style-type: none"> 1. Developing the basic skill of listening and speaking 2. Applying acquired knowledge, facts and techniques by inferring the true meaning of a given text. 3. To interpret the combination of Science and imagination 	3	40	60



			<p>through articles</p> <ol style="list-style-type: none"> Interpret and apply advanced concepts of grammar to enrich the linguistic skills of the students. Articulate varied thoughts and perspectives and understand the importance of Formal Writing by learning different forms of Correspondence 			
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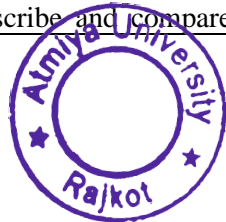
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
III	21ULCEN301	Advanced English & Correspondence	<ol style="list-style-type: none"> Demonstrate understanding of facts and ideas by organizing, comparing and analyzing given articles and passages from the domain of science. Applying acquired knowledge, facts and techniques by inferring the true meaning of a given text. Interpret and apply advanced concepts of grammar to enrich the linguistic skills of the students. Articulate varied thoughts and perspectives and understand the importance of Formal Writing by learning different forms of Correspondence Utilize ethics and moral based knowledge acquired from value-based literature. 	3	40	60
III	21BBTCC301	Core 6: Genetics	<ol style="list-style-type: none"> Recall and understand the Mendelian and non-Mendelian concepts Explain and apply various concepts of sex linkage and pedigree analysis Explain and analyze mechanism of Mitochondrial Genetic Diseases, Extranuclear Inheritance & Chromosomal Aberrations Describe and assess the process and parameters of sex determination Understand the concept and applications of population genetics 	3	30	70
III	21BBTCC302	Core 7: Physiology (Self Study)	<ol style="list-style-type: none"> Relate basic biology to applied biology. Show coordination of sensory system with physiological activity. Explain and intricate the importance of plant water relationship and 	3	40	60



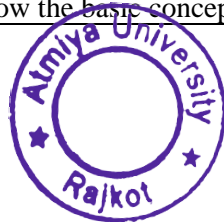
			<p>involvement in translocation and transpiration.</p> <ol style="list-style-type: none"> Identify elements required by plants and use in growth and development. Interpret the effect of light on general physiology of plants 			
III	21BBTCC303	Core 8: Environmental Biotechnology	<ol style="list-style-type: none"> Recognize the global environmental issues Understand role of biotechnology in biodegradation and bioremediation Develop the knowledge of liquid waste management. Develop the knowledge of solid waste management. Apply biotechnological tools in environment management 	3	40	60
III	21BBTCC304	Core-9: Biology of Immune System	<ol style="list-style-type: none"> Understand the structure and functions of immune cells, immune organs and other components of immune system Define and describe the structure and function of antigens and antibodies and basis of their interaction. Understand the principles of antigen antibody interactions and will be able to perform the diagnostic test based on these reactions Understand the molecular basis of clinical immunology, immune related diseases and allergic responses Define and relate the principles, applications and methods used in vaccine development 	3	40	60
III	21BBTCC305	Core Practical 3: Techniques in Biotechnology I	<ol style="list-style-type: none"> Understand the principles of Population and Classical genetics Develop technical skills to analyze various parameters of Waste water Learn qualitative analysis of drinking water. Identify and count the different types of blood cells Understand the principal of Ag/Ab interaction and perform diagnostic test based on these interaction 	5	100	-
III	21BBTDE301	DSE1: Cell Culture Technology	<ol style="list-style-type: none"> Compare and contrast the plant tissue culture and construct the hypothesis for factors affecting success Demonstrate and experiment with plant cell for successful establishment of plant cell culture Demonstrate the basics of animal cell culture techniques Comprehend and apply the animal cell line development Apply the knowledge of stem cell culture and engineering 	4	40	60



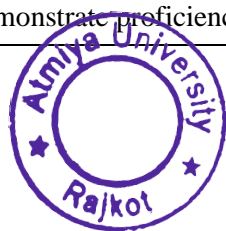
IV	21BBTCC401	Core 10: Molecular Biology	<ol style="list-style-type: none"> 1. Understand the organization of the Bacterial genome and Eukaryotic chromosomes 2. Illustrate the various fundamental cellular process 3. Identify the mechanisms of DNA replication and repair 4. Interpret the mechanism of Transcription and mechanism of protein synthesis 5. Understand the regulation of Gene expression 	4	30	70
IV	21BBTCC402	Core 11: Analytical technique (Ad)	<ol style="list-style-type: none"> 1. Basic principles of instrumentation 2. Classify and demonstrate various analytical techniques for biological applications 3. Select and utilize appropriate instrumentation method for sample identification, analysis and problem solving 4. Evaluate and interpret data according to application 5. Compare and choose between various analytical methods for sample analysis 	4	30	70
IV	21BBTCL401	Core Elective 1: Food and Dairy Technology(Ad)	<ol style="list-style-type: none"> 1. Describe the interaction of microbes with food and define various food quality standards their control and safety regulations. 2. Analysis and assess various techniques involved in food spoilage and food preservation. 3. Operate various food processing techniques and apply different packing techniques. 4. Estimate the quality of milk by various techniques and formulate various dairy products. 5. Design and explain advances in food technology 	4	40	60
IV	21ULCEN401	Effective Communicative Skills	<ol style="list-style-type: none"> 1. To construct and organize the text with 2. To discover and analyze the true sense of moral through story and poems 3. To interpret the combination of Science and imagination through articles 4. To improve the language with the verity of words 5. To compose a formal speech 	3	40	60
V	21BBTCC501	Core 12: Bioprocess Engineering	<ol style="list-style-type: none"> 1. Describe and discuss essential initial processes needed for fermentation technology, such as microbial strain isolation, screening, and improvement. 2. Describe and compare vital growth parameters, mass transfer, and 	4	30	70



			<p>material balance essential in fermenters.</p> <ol style="list-style-type: none"> Describe, demonstrate and compare various industrially important fermenters employed to control in vitro growth process of bacteria and fungi. Describe, demonstrate and compare various separation and purification of fermentation product using different methods and calculate the economy of bioprocess. Describe application of knowledge of bioprocess engineering for biological product and its biochemical pathway. 			
V	21BBTCC502	Core 13: Bioinformatics	<ol style="list-style-type: none"> Students will be able to define and differentiate between sequence similarity, identity, and homology. Students will be able to describe the different types of biological databases and understand the purpose of bibliographic databases such as PubMed. Students will be able to use software tools to perform sequence alignment and analysis using substitution matrices and dynamic algorithms. Students will be able to evaluate and interpret phylogenetic trees constructed using different methods and algorithms. Students will be able to understand the concept of the genome-wide association studies and analyze gene expression data using microarray analysis and RNA sequencing. 	4	60	40
V	21BBTCL501	Core-Elective 2: Pharmaceutical Biotechnology	<ol style="list-style-type: none"> Understand the basic concepts of pharmaceutical industry/laboratories/ Research institutes Apply the concept of pharmaceutical principle in lab and industry Illustrate knowledge about QC,QA and other departments Understand and aware about Compliance, standards and safety and regulations Know the recent advancement and role of Biotechnology in pharmaceutical sector. 	4		
V	21BBTCL502	Core-Elective 2: Molecular Diagnosis and Drug Designing	<ol style="list-style-type: none"> Understand the basic concepts of diseases and its transmission Apply the concept of molecular techniques in disease diagnoses Apply the concept of immune-techniques in disease diagnoses Understand the various genetic tool and quality control Know the basic concept of drug designing and its significance. 	4	30	70



V	21BBTCC504	Core Practical 5: Techniques in Biotechnology -III	<ol style="list-style-type: none"> 1. Carry out the isolation and screening of industrially important microorganisms. 2. Demonstrate optimization of various process parameter essential for microbial growth. 3. Carry out production and estimation of various metabolites using isolated microorganisms. 4. Ability to perform various bioinformatics tasks, such as database searching, sequence alignment, protein structure analysis, and phylogenetic tree construction. 5. Familiarity with bioinformatics software and databases, and the ability to interpret the results obtained from these tools to derive biologically significant relationships. 	4		
VI	21BBTCC601	Core 15: Cell Culture Technology	<ol style="list-style-type: none"> 1. Demonstrate a comprehensive understanding of the history and scope of plant tissue culture, including the principles of cellular totipotency, in vitro differentiation, and morphogenesis. 2. Demonstrate proficiency in the principles and techniques of tissue culture, understand and differentiate between various micropropagation pathways and will be equipped to express the essential steps of micropropagation. 3. Demonstrate and perform aseptically the laboratory 4. techniques essential for maintaining the cell lines 5. Comprehend and apply the animal cell culture experiments for drug screening 6. Apply the knowledge of plant and animal cell culture technology in Research and Industries 	4	90	60
VI	21BBTCC602	Core 16: Recombinant DNA Technology	<ol style="list-style-type: none"> 1. Describe the plasmids, Bacteriophage, and infection cycle 2. Classify and illustrate various essential enzymes that 3. are important in Recombinant DNA technology. 4. Determine various cloning vectors-plasmids, phages, artificial and expression vectors 5. Examine and design various screening strategies essential for the selection of recombinants. 6. Correlate various molecular techniques and applications employed for attaining advancement in genetic engineering 	4	30	70
VI	21BBTCC603	Core Practical 6:	<ol style="list-style-type: none"> 1. Demonstrate proficiency in performing restriction endonuclease 	6		



		Techniques in Biotechnology -IV	<p>digestion and genomic DNA isolation techniques.</p> <ol style="list-style-type: none"> 2. Apply acquired skills in molecular biology to analyze and interpret experimental results effectively. 3. Proficient in the aseptic technique and skilled in the preparation of plant tissue culture medium, enabling them to successfully initiate nodal cultures for the study of micropropagation pathways." 4. Proficiently prepare animal cell culture media, sterilize equipment, and demonstrate a sound understanding of the organization and handling of a cell culture laboratory, ensuring aseptic conditions for cell culture experiments. 5. Acquire the essential skills to conduct the basic techniques of animal cell culture 			
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Faculty of Science
Department of Chemistry
Program: M.Sc. Chemistry

Program Objective:

Courses offered in this master program are designed to facilitate advanced and applied understanding of all aspects of chemistry, along with high technical skills to be the active part of scientific workforce. The program aims to equip aspirants with the current industry practices and technologies across the globe.

The objectives are to:

- Equip learners with the essential knowledge and skills to independently pursue research activities in Chemistry for doctoral studies or industrial applications.
- Prepare qualified aspirants who can be employed in Pharmaceutical & Chemical based Industries and other fast moving sectors of the economy.
- Empower graduates who can teach the subject with intertwining of science with human values leading to holistic development of the next generation of India.
- Provide necessary opportunities, information and motivation to graduates for opting innovation driven entrepreneurship as their carrier option.



Graduate Attributes:

- **Core Competence:** Possess discipline-relevant knowledge and competencies and able to link them to local, national and global issues to seek positive and sustainable solutions
- **Transferable global & impactful societal skills:** Ability to create knowledge through research and innovations by social immersions and transferring them to impact through problem solving at local and global levels.
- **Adaptability and Resilience:** Demonstrate resilience, perseverance and positivity in unfamiliar situations and adapt their skills and knowledge to excel in new environment
- **Sense of purpose & curiosity:** Possess intellectual curiosity to apply the knowledge to generate, develop and realize new ideas
- **Ethics & lifelong immersive learning:** Adhered to highest standards of ethics and always amenable to new ideas and actively seek out new ways of learning

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO ₁	Depth and Breadth of Knowledge	Efficient chemistry graduates with strong fundamental knowledge to cater the needs of industries/ laboratories/ academics related to chemistry.
PEO ₂	Practice, Operation and Usage of Modern Tools and Technology	Technical skills in the chemistry graduates towards the use of modern & sophisticated instruments, equipments & cheminformatics tools to analyze and obtain molecular information of the material.
PEO ₃	Research, Numeracy	Ability among graduates to work for the effective & practical solutions for issues related to chemical science while complying with economic, environmental, ethical, and safety aspects.



	and Scholarship	
PEO₄	Professional Capacity and Passion of Learning	Graduates who can skilfully utilize the chemical literature to assess & identify problems significant to industries & society.
PEO₅	Global, Moral and Aesthetic Sustainability	Graduates with contemporary training in professional responsibility, including ethics, the global and societal impact of scientific decisions, and the need for lifelong learning.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO₁	Fundamental Knowledge	Understand the traditional core of chemistry and acquire the ability to apply chemistry knowledge for qualitative or quantitative behaviour of molecules to a broad variety of chemical problems.
PO₂		Understand and demonstrate a working knowledge of specialized area comprising Organic / Analytical / Pharmaceutical chemistry
PO₃	Technical Skill	Design and perform a broad variety of analytical and synthetic experiments
PO₄		Show ability to use the techniques, skills, and modern tools necessary for chemistry domain.
PO₅	Research Skill	Comprehend and apply chemical literature for effective problem solving
PO₆		Examine and critically evaluate the experimental results and extend the knowledge with skills to secure placement.
PO₇	Critical Thinking	Apply critical thinking skills for the environmental issues & Sustainable development through chemistry research



PO₈	Effective Communication	Communicate scientific information orally and in writing.
PO₉	Self-directed and Lifelong Learning	Acquire the ability to engage in independent and life- long learning in the broadest context socio- technological changes.
PO₁₀	Ethics	Appraise and Demonstrate professional & ethical responsibility with Universal brotherhood (<i>Atmiyata</i>)

Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO₁	:	Integrate knowledge of chemistry and related domains for identifying strategies to address problems pertaining to environment, agriculture and healthcare sectors.
PSO₂	:	Able to pursue higher education and research in the institutes of national and international repute.
PSO₃	:	Comprehend chemical literature with critical thinking for designing innovation driven solutions (Intellectual Property) and safeguard them with procurement of Intellectual Property Rights.
PSO₄	:	Apply knowledge of functional & fundamental chemistry to understand and predict behaviour of molecules to a broad variety of chemical problems.



Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21MCHCC101	Core 1: Organic Chemistry (F)	<ol style="list-style-type: none"> 1. Understand concept and types of reaction mechanism draw arrow notation, categorize bond cleavages, and generation of reactive intermediates. 2. Understand the concept of various electronic effect and its applications. 3. Predict the stability of reactive intermediates by applying electronic effect. 4. Differentiate between aromatic, anti-aromatic and non-aromatic compounds 5. Illustrate preparation of organic reagents and recognize appropriate reagent for particular reaction. 	4	40	60
I	21MCHCC102	Core 2: Analytical Chemistry(F)	<ol style="list-style-type: none"> 1. Differentiate basic analytical techniques and apply for various chemical analyses. 2. Calculate modes of concentration for chemical analysis. 3. Apply concept of non aqueous titration for chemical analysis. 4. Employ appropriate extraction methods for the chemical separation. 5. Understand the different terms and criteria of Intellectual Property right 	3	40	60
I	21MCHCC103	Core 3: Inorganic Chemistry (F)	<ol style="list-style-type: none"> 1. Predict bond order & shapes of covalent compounds using MO & VB theories. 2. Classify coordination compounds & predict isomerism, coordination number, shapes and spectral term symbol for coordination compounds. 3. Understand and apply CFT for splitting of d-orbitals in octahedral, tetrahedral and square planer complexes. 4. Determine symmetry elements and their point groups of molecules by point group theory 5. Recognize bonding, synthesis and application of organometallic 	4	40	60



			complexes.			
I	21MCHCC104	Core 4: Physical Chemistry (F)	<ol style="list-style-type: none"> 1. Recall types & order of chemical reaction 2. Understand properties & behavior of ideal, non-ideal and dilute solutions 3. Distinguish Free energy change and its applications in chemical reactions. 4. Classify the types, characteristics and mechanism of homogeneous & heterogeneous catalysis. 5. Derive synthesis of polymers and its identification by different techniques. 	3	40	60
I	21MCHID101	DSE-ID-1: Industrial Environment Management	<ol style="list-style-type: none"> 1. Summarize the government legislations regarding environmental pollution control and classify environment management tools. 2. Interpret cleaner tools and technology including case study of industries and understand principal of green chemistry. 3. Identify air pollution control devices, sampling procedure for air monitoring applicable for industries and can understand waste water treatment plant unit with case study of industries. 4. Identify different types of solid waste with the help of their characteristics and summarize various treatment technologies for handling of solid waste in relate to handling rules. 5. Interpret industry specify hazards and can understand technique regarding hazards and risk identification 	4	50	50
I	21MCHID102	DSE-ID-1: Chemistry of Biomolecules	<ol style="list-style-type: none"> 1. Know the Biomolecules at the atomic level. 2. Classify function of Biomolecules. 3. Recognize how the structure of Biomolecules determines their chemical properties and reactivity. 4. Predict situation based problems related to life processes. 5. Relate the drug molecule with physiological problems. 	4	50	50
I	21MCHCC105	Practical Core 1 & 2: Organic & Analytical	<ol style="list-style-type: none"> 1. Perform Qualitative Analysis of a ternary organic mixture 2. Prepare and standardize the solutions. 3. Demonstrate Calibration of glassware and apparatus. 4. Measure the Assay and % Purity of fine chemicals. 	3	40	60



		Chemistry	5. Employ appropriate extraction methods for the chemical separation			
I	21MCHCC106	Practical Core 3 & 4: Inorganic & Physical Chemistry	<ol style="list-style-type: none"> 1. Perform Qualitative Analysis of an inorganic mixture containing six radicals. 2. Utilize Conductivity meter, pH & Potentiometer, Refractometer, and Ultrasonic instrument for physicochemical analysis. 3. Demonstrate experiments on Partition Co-efficient, First and second order reactions-order determination, energy of activation, Heat of vaporization, Partial molar volume. 	3	40	60
II	21MCHCC201	Core 5: Separation Techniques (Ad)	<ol style="list-style-type: none"> 1. Understand the principle, fundamental theory and instrumentation of various planar and column chromatographic techniques. 2. Identify the significance, quality, and limitations of the results produced by the various separation techniques. 3. Apply theoretical knowledge to design and develop suitable operating conditions for separation and identification of organic/natural compounds from multi-component mixtures 4. Calculate R_f values and Interpret HPLC and GC chromatograms to perform qualitative analysis of unknown 5. Differentiate various applications of separation techniques to 	4	40	60
II	21MCHCC202	Core 6: Organic Reactions & Rearrangements (Ad)	<ol style="list-style-type: none"> 1. Understand concept and types of reaction mechanism draw arrow notation, categorize bond cleavages. 2. Extend concept of molecular rearrangement and describe plausible reaction mechanism mentioning its applications in organic synthesis. 3. Describe Principle, plausible reaction mechanism and applications of various organic reactions. 4. Identify suitable starting material, reagent and reaction condition or product for given organic transformations. 5. Apply concept of various reaction and rearrangements to predict plausible product(s). 	4	40	60
II	21MCHCC203	Core 7: Stereochemistry (Ad)	<ol style="list-style-type: none"> 1. Understand the fundamentals of stereochemistry and able to draw stereoisomers of organic compounds, and recognize diastereomers, enantiomers, meso compounds and centers of symmetry. 2. Able to discuss the relative stability of conformational isomers of 	3	40	60



			<p>cyclohexanes and related compounds.</p> <ol style="list-style-type: none"> Recognize and discuss the stereoisomers of chiral compounds that do not contain a stereogenic carbon center and assign the configuration of the stereoisomer. Understand and identify the Substitution Nucleophilic (SN1, SN2, SNi & Mixed SN1 & SN2) and Elimination reaction (E1, E2 and E1cB) mechanism and stereochemistry and Addition Reactions to Carbon-Hetero multiple bond. Apply the stereochemistry concept to identify configuration, conformation, stereochemical notations, Nucleophilic substitution, elimination, reduction and addition reactions to Carbon-Hetero multiple bond. 			
II	21MCHCC204	Core 8: Modern Analytical Techniques(A d)	<ol style="list-style-type: none"> Understand Principle and theory of various spectroscopy. i.e. UV-Vis, FT-IR, NMR Spectroscopy and Mass Spectrometry. Discuss Instrumentation of UV-Vis, FT-IR, NMR Spectroscopy Mass Spectrometry and X-ray diffraction techniques. Interpret the structure and function of various elements by using X-ray diffraction, spectroscopy and magnetic measurement techniques. Solve problems related to the saturation, functional group, molecular weight and structure of molecules. Analyze spectroscopic information to obtain structural information of molecules 	4	40	60
II	21MCHID201	DSE - ID-2: Statistical Methods	<ol style="list-style-type: none"> Understand the concept of statistical parameters. Understand sampling and sampling distributions also measures of dispersion. Apply the techniques of correlation, regression, and Random Variables Remember, understand and apply the analytical techniques of statistics. Test the hypotheses using various techniques and interpret the result. 	4	50	50
II	21MCHID202	DSE - ID-2: Chemical Technology	<ol style="list-style-type: none"> Understand the advanced concepts of ceramic & refractories industries. Apply the basic technology of soap & detergents industries. 	4	50	50



			<ol style="list-style-type: none"> 3. Apply the fundamental technology of paint industries. 4. Evaluate the concepts of pigment industries. 5. Apply the basic concepts and technology of sugar industries. 			
II	21MCHCC205	Practical Core 5 & 6: Separation Techniques & Organic Synthesis	<ol style="list-style-type: none"> 1. Design and develop solvent system for separation and identification of organic/natural compounds from multi-component mixtures. 2. Construct manual Thin layer chromatography and Column chromatography and Demonstration of HPLC and GC-Mass spectrometer. 3. Demonstrate laboratory setup for various reactions conditions. 4. Apply understanding of reaction mechanism and reagents to perform organic preparation. 5. Analyze product formation by using physical measurement, separation and purification techniques. 	3	40	60
II	21MCHCC206	Practical Core 7 & 8: Stereochemistry & Modern Analytical Techniques	<ol style="list-style-type: none"> 1. Apply the stereochemistry concept to identify optical activity of pure stereoisomer's and racemic mixture. 2. Calculate enantiomer excess of racemic mixture. 3. Apply UV Viz. phenomena to find out wavelength, concentration and chemical shifts of organic molecules. 4. Interpret IR spectrum for identification of various functional group in organic molecules. 5. Operate polarimeter, UV Visible and IR spectrophotometer. 	3	40	60
II	21MCHCE01	CEC 1: Scientific Writing (Research review & presentation)	<ol style="list-style-type: none"> 1. Understand the application of chembiodraw and chemsketch for drawing reactions in various scientific journals. 2. Generate IUPAC nomenclature from structures & vice versa. 3. Predict and correlate physicochemical & spectral properties and characteristics of chemical / materials. 4. Study spatial arrangement of molecules and energy minimization. 5. Search & retrieve authenticated scientific reference materials. 	2		
II	21CEWE201	Wisdom & Ethics for Success in Life	<ol style="list-style-type: none"> 1. Differentiate the career success, academic success and life success 2. Identify the correct priority order in life and illustrate the human goal. 3. Understand that the relationships are definite. 4. Understand the Interconnectedness between all the orders in existence. 	2		



III (Organic Chemistry)	21MCHOCC301	Core 9: Interpretative Molecular Spectroscopy (Self study) (Ap)	<ol style="list-style-type: none"> 1. Calculate wavelength of organic molecules by UV-Vis Spectroscopy 2. Differentiate functional groups based on their frequencies by using IR spectroscopy 3. Analyse molecular structure and its molecular weight by their fragmentation pattern in mass spectroscopy 4. Deduce the chemical structure from ¹H NMR, ¹³C NMR and 2D-NMR spectral data. 5. Analyse data obtained from sophisticated instruments (like UV-Vis, FTIR, NMR, and Mass) for the structure determination and chemical analysis. 	3	50	50
III (Organic Chemistry)	21MCHOCC302	Core 10: Heterocyclic Chemistry (Ad)	<ol style="list-style-type: none"> 1. Generate IUPAC nomenclature for heterocyclic systems and vice versa. 2. Predict and describe chemical reactivity of various heterocyclic compounds. 3. Illustrate & Plan synthetic methodology for various heterocycles. 4. Identify suitable starting material, reagent and reaction condition or product for given reaction of heterocyclic compounds. 5. Apply concept of various reaction and rearrangements to predict plausible product(s), and characterize using spectroscopic techniques. 	4	40	60
III (Organic Chemistry)	21MCHOCC303	Core 11: Organic Synthesis: A Disconnection Approach (Ad)	<ol style="list-style-type: none"> 1. Understand concept of disconnection, synthon and synthetic equivalents and its application in disconnection analysis. 2. Understand concept of functional group interconversion strategy and its application for the aromatic compounds. 3. Recognize disconnection pattern for dicarbonyl compounds including 1-2,1-3, 1-4, 1-5 and 1-6 dicarbonyl framework and plan synthesis thereof. 4. Apply the stepwise disconnection approach for a range of compounds having different patterns of functionalisation to support selected strategic and tactical principles in retrosynthetic analysis of targeted molecules. 5. Analyze published synthetic routes in terms of retrosynthetic strategy, recognize the importance of reagent selection for common 	4	40	60



			transformations and suggest reagents for such transformations in the context of such synthetic routes.			
III (Organic Chemistry)	21MCHODC302	DSE –Core 1 Pharmaceutica l Technology (Ad)	<ol style="list-style-type: none"> 1. Define the components and their functions of product design and development processes 2. Identify and analyze the product design and development processes in manufacturing industry. 3. Gained an understanding of modern formulation technology 4. Design an experimental protocol to investigate selected factors' effects 5. Develop and improve commercial products 	4	40	60
III (Organic Chemistry)	21MCHODC301	DSE –Core 1 Medicinal Chemistry (Ad)	<ol style="list-style-type: none"> 1. To understand the chemistry of drugs with respect to their pharmacological activity. 2. Demonstrate an understanding of the steps involved in the drug discovery and design process 3. Understand the background of combinatorial chemistry and role of combinatorial chemistry in drug discovery. 4. Critically analyse biological pathways for their potential as drug targets for a given disease. 5. Describe the role of pharmacodynamic and pharmacokinetic factors as determinants of drug response. 	4	40	60
III (Organic Chemistry)	21MCHGE01	GE: Molecular Spectroscopy	<ol style="list-style-type: none"> 1. Understand the principle, fundamental theory of various Spectroscopy techniques. 2. Discuss Instrumentation of UV-Vis, FT-IR, NMR Spectroscopy and Mass Spectrometry. 3. Characterize and Interpret spectroscopic data to perform qualitative analysis of unknown compounds. 4. Elucidate structures of the unknown compounds by amalgamation of various spectroscopic techniques 5. Differentiate various applications of Characterization techniques to medicinal and pharmaceutical field. 	2	100	
III (Organic	21MCHOCC304	Practical Core 10& 11: Heterocyclic Chemistry &	<ol style="list-style-type: none"> 1. Demonstrate laboratory setup for various reactions conditions. 2. Apply understanding of reaction mechanism and reagents to perform heterocyclic preparation. 	4	60	90



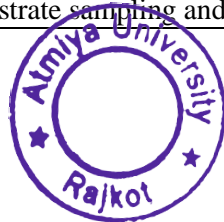
Chemistry)		Organic Synthesis	<ol style="list-style-type: none"> Analyze product formation by using physical measurement, separation and purification techniques. Design and develop solvent system for separation and identification of organic/natural compounds from single/multi-step reactions. Construct manual Thin layer chromatography and Column chromatography whenever applicable. 			
III (Organic Chemistry)	21MCHODC303	Practical DSE –Core 1 Medicinal Chemistry	<ol style="list-style-type: none"> Demonstrate laboratory setup for various reactions conditions. Apply understanding of reaction mechanism and reagents to perform drug synthesis/ Important intermediates/ privilege scaffolds. Analyze product formation by using physical measurement, separation and purification techniques. Design and develop solvent system for separation and identification of drug/intermediate compounds from single/multi-step reactions. Construct manual Thin layer chromatography and Column chromatography whenever applicable. 	2	20	30
III (Organic Chemistry)	21MCHODC304	Practical DSE –Core 1 Pharmaceutical Technology	<ol style="list-style-type: none"> Demonstrate laboratory setup for various reactions conditions. Apply the principles of equipments and instruments with their working and uses in formulation of dosage forms. Formulate and evaluate of solid dosage form such as tablets, tablet coating and capsules. Formulate and evaluate of syrup, emulsion and dry suspension. Formulate and evaluate of injections and eye drops. 	2	20	30
III (Analytical Chemistry)	21MCHACC301	Core 9: Interpretative Molecular Spectroscopy (Self-Study) (Ap)	<ol style="list-style-type: none"> Calculate wavelength of organic molecules by UV-Vis Spectroscopy Differentiate functional groups based on their frequencies by using IR spectroscopy Analyse molecular structure and its molecular weight by their fragmentation pattern in mass spectroscopy Deduce the chemical structure from ¹H NMR, ¹³C NMR and 2D-NMR spectral data. Analyse data obtained from sophisticated instruments (like UV-Vis, FTIR, NMR, and Mass) for the structure determination and chemical analysis. 	3	50	50



III (Analytical Chemistry)	21MCHACC302	Core 10: Analytical Method Development & Validation (Ad)	<ol style="list-style-type: none"> 1. Understand the latest internationally recognized standards and developments in analytical assurance and their acceptance criteria. 2. Gain an understanding of method validation requirements as per ICH guideline and Pharmacopoeia. 3. Identify and classify suitable analytical methods on the basis of various characteristic i.e. accuracy, precision, specificity, etc. 4. Evaluate statistical data Elements for Assay Validation 5. Prepare method validation protocol. 	4	40	60
III (Analytical Chemistry)	21MCHACC303	Core 11: Industrial Formulations Development (Ad)	<ol style="list-style-type: none"> 1. Define the components and their functions of product design and development processes 2. Identify and analyze the product design and development processes in manufacturing industry. 3. Gained an understanding of modern formulation technology 4. Design an experimental protocol to investigate selected factors' effects 5. Develop and improve commercial products 	4	40	60
III (Analytical Chemistry)	21MCHADC301	DSE – Core1 Chemistry of Food Analysis (Ad)	<ol style="list-style-type: none"> 1. Identify & classify carbohydrates, enzymes, lipids, proteins and vitamins. 2. Appreciate methods of analysis of food carbohydrates and activation & inactivation of enzymes. 3. Choose physical and chemical tests for analysis of oils and fats. 4. Categorize & classify proteins and vitamins with their source & structure. 5. Employ detection methods for food additives and adulterants. 	4	40	60
III (Analytical Chemistry)	21MCHADC302	DSE – Core1 Instrumental Methods of Analysis (Ad)	<ol style="list-style-type: none"> 1. Understand the theory and practice of instrumental methods for the emission and absorption spectroscopy, ICP-OES, Thermal techniques etc. 2. Distinguish between qualitative and quantitative measurements and be able to effectively compare and critically select methods for elemental and molecular analyses 3. Demonstrate sampling and sample treatment prior to analysis 4. Assess concepts of availability and evaluation of analytical standards and formulate standard methodology for analysis. 	4	40	60



			5. Apply the basic phenomena of instrumental techniques to operate instruments and evaluate the experimental data.			
III (Analytical Chemistry)	21MCHGE01	GE: Molecular Spectroscopy	<ol style="list-style-type: none"> 1. Understand the principle, fundamental theory of various Spectroscopy techniques. 2. Discuss Instrumentation of UV-Vis, FT-IR, NMR Spectroscopy and Mass Spectrometry. 3. Characterize and Interpret spectroscopic data to perform qualitative analysis of unknown compounds. 4. Elucidate structures of the unknown compounds by amalgamation of various spectroscopic techniques 5. Differentiate various applications of Characterization techniques to medicinal and pharmaceutical field. 	2	100	
III (Analytical Chemistry)	21MCHACC304	Practical Core 10 & 11: Analytical Method Development & Validation and Industrial Formulations Development	<ol style="list-style-type: none"> 1. Understand the latest internationally recognized standards and developments in analytical assurance and their acceptance criteria. 2. Identify and classify suitable analytical methods on the basis of various characteristic i.e. accuracy, precision, specificity, etc. 3. Evaluate statistical data Elements for Validation 4. Define the components and their functions of product design and development processes 5. Develop and improve commercial products 	4	60	90
III (Analytical Chemistry)	21MCHADC303	Practical DSE – Core1: Chemistry of Food Analysis	<ol style="list-style-type: none"> 1. Choose physical and chemical tests for analysis of oils and fats. 2. Quantify different parameter of Food and Adulterant. 3. Employ different detection methods for food additives and adulterants. 	2	20	30
III (Analytical Chemistry)	21MCHADC304	Practical DSE – Core1: Instrumental Methods of Analysis	<ol style="list-style-type: none"> 1. Understand the practice of instrumental methods for the absorption spectroscopy. 2. Distinguish between qualitative and quantitative measurements and be able to effectively compare and critically select methods for elemental and molecular analyses 3. Demonstrate sampling and sample treatment prior to analysis 	2	20	30



			4. Apply the basic phenomena of instrumental techniques to operate instruments and evaluate the experimental data.			
IV (Organic Chemistry)	21MCHOCC401	Core 12: Dissertation/Internship/Skill Training/Advance Practical (Ap)	<ol style="list-style-type: none"> 1. Apply critical and analytical skills in a scientific and professional manner. 2. Critically apprising and interpretative published literature 3. Synthesize knowledge and skills previously gained and applied to an in-depth study. 4. Select from different research methodologies, methods and forms of analysis to produce a suitable research method. 5. Present the finding of their project in a written report. 	8	80	120
IV (Organic Chemistry)	21MCHOCC402	Core 13: Chemistry of Natural Products (Ap)	<ol style="list-style-type: none"> 1. Understand the concept of identification and isolation of primary and secondary metabolites. 2. Prepare systematic extraction method for the active ingredient. 3. Explain structural significance of the active molecules from the natural resources. 4. To identify active molecules from medicinal plants. 5. Illustrate total synthesis of the selected natural products. 	5	50	50
IV (Organic Chemistry)	21MCHOCC403	Core 14 : Chemistry of Synthetic Drugs (Ap)	<ol style="list-style-type: none"> 1. Classify type of disease and drugs. 2. Employ the core subject knowledge of anticancer and anti-infectious, Cardiovascular and the drugs affecting on metabolic disease. 3. Well acquainted with the synthesis of some important class of drugs. 4. Knowledge about the mechanism pathways of disease and curing by medicinal compounds. 5. Critically evaluate modern methods of functional group transformations and the application of protecting groups in Drug synthesis. 	5	50	50
IV (Organic)	21MCHCE02	*CEC 2: Online Courses/ Professional Certification Courses/ STC	<ol style="list-style-type: none"> 1. Prepare samples for IR analysis using different cells and functional group identification by analysis of spectra. 2. Knowledge about working & characteristic of each part of Gas chromatography and able to handle the instruments and can separate the mixtures of multi compounds. 3. Able to handle the Mass spectrophotometer and knowledge of working 	2		



Chemistry)			<p>phenomena of each part of instrument.</p> <ol style="list-style-type: none"> Analyses the sample quantitatively to find out the % by different methods and calculations and identify it qualitatively. Preparation of sample solution of different concentrations. Able to handle the instrument and identify the various elements in sample applying knowledge. 			
IV (Analytical Chemistry)	21MCHACC401	Core 12: Dissertation /Internship/Skill Training/Advance Practical (Ap)	<ol style="list-style-type: none"> Apply critical and analytical skills in a scientific and professional manner. Critically apprising and interpretative published literature Synthesize knowledge and skills previously gained and applied to an in-depth study. Select from different research methodologies, methods and forms of analysis to produce a suitable research method. Present the finding of their project in a written report. 	8	80	120
IV (Analytical Chemistry)	21MCHACC402	Core 13: Chemistry of Natural Products (Ap)	<ol style="list-style-type: none"> Understand the concept of identification and isolation of primary and secondary metabolites. Prepare systematic extraction method for the active ingredient. Explain structural significance of the active molecules from the natural resources. To identify active molecules from medicinal plants. Illustrate total synthesis of the selected natural products. 	5	50	50
IV (Analytical Chemistry)	21MCHACC403	Core 14: Regulatory Affairs (Ap)	<ol style="list-style-type: none"> Understanding of important regulatory concepts To provide global knowledge of Regulatory Affairs and create Regulatory Strategy Write Regulatory Documents Take independent responsibility for own professional development Evaluate scientific data and conclusions intended for regulatory review 	5	50	50
IV (Analytical Chemistry)	21MCHCE02	*CEC2 : Online Core Courses/ Professional Certification Courses/ STC	<ol style="list-style-type: none"> Prepare samples for IR analysis using different cells and functional group identification by analysis of spectra. Knowledge about working & characteristic of each part of Gas chromatography and able to handle the instruments and can separate the mixtures of multi compounds. 	2	-	-



			<ol style="list-style-type: none"> 3. Able to handle the Mass spectrophotometer and knowledge of working phenomena of each part of instrument. 4. Analyses the sample quantitatively to find out the % by different methods and calculations and identify it qualitatively. Preparation of sample solution of different concentrations. 5. Able to handle the instrument and identify the various elements in sample applying knowledge. 			
I	18MCHCC101	Core 1: Organic Chemistry (F)	<ol style="list-style-type: none"> 1. Understand concept and types of reaction mechanism draw arrow notation, categorize bond cleavages, and generation of reactive intermediates. 2. Understand the concept of various electronic effect and its applications. 3. Predict the stability of reactive intermediates by applying electronic effect. 4. Differentiate between aromatic, anti-aromatic and non-aromatic compounds 5. Illustrate preparation of organic reagents and recognize appropriate reagent for particular reaction. 	4	40	60
I	18MCHCC102	Core 2: Analytical Chemistry(F)	<ol style="list-style-type: none"> 1. Differentiate basic analytical techniques and apply for various chemical analyses. 2. Calculate modes of concentration for chemical analysis. 3. Apply concept of non aqueous titration for chemical analysis. 4. Employ appropriate extraction methods for the chemical separation. 5. Understand the different terms and criteria of Intellectual Property right 	3	40	60
		Core 3: Inorganic Chemistry (F)	<ol style="list-style-type: none"> 1. Predict bond order & shapes of covalent compounds using MO & VB theories. 2. Classify coordination compounds & predict isomerism, coordination number, shapes and spectral term symbol for coordination compounds. 3. Understand and apply CFT for splitting of d-orbitals in octahedral, tetrahedral and square planar complexes. 4. Determine symmetry elements and their point groups of molecules by 	4	40	60



I	18MCHCC103		point group theory 5. Recognize bonding, synthesis and application of organometallic complexes.			
I	18MCHCC104	Core 4: Physical Chemistry (F)	1. Recall types & order of chemical reaction 2. Understand properties & behavior of ideal, non-ideal and dilute solutions 3. Distinguish Free energy change and its applications in chemical reactions. 4. Classify the types, characteristics and mechanism of homogeneous & heterogeneous catalysis. 5. Derive synthesis of polymers and its identification by different techniques.	3	40	60
I	18MCHID101	DSE-ID-1: Industrial Environment Management	1. Summarize the government legislations regarding environmental pollution control and classify environment management tools. 2. Interpret cleaner tools and technology including case study of industries and understand principal of green chemistry. 3. Identify air pollution control devices, sampling procedure for air monitoring applicable for industries and can understand waste water treatment plant unit with case study of industries. 4. Identify different types of solid waste with the help of their characteristics and summarize various treatment technologies for handling of solid waste in relate to handling rules. 5. Interpret industry specify hazards and can understand technique regarding hazards and risk identification	4	50	50
I	18MCHID102	DSE-ID-1: Chemistry of Biomolecules	1. Know the Biomolecules at the atomic level. 2. Classify function of Biomolecules. 3. Recognize how the structure of Biomolecules determines their chemical properties and reactivity. 4. Predict situation based problems related to life processes. 5. Relate the drug molecule with physiological problems.	4	50	60
	18MCHCC105	Practical Core 1 & 2: Organic &	1. Perform Qualitative Analysis of a ternary organic mixture 2. Prepare and standardize the solutions.	3	40	60



I		Analytical Chemistry	<ol style="list-style-type: none"> 3. Demonstrate Calibration of glassware and apparatus. 4. Measure the Assay and % Purity of fine chemicals. 5. Employ appropriate extraction methods for the chemical separation 			
I	18MCHCC106	Practical Core 3 & 4: Inorganic & Physical Chemistry	<ol style="list-style-type: none"> 1. Perform Qualitative Analysis of an inorganic mixture containing six radicals. 2. Utilize Conductivity meter, pH & Potentiometer, Refractometer, and Ultrasonic instrument for physicochemical analysis. 3. Demonstrate experiments on Partition Co-efficient, First and second order reactions-order determination, energy of activation, Heat of vaporization, Partial molar volume. 	3	40	60
I	18MCHCE02	*CEC- II STC/Online Courses/ Professional Certification Courses	<ol style="list-style-type: none"> 1. Prepare samples for IR analysis using different cells and functional group identification by analysis of spectra. 2. Knowledge about working & characteristic of each part of Gas chromatography and able to handle the instruments and can separate the mixtures of multi compounds. 3. Able to handle the Mass spectrophotometer and knowledge of working phenomena of each part of instrument. 4. Analyses the sample quantitatively to find out the % by different methods and calculations and identify it qualitatively. Preparation of sample solution of different concentrations. 5. Able to handle the instrument and identify the various elements 	-	-	-
I	18LSVE01	Value Education for Consciousness Development	<ol style="list-style-type: none"> 1. Differentiate the career success, academic success and life success 2. Identify the correct priority order in life and illustrate the human goal. 3. Understand that the relationships are definite 	-	-	-
II	18MCHCC201	Core 5: Separation Techniques (Ad)	<ol style="list-style-type: none"> 1. Understand the principle, fundamental theory and instrumentation of various planar and column chromatographic techniques. 2. Identify the significance, quality, and limitations of the results produced by the various separation techniques. 3. Apply theoretical knowledge to design and develop suitable operating conditions for separation and identification of organic/natural compounds from multi-component mixtures 4. Calculate Rf values and Interpret HPLC and GC chromatograms to 	4	40	60



			perform qualitative analysis of unknown 5. Differentiate various applications of separation techniques to			
II	18MCHCC202	Core 6 : Organic Reactions & Rearrangements(Ad)	<ol style="list-style-type: none"> Understand concept and types of reaction mechanism draw arrow notation, categorize bond cleavages. Extend concept of molecular rearrangement and describe plausible reaction mechanism mentioning its applications in organic synthesis. Describe Principle, plausible reaction mechanism and applications of various organic reactions. Identify suitable starting material, reagent and reaction condition or product for given organic transformations. Apply concept of various reaction and rearrangements to predict plausible product(s). 	3	40	60
II	18MCHCC203	Core 7: Stereochemistry (Ad)	<ol style="list-style-type: none"> Understand the fundamentals of stereochemistry and able to draw stereoisomers of organic compounds, and recognize diastereomers, enantiomers, meso compounds and centers of symmetry. Able to discuss the relative stability of conformational isomers of cyclohexanes and related compounds. Recognize and discuss the stereoisomers of chiral compounds that do not contain a stereogenic carbon center and assign the configuration of the stereoisomer. Understand and identify the SN and Elimination reaction mechanism and stereochemistry and Addition Reactions to Carbon-Hetero multiple bond. Apply the stereochemistry concept to identify configuration, conformation, stereochemical notations, Nucleophilic substitution, elimination, reduction and addition reactions to Carbon-Hetero multiple bond. 	3	40	60
II	18MCHCC204	Core 8: Modern Analytical Techniques(Ad)	<ol style="list-style-type: none"> Understand Principle and theory of various spectroscopy. i.e. UV-Vis, FT-IR, NMR Spectroscopy and Mass Spectrometry. Discuss Instrumentation of UV-Vis, FT-IR, NMR Spectroscopy Mass Spectrometry and X-ray diffraction techniques. Interpret the structure and function of various elements by using X-ray 	3	40	60



			<p>diffraction, spectroscopy and magnetic measurement techniques.</p> <ol style="list-style-type: none"> Solve problems related to the saturation, functional group, molecular weight and structure of molecules. Analyze spectroscopic information to obtain structural information of molecules 			
II	18MCHID201	DSE - ID-2: Statistical Methods	<ol style="list-style-type: none"> Understand the concept of statistical parameters. Understand sampling and sampling distributions also measures of dispersion. Apply the techniques of correlation, regression, and Random Variables Remember, understand and apply the analytical techniques of statistics. Test the hypotheses using various techniques and interpret the result. 	4	50	50
II	18MCHID202	DSE - ID-2: Chemical Technology	<ol style="list-style-type: none"> Understand the advanced concepts of ceramic & refractories industries. Apply the basic technology of soap & detergents industries. Apply the fundamental technology of paint industries. Evaluate the concepts of pigment industries. Apply the basic concepts and technology of sugar industries. 	4	50	50
II	18MCHCC205	Practical Core 5 & 6: Separation Techniques & Organic Synthesis	<ol style="list-style-type: none"> Design and develop solvent system for separation and identification of organic/natural compounds from multi-component mixtures. Construct manual Thin layer chromatography and Column chromatography and Demonstration of HPLC and GC-Mass spectrometer. Demonstrate laboratory setup for various reactions conditions. Apply understanding of reaction mechanism and reagents to perform organic preparation. Analyze product formation by using physical measurement, separation and purification techniques. 	2	40	60
II	18MCHCC206	Practical Core 7 & 8: Stereochemistry & Modern Analytical	<ol style="list-style-type: none"> Apply the stereochemistry concept to identify optical activity of pure stereoisomer's and racemic mixture. Calculate enantiomer excess of racemic mixture. Apply UV Viz. phenomena to find out wavelength, concentration and 	2	40	60



		Techniques	<p>chemical shifts of organic molecules.</p> <ol style="list-style-type: none"> Interpret IR spectrum for identification of various functional group in organic molecules. Operate polarimeter, UV Visible and IR spectrophotometer. 			
II	18MCHCE01	CEC 1: Scientific Writing (Research review & presentation)	<ol style="list-style-type: none"> Understand the application of chembiobdraw and chemsketch for drawing reactions in various scientific journals. Generate IUPAC nomenclature from structures & vice versa. Predict and correlate physicochemical & spectral properties and characteristics of chemical / materials. Study spatial arrangement of molecules and energy minimization. Search & retrieve authenticated scientific reference materials. 	2	-	-
II	18MCHCE02	*CEC- II STC/Online Courses/ Professional Certification Courses	<ol style="list-style-type: none"> Prepare samples for IR analysis using different cells and functional group identification by analysis of spectra. Knowledge about working & characteristic of each part of Gas chromatography and able to handle the instruments and can separate the mixtures of multi compounds. Able to handle the Mass spectrophotometer and knowledge of working phenomena of each part of instrument. Analyses the sample quantitatively to find out the % by different methods and calculations and identify it qualitatively. Preparation of sample solution of different concentrations. Able to handle the instrument and identify the various elements 	-	-	-
II	18LSVE01	Value Education for Consciousness Development	<ol style="list-style-type: none"> Differentiate the career success, academic success and life success Identify the correct priority order in life and illustrate the human goal. Understand that the relationships are definite. Understand the Interconnectedness between all the orders in existence. 	2	-	-
III (Organic)	18MCHOCC301	Core 9: Interpretative Molecular Spectroscopy (Self study) (Ap)	<ol style="list-style-type: none"> Calculate wavelength of organic molecules by UV-Vis Spectroscopy Differentiate functional groups based on their frequencies by using IR spectroscopy Analyse molecular structure and its molecular weight by their fragmentation pattern in mass spectroscopy Deduce the chemical structure from ¹H NMR, ¹³C NMR and 2D- 	3	50	50



Chemistry)			NMR spectral data. 5. Analyse data obtained from sophisticated instruments (like UV-Vis, FTIR, NMR, and Mass) for the structure determination and chemical analysis.			
III (Organic Chemistry)	18MCHOCC302	Core 10: Heterocyclic Chemistry (Ad)	1. Generate IUPAC nomenclature for heterocyclic systems and vice versa. 2. Predict and describe chemical reactivity of various heterocyclic compounds. 3. Illustrate & Plan synthetic methodology for various heterocycles. 4. Identify suitable starting material, reagent and reaction condition or product for given reaction of heterocyclic compounds. 5. Apply concept of various reaction and rearrangements to predict plausible product(s), and characterize using spectroscopic techniques.	4	40	60
III (Organic Chemistry)	18MCHOCC303	Core 11: Organic Synthesis: A Disconnection Approach (Ad)	1. Understand concept of disconnection, synthon and synthetic equivalents and its application in disconnection analysis. 2. Understand concept of functional group interconversion strategy and its application for the aromatic compounds. 3. Recognize disconnection pattern for dicarbonyl compounds including 1-2,1-3, 1-4, 1-5 and 1-6 dicarbonyl framework and plan synthesis thereof. 4. Apply the stepwise disconnection approach for a range of compounds having different patterns of functionalisation to support selected strategic and tactical principles in retrosynthetic analysis of targeted molecules. 5. Analyze published synthetic routes in terms of retrosynthetic strategy, recognize the importance of reagent selection for common transformations and suggest reagents for such transformations in the context of such synthetic routes.	4	40	60
III	18MCHODC302	DSE –Core 1 Pharmaceutica l Technology (Ad)	1. Define the components and their functions of product design and development processes 2. Identify and analyze the product design and development processes in manufacturing industry.	4	40	60



(Organic Chemistry)			<ol style="list-style-type: none"> Gained an understanding of modern formulation technology Design an experimental protocol to investigate selected factors' effects Develop and improve commercial products 			
III (Organic Chemistry)	18MCHODC301	DSE –Core 1 Medicinal Chemistry (Ad)	<ol style="list-style-type: none"> To understand the chemistry of drugs with respect to their pharmacological activity. Demonstrate an understanding of the steps involved in the drug discovery and design process Understand the background of combinatorial chemistry and role of combinatorial chemistry in drug discovery. Critically analyse biological pathways for their potential as drug targets for a given disease. Describe the role of pharmacodynamic and pharmacokinetic factors as determinants of drug response. 	4	40	60
III (Organic Chemistry)	18MCHGE01	GE: Molecular Spectroscopy	<ol style="list-style-type: none"> Understand the principle, fundamental theory of various Spectroscopy techniques. Discuss Instrumentation of UV-Vis, FT-IR, NMR Spectroscopy and Mass Spectrometry. Characterize and Interpret spectroscopic data to perform qualitative analysis of unknown compounds. Elucidate structures of the unknown compounds by amalgamation of various spectroscopic techniques Differentiate various applications of Characterization techniques to medicinal and pharmaceutical field. 	2	100	0
III (Organic Chemistry)	18MCHOCC304	Practical Core 10& 11: Heterocyclic Chemistry & Organic Synthesis	<ol style="list-style-type: none"> Demonstrate laboratory setup for various reactions conditions. Apply understanding of reaction mechanism and reagents to perform heterocyclic preparation. Analyze product formation by using physical measurement, separation and purification techniques. Design and develop solvent system for separation and identification of organic/natural compounds from single/multi-step reactions. Construct manual Thin layer chromatography and Column chromatography whenever applicable. 	4	60	90



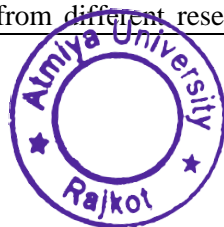
III (Organic Chemistry)	18MCHODC303	Practical DSE –Core 1 Medicinal Chemistry	<ol style="list-style-type: none"> 1. Demonstrate laboratory setup for various reactions conditions. 2. Apply understanding of reaction mechanism and reagents to perform drug synthesis/ Important intermediates/ privilege scaffolds. 3. Analyze product formation by using physical measurement, separation and purification techniques. 4. Design and develop solvent system for separation and identification of drug/intermediate compounds from single/multi-step reactions. 5. Construct manual Thin layer chromatography and Column chromatography whenever applicable. 	2	20	30
III (Organic Chemistry)	18MCHODC304	Practical DSE –Core 1 Pharmaceutical Technology	<ol style="list-style-type: none"> 1. Demonstrate laboratory setup for various reactions conditions. 2. Apply the principles of equipments and instruments with their working and uses in formulation of dosage forms. 3. Formulate and evaluate of solid dosage form such as tablets, tablet coating and capsules. 4. Formulate and evaluate of syrup, emulsion and dry suspension. 5. Formulate and evaluate of injections and eye drops. 	2	20	30
III (Analytical Chemistry)	18MCHACC301	Core 9: Interpretative Molecular Spectroscopy (Self-Study) (Ap)	<ol style="list-style-type: none"> 1. Calculate wavelength of organic molecules by UV-Vis Spectroscopy 2. Differentiate functional groups based on their frequencies by using IR spectroscopy 3. Analyse molecular structure and its molecular weight by their fragmentation pattern in mass spectroscopy 4. Deduce the chemical structure from ¹H NMR, ¹³C NMR and 2D-NMR spectral data. 5. Analyse data obtained from sophisticated instruments (like UV-Vis, FTIR, NMR, and Mass) for the structure determination and chemical analysis. 	3	50	50
III (Analytical Chemistry)	18MCHACC302	Core 10: Analytical Method Development	<ol style="list-style-type: none"> 1. Understand the latest internationally recognized standards and developments in analytical assurance and their acceptance criteria. 2. Gain an understanding of method validation requirements as per ICH guideline and Pharmacopoeia. 3. Identify and classify suitable analytical methods on the basis of various characteristic i.e. accuracy, precision, specificity, etc. 	4	40	60



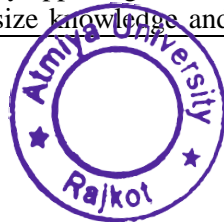
		& Validation (Ad)	<ol style="list-style-type: none"> Evaluate statistical data Elements for Assay Validation Prepare method validation protocol. 			
III (Analytical Chemistry)	18MCHACC303	Core 11: Industrial Formulations Development (Ad)	<ol style="list-style-type: none"> Define the components and their functions of product design and development processes Identify and analyze the product design and development processes in manufacturing industry. Gained an understanding of modern formulation technology Design an experimental protocol to investigate selected factors' effects Develop and improve commercial products 	4	40	60
III (Analytical Chemistry)	18MCHADC301	DSE – Core1 Chemistry of Food Analysis (Ad)	<ol style="list-style-type: none"> Identify & classify carbohydrates, enzymes, lipids, proteins and vitamins. Appreciate methods of analysis of food carbohydrates and activation & inactivation of enzymes. Choose physical and chemical tests for analysis of oils and fats. Categorize & classify proteins and vitamins with their source & structure. Employ detection methods for food additives and adulterants. 	4	40	60
III (Analytical Chemistry)	18MCHADC302	DSE – Core1 Instrumental Methods of Analysis (Ad)	<ol style="list-style-type: none"> Understand the theory and practice of instrumental methods for the emission and absorption spectroscopy, ICP-OES, Thermal techniques etc. Distinguish between qualitative and quantitative measurements and be able to effectively compare and critically select methods for elemental and molecular analyses Demonstrate sampling and sample treatment prior to analysis Assess concepts of availability and evaluation of analytical standards and formulate standard methodology for analysis. Apply the basic phenomena of instrumental techniques to operate instruments and evaluate the experimental data. 	4	40	60
III (Analytical Chemistry)	18MCHGE01	GE: Molecular Spectroscopy	<ol style="list-style-type: none"> Understand the principle, fundamental theory of various Spectroscopy techniques. Discuss Instrumentation of UV-Vis, FT-IR, NMR Spectroscopy and Mass Spectrometry. 	2	100	-



			<ol style="list-style-type: none"> 3. Characterize and Interpret spectroscopic data to perform qualitative analysis of unknown compounds. 4. Elucidate structures of the unknown compounds by amalgamation of various spectroscopic techniques 5. Differentiate various applications of Characterization techniques to medicinal and pharmaceutical field. 			
III (Analytical Chemistry)	18MCHACC304	Practical Core 10 & 11: Analytical Method Development & Validation and Industrial Formulations Development	<ol style="list-style-type: none"> 1. Understand the latest internationally recognized standards and developments in analytical assurance and their acceptance criteria. 2. Identify and classify suitable analytical methods on the basis of various characteristic i.e. accuracy, precision, specificity, etc. 3. Evaluate statistical data Elements for Validation 4. Define the components and their functions of product design and development processes 5. Develop and improve commercial products 	4	60	90
III (Analytical Chemistry)	18MCHADC303	Practical DSE – Core1: Chemistry of Food Analysis	<ol style="list-style-type: none"> 1. Choose physical and chemical tests for analysis of oils and fats. 2. Quantify different parameter of Food and Adulterant. 3. Employ different detection methods for food additives and adulterants. 	2	20	30
III (Analytical Chemistry)	18MCHADC304	Practical DSE – Core1: Instrumental Methods of Analysis	<ol style="list-style-type: none"> 1. Understand the practice of instrumental methods for the absorption spectroscopy. 2. Distinguish between qualitative and quantitative measurements and be able to effectively compare and critically select methods for elemental and molecular analyses 3. Demonstrate sampling and sample treatment prior to analysis 4. Apply the basic phenomena of instrumental techniques to operate instruments and evaluate the experimental data. 	2	20	30
IV (Organic)	18MCHOCC401	Core 12: Dissertation/Internship/Skill Training/Advance Practical	<ol style="list-style-type: none"> 1. Apply critical and analytical skills in a scientific and professional. 2. Critically apprising and interpretative published literature 3. Synthesize knowledge and skills previously gained and applied to an in-depth study. 4. Select from different research methodologies, methods and forms of 	12	80	120



Chemistry)		(Ap)	analysis to produce a suitable research method. 5. Present the finding of their project in a written report.			
IV (Organic Chemistry)	18MCHOCC402	Core 13: Chemistry of Natural Products (Ap)	1. Understand the concept of identification and isolation of primary and secondary metabolites. 2. Prepare systematic extraction method for the active ingredient. 3. Explain structural significance of the active molecules from the natural 4. To identify active molecules from medicinal plants. 5. Illustrate total synthesis of the selected natural products.	5	50	50
IV (Organic Chemistry)	18MCHOCC403	Core 14 : Chemistry of Synthetic Drugs (Ap)	1. Classify type of disease and drugs. 2. Employ the core subject knowledge of anticancer and anti-infectious, Cardiovascular and the drugs affecting on metabolic disease. 3. Well acquainted with the synthesis of some important class of drugs. 4. Knowledge about the mechanism pathways of disease and curing by medicinal compounds. 5. Critically evaluate modern methods of functional group transformations and the application of protecting groups in Drug synthesis.	5	50	50
IV (Organic Chemistry)	18MCHCE02	*CEC 2: Online Courses/ Professional Certification Courses/ STC	1. Prepare samples for IR analysis using different cells and functional group identification by analysis of spectra. 2. Knowledge about working & characteristic of each part of Gas chromatography and able to handle the instruments and can separate the mixtures of multi compounds. 3. Able to handle the Mass spectrophotometer and knowledge of working phenomena of each part of instrument. 4. Analyses the sample quantitatively to find out the % by different methods and calculations and identify it qualitatively. Preparation of sample solution of different concentrations. 5. Able to handle the instrument and identify the various elements in sample applying knowledge.	2	-	-
	18MCHACC401	Core 12: Dissertation /Internship/Ski II	1. Apply critical and analytical skills in a scientific and professional manner. 2. Critically apprising and interpretative published literature 3. Synthesize knowledge and skills previously gained and applied to an	12	80	120



IV (Analytical Chemistry)		Training/Advance Practical (Ap)	in-depth study. 4. Select from different research methodologies, methods and forms of analysis to produce a suitable research method. 5. Present the finding of their project in a written report.			
IV (Analytical Chemistry)	18MCHACC402	Core 13: Chemistry of Natural Products (Ap)	1. Understand the concept of identification and isolation of primary and secondary metabolites. 2. Prepare systematic extraction method for the active ingredient. 3. Explain structural significance of the active molecules from the natural resources. 4. To identify active molecules from medicinal plants. 5. Illustrate total synthesis of the selected natural products.	5	50	50
IV (Analytical Chemistry)	18MCHACC403	Core 14: Regulatory Affairs (Ap)	1. Understanding of important regulatory concepts 2. To provide global knowledge of Regulatory Affairs and create Regulatory Strategy 3. Write Regulatory Documents 4. Take independent responsibility for own professional development 5. Evaluate scientific data and conclusions intended for regulatory review	5	50	50
IV (Analytical Chemistry)	18MCHCE02	CEC2 : Online Core Courses/ Professional Certification Courses/ STC	1. Prepare samples for IR analysis using different cells and functional group identification by analysis of spectra. 2. Knowledge about working & characteristic of each part of Gas chromatography and able to handle the instruments and can separate the mixtures of multi compounds. 3. Able to handle the Mass spectrophotometer and knowledge of working phenomena of each part of instrument. 4. Analyses the sample quantitatively to find out the % by different methods and calculations and identify it qualitatively. Preparation of sample solution of different concentrations. 5. Able to handle the instrument and identify the various elements in sample applying knowledge.	2	-	-



Department of Chemistry
Program: B.Sc. Chemistry

Program Objective:

Courses offered in this program are geared towards providing students with an overall understanding of general chemistry so that they can enter the workforce with the necessary knowledge and skills. It will enable students to gain familiarity with the current industry practices and technologies.

The objectives are to:

- Train graduates with the requisite knowledge and skill to pursue M.Sc. & Ph.D. degrees in Chemistry.
- Turn out graduates who can teach the subject in secondary and tertiary level of education in the county.
- Train graduates who can be employed in Industry and the other sectors of the economy.

Graduate Attributes:

- Academic excellence: Ability to identify key questions, research and pursue rigorous evidence-based arguments
- Critical Thinking and Effective communications: Analysis and evaluation of information to form a judgment about a subject or idea and ability to effectively communicate the same in a structured form.
- Global Citizenship: Mutual understanding with others from diverse cultures, perspectives and backgrounds
- Life Long Learning: Open, curious, willing to investigate, and consider new knowledge and ways of thinking



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO ₁	Core competency	Understand and apply the fundamental core of chemistry to a broad variety of chemical problems.
PEO ₂	Breath of knowledge	Competent chemistry graduates with strong fundamental knowledge to cater the needs of GOs and NGOs related to chemical science domain.
PEO ₃	Preparedness	Demonstrate ability to use necessary tools & techniques of applied chemistry domain.
PEO ₄	Professionalism	Graduates who can work individually or in teams to interpret chemical literature and propose solutions for problems significant to industries and society as a whole.
PEO ₅	Learning environment	Inculcate the aptitude to engage in life- long learning from social, economic, and scientific activities of the time.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO 1	:	Domain knowledge: Demonstrate an understanding of concepts, principles and applications of chemistry in various fields. Conduct experiments and analyze data, while maintaining responsible and ethical scientific conduct.
PO 2	:	Problem analysis: Employ critical thinking and efficient problem-solving skills in the basic areas of chemistry.
PO 3	:	Design/development of solutions: Using appropriate tools and techniques as well as approaches to arrive at viable conclusions/solutions pertaining to Chemical Science.
PO 4	:	Conduct investigations of complex problems: Cultivate the skills to Employ modern library search tools to locate and



		retrieve scientific information about a problem relating to Chemistry.
PO 5	:	Modern tool usage: Ability to handle/Use appropriate chemistry experiments using tools/techniques/ basic laboratory equipment with an understanding of the standard operating procedures, safety aspects/limitations.
PO 6	:	The Chemistry Professional and society: Understand own's role in scientific developments for society and act in an honest and consistent manner based on a strong sense of self and personal values
PO 7	:	Environment and sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development
PO 8	:	Ethics: Commitment to professional ethics and responsibilities.
PO 9	:	Individual and team work: Able to function effectively as individual and as a member or leader in multidisciplinary settings.
PO 10	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large
PO 11	:	Project management and finance: Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	:	Life-long learning: Able to recognize the need to undertake life-long learning and acquire the capacity to do so

Programme Specific Outcome (PSOs):

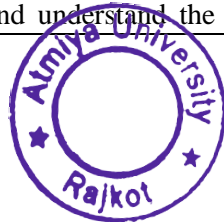
After completion of the programme the Graduate will:		
PSO₁	:	Acquire knowledge on the fundamentals aspects of chemistry leading to functional understanding of emerging concepts and technologies in chemical sciences.



PSO₂	:	Able to pursue higher education and research in the institutes of national and international repute.
PSO₃	:	Apply conceptual knowledge of Chemistry to identify practical & innovative solutions for socio-economically relevant issues.
PSO₄	:	Demonstrate ability to skilfully utilize the chemical literature to identify existing problems and employ tools & techniques of applied chemistry for finding sustainable & ethical solutions.
PSO₅	:	Acquire the ability to engage in life- long learning in the broadest context of socio- technological changes.

Course Outcomes (COs):

Seme ster	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGEN140	Functional English for Science	<ol style="list-style-type: none"> 1. Develop basic Reading skills. 2. Infer the true meaning of the text and execute values received through the literature. 3. Understand and interpret text related to science, leading to the cultivation of the reading habit. 4. Recall the essential grammatical aspects of the language. 5. Develop basic Writing skills. 	3	40	60
I	23UGCH101	Chemistry-I	<ol style="list-style-type: none"> 1. Remember basic idea of structure of atom and its mechanics. Understand periodic properties & apply basic knowledge and predict the properties of the main block elements. 2. Understand and predict shape, geometry of various elements and their compound and by using VB theory and MO theory. 3. Recognize the basic concept of organic chemistry for a chemical reaction. 4. Understand and predict chemical properties and preparation of alkanes, alkenes, alkynes and dienes. 5. Recall and understand the concept of chemical kinetics and surface 	4	30	70



			chemistry.			
I	23UGCH102	Practical : Chemistry-I	<ol style="list-style-type: none"> 1. Perform qualitative tests on organic compounds and identify it. 2. Apply chemical tests on organic & inorganic small molecules for their qualitative analysis and identification. 3. Develop scientific skills in qualitative analysis of organic compounds and preparation of organic reagents. 4. Understanding and perform the scientific methods for calibration of the glassware's. 5. Comprehend the rate and order of elementary chemical reactions. 	2	50	50
II	23UGCH201	Chemistry-II	<ol style="list-style-type: none"> 1. Understand postulates of wave mechanics and apply it for construction of wave equation. 2. Understand the basic concept of hydrocarbon and stereochemistry of structure. 3. Correlate and Compare various methods for preparations of different concentrated solutions. 4. Understand and apply knowledge of acid base and redox titration. 5. Use concepts of thermodynamics to make predictions and give explanations about chemical systems and basic physical properties of matter. 	4	30	70
II	23UGCH202	Practical : Chemistry-II	<ol style="list-style-type: none"> 1. Understanding, planning and performing experiments for preparation and standardization of analytical solutions. 2. Perform qualitative tests on organic compounds and identify it. 3. Identify the given inorganic salt having two radicals with various qualitative test. 4. Understanding and performing experiments for redox and acid -base titration. 5. Built ability for summarization and determination of basic physical properties. 	2	50	50
II	23UGCH050	Formulation of Detergents & Toiletries	<ol style="list-style-type: none"> 1. Understand the basic concept of surface active agents. 2. Understand the basic theory and role of additives in the formulation of cleansing agents and their role in day to day life of humans 3. Develop the raw materials and formulation of the soap. 	2	-	-



			<ol style="list-style-type: none"> Understand the basic concept of toiletries and their formulation with vast applications. Assess the quality of soap and detergent. 			
II	23UGCH051	Electroplating: Sustainable Techniques and Mitigation	<ol style="list-style-type: none"> Decide the surface preparation methods suitable for different substrate materials Understand the basic concept of electroplating & interpret testing & evaluation.-explain importance of electroplating & its applications Understand formulations of Electrolyte based on different processes. Familiar with the different types of organic surface coating and inorganic surface coating Formulate various electrolytes and to determine quality of electrolyte. 	2	-	-
III	23UGCH301	Chemistry-III: Analytical Chemistry	<ol style="list-style-type: none"> Apply the theoretical concepts and statistical methods to solve numerical problems involving errors, significant figures, and data analysis. Understand the principles of complexometric and precipitation titrations and its application in water analysis Gain comprehensive understanding and practical skills in electrical conductance, titration methods, and refractometry to effectively analyze and interpret chemical data. Apply advanced principles of colorimetry, polarimetry, and flame photometry to perform precise chemical analysis and insightful data interpretation Summarize the knowledge about properties of solution 	4	30	70
III	23UGCH302	Chemistry-IV: Inorganic Chemistry	<ol style="list-style-type: none"> Recognize basic properties of transition and inner-transition elements. Compare and classify various solid& liquid crystalline compounds. Calculate microstate and ground state spectral term of multi electron system. Identify, interpret and evaluate the concepts of crystal field theory Understand the basic theory of magneto chemistry and organometallic compound. 	4	30	70
III	23UGCH303	Chemistry- III: Practical	<ol style="list-style-type: none"> Students will learn to quantify analytes by complexometric titration Determine and Measurement important parameters of water analysis. 			



			<ol style="list-style-type: none"> Understanding the scientific methods for performing and calibration of various instruments. Perform scientific experiments and accurately record observation to infer results of the experiments. The students will be skilled in handling the different types of instruments practically. e.g. Conductometer, Refractometry Colorimetry and Polarimetry 			
III	23UGCH304	Chemistry- IV: Practical	<ol style="list-style-type: none"> Understand the basic concepts of qualitative analysis of inorganic mixture. Perform qualitative analysis of the inorganic salt and identification of radicals. Determine concentration of metal ion in solution and preparation of inorganic complexes. To prepare the different type of inorganic complexes Perform Inorganic Pharmaceutical preparation 			
I	21BCHCC101	Core 1: Introductory Inorganic and Analytical Chemistry(F)	<ol style="list-style-type: none"> Remember basic idea of structure of atom and its mechanics. Understand the periodic properties, shape, geometry of various elements and their compound. Apply basic knowledge and predict the properties of the main block element. Correlate and Compare various methods for preparations of different concentrated solutions. Understand and apply knowledge of acid base, redox and non-aqueous titration. 	4	30	70
I	21BCHCC102	Core2: Introductory Organic and Physical Chemistry(F)	<ol style="list-style-type: none"> Recognize the basic concept of organic chemistry for a chemical reaction. Distinguish between different kinds of isomers and Able to predict the stereochemistry of organic compound. Remember nomenclature and understand the properties of organic compound. Understand the principles of kinetics and mechanisms of surface reactions. 	4	30	70



			5. Memorize gaseous laws and exploring the way solid, liquid and gases change under different situation.			
I	21BCHCC103	Core Practical 1: Combined Practical	<ol style="list-style-type: none"> 1. Identify one cation and anion in a given unknown inorganic salt and record observation and write laboratory reports according to disciplinary standards. 2. Built ability for summarization and determination of basic physical properties. 3. Illustrate scientific skills in understanding, planning and preparing various organic reagents and solutions. 4. Understanding the scientific methods for calibration of the glassware's and instruments. 5. Understanding, planning and performing experiments for preparation and standardization of analytical solutions. 	4	40	60
II	21BCHCC201	Core 3: Conceptual Inorganic and Analytical Chemistry(F)	<ol style="list-style-type: none"> 1. Recognize basic properties of transition and inner-transition elements. 2. Remember and Understand molecular orbital theory of various element. 3. Define and Compare the various solid& liquid crystalline compounds. 4. Identify& Estimate the errors and statistics, calibration of instruments and organic qualitative analysis. 5. Determine& Compare the various titrimetric analyses of water treatment. 	4	30	70
II	21BCHCC202	Core 4: Conceptual Organic and Physical Chemistry (F)	<ol style="list-style-type: none"> 1. Understand physical & chemical properties and plan the preparation of Alkenes, Alkynes, Dienes, Alcohols, Phenols, Ethers and Epoxide, Alkyl halide and Aryl halide. 2. Use concepts of chemical kinetics for making predictions and explanations of type, rate and order of reactions. 3. Understanding aromatic behavior of organic compounds and their typical chemical properties. 4. Recall the concept of Chemical equilibrium and chemical kinetics. 5. Understand and apply properties, application and various methods for preparation of colloidal solution. 	4	30	70
	21BCHCC203		1. Apply chemical tests on organic & inorganic small molecules for their			



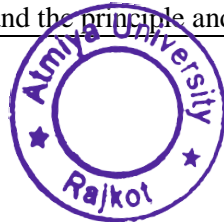
II		Core Practical 2: Combined Practical	<p>qualitative analysis and identification.</p> <ol style="list-style-type: none"> 2. Select & perform titrimetric analysis of metal ions and organic compounds. 3. Identify adulteration in food stuff and evaluate water quality as per international standards. 4. Comprehend the rate and order of elementary chemical reactions. 5. Perform scientific experiments and accurately record observation to infer results of the experiments. 	6	40	60
III	21BCHCC301	Core 5: Inorganic Chemistry (Ad)	<ol style="list-style-type: none"> 1. Understand the principle, theory and instrumentation of quantum chemistry. 2. Calculate microstate and ground state spectral term of multi electron system. 3. Remember basic idea of magneto chemistry and understand the properties of Organometallic compound. 4. Identify, interpret and evaluate the concepts of crystal field theory 5. Classify and apply knowledge of crystal field theory. 	4	40	60
III	21BCHCC302	Core 6: Analytical Chemistry (Ad)	<ol style="list-style-type: none"> 1. Learn separation by solvent extraction & fuel analysis techniques 2. Able to differentiate volumetric analysis with known electrochemical cells 3. Understand the electro analytical methods 4. Summarize the knowledge about various Opto-analytical 5. Understand and compare theory with practical the knowledge of polarimeter in polarography 	4	40	60
III	21BCHCC303	Core 7: Petrochemicals and Polymers (Ad)	<ol style="list-style-type: none"> 1. Understand and explain fundamental concept of Petroleum and describe basic terminologies of crude oil and petroleum refineries. 2. Understand fundamental technology behind the refinery of petroleum and Interpret the various Processing methods of Petroleum products 3. Summarize, Correlate and synthesizes several of aromatic compounds. 4. Recognize fundamental theory and significance of some industrial polymer and different kind of polymers and their properties 5. Illustrate properties of polymer compound through various methods of their analysis 	4	40	60



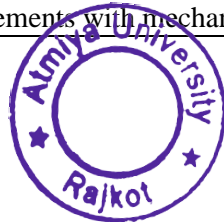
III	21BCHCC304	Core Practical 3: Combined Practical	<ol style="list-style-type: none"> 1. Identify radicals in mixture of inorganic salts. 2. Determine concentration of metal ion in solution and preparation of inorganic complexes. 3. Understanding the Calibration and performing of different instruments and also extraction method for various organic compounds. 4. Understanding the scientific methods for performing and calibration of various instruments. 5. Understanding, planning and performing experiments for preparation of different polymer material. 	3	40	60
III	21UFSDE303	DSE 1 (Cluster): Conceptual Inorganic & Organic Chemistry	<ol style="list-style-type: none"> 1. Calculate various concentrations of aqueous solutions in the acid-base chemistry. 2. Remember the various terminologies heterocyclic chemistry. 3. Understand the concept inorganic qualitative and quantitative analysis. 4. Understanding the fundamentals of electrochemistry and its application. 5. Understand basic concepts of surface chemistry and catalysis. 	4	40	60
IV	21BCHCC401	Core 8: Organic Chemistry(Ad)	<ol style="list-style-type: none"> 1. Recognize the basic concept of carbonyl compounds and active Methylene group for a chemical reaction. 2. Predict and synthesis of carboxylic acid and derivatives with help of different reagents. 3. Understanding of classification, properties and synthesis of nitrogen containing compounds 4. Identification Classification, properties and prediction of the products of alcohol and phenol with various synthetic paths. 5. Differentiate mechanisms of nucleophilic substitution and Elimination and the factors affecting it. 	4	40	60
IV	21BCHCC402	Core 9: Physical	<ol style="list-style-type: none"> 1. Recall law of thermodynamics (Zero and First) 2. Understand properties & behavior of chemical potential 3. Distinguish Free energy change and its applications in chemical reactions. 4. Classify the types of concentration cell and application of EMF. 5. Summarize photo Chemistry law and its application. 	4	40	60



		Chemistry(Ad)				
IV	21BCHCL401	Core Elective 1: Green Methods in Chemistry	<ol style="list-style-type: none"> 1. Retrieve and Understand basic principles of Green Chemistry. 2. Understand the principle and instrumentation of microwave reactor and microwave assisted organic synthesis. 3. Application of ionic liquids and green solvents in chemical industries. 4. Correlate use of eco-friendly green catalysts in synthesizing chemicals. 5. Building the chemical future in green synthesis. 	4	40	60
IV	21BCHCL402	Core Elective 1: Soil Analysis(Ad)	<ol style="list-style-type: none"> 1. Gain knowledge on rocks and minerals, their composition and the types of soils formed from different parent materials 2. Understand various soil physical, chemical and biological properties and their impact on plant growth 3. Imparts knowledge on essential nutrients, soil fertility, nutrient transformations in soil. 4. Describe the Organic Forms of Nitrogen, Mineralizable Nitrogen 5. Analyze Soil Health by applications of different Chemical Test 	4	40	60
IV	21BCHCC403	Core Practical 4: Combined Practical	<ol style="list-style-type: none"> 1. Identify bi functional organic compounds by chemical tests 2. Synthesize and identify organic compounds by physical and chemical experimental methods. 3. Understand principle of electrometric method. 4. Develop skill for the standardization of instrument. 5. To determine distribution co efficient by partition function. 	3	40	60
IV	21BCHCL403	Core Elective 1: Practical Green Methods in Chemistry	<ol style="list-style-type: none"> 1. Perform green synthesis of various green catalyst and solvent less reaction. 2. Applications of green catalyst and solvent less reaction. 3. Summarize microwave irradiation in chemical synthesis. 	1	40	60
	21BCHCL404		<ol style="list-style-type: none"> 1. Handle various machineries and equipment used in laboratory as well as commercial scale. 2. Understand the principle and instrumentation of Flame Photometer 			



IV		Core Elective 1: Practical Soil Analysis	<ol style="list-style-type: none"> Ability to understand testing methods for various metal ion Develop skill to identify the health of soil. Practical demonstrations on various aspects of soil testing were provided to the trainees for the purpose of developing skill and self-entrepreneurship for economic upliftment. 	1	40	60
IV	21UFSDE403	DSE 2 (Cluster): Conceptual Analytical & Physical Chemistry	<ol style="list-style-type: none"> Distinguishing various types of concentration of aqueous solutions and apply it in the acid-base chemistry. Recognize concepts of thermodynamics and thermo chemistry. Use concept of chemical kinetics and interpretation of rate of reaction by different methods. Execute the fundamentals of electrochemistry in various applications. Understand basics of surface chemistry 	4	40	60
V	21BCHCC501	Core 10: Spectral and Separation Techniques (Ad)	<ol style="list-style-type: none"> Understand the principle, fundamental theory of molecular spectroscopy and Ultraviolet spectroscopy. Understand and identify structural symmetry of various molecules. Calculate R_f values, Apply theoretical knowledge to design and develop suitable operating conditions for separation and identification of organic/natural compounds from multi-component mixtures. Understand the principle, fundamental theory and instrumentation of column chromatographic techniques & ion exchange chromatographic techniques. Understand and differentiate the importance and perfection of HPLC and GC techniques and various applications of separation techniques to medicinal and pharmaceutical field. 	4	40	60
V	21BCHCC502	Core 11: Synthetic Molecules (Ap)	<ol style="list-style-type: none"> Classification, synthesis and application of dyes. Understand the different explosives, perfumes, and sweetening agents with their synthesis and application. Well acquainted with the synthesis of some important class of drugs. Employ the core subject knowledge of antibiotic, antiviral, Antimalarial drugs. To understand various industrially important reactions and rearrangements with mechanism and application. 	4	50	50



V	21BCHCC503	Core 12:(Self-Study) Industrial Formulations (Ad)	<ol style="list-style-type: none"> 1. Understand and apply the concepts of soaps and detergents. 2. Interpret chemistry of binders to develop green coatings and its manufacturing. 3. Define and Compare applications, manufacturing and properties of refractories and ceramics. 4. Identify and recognize various types of cement and its properties. 5. Understand the types, manufacturing, properties and raw materials of glass. 	4	40	60
V	21BCHCL501	Core Elective 2: Unit Operation & Processes(Ad)	<ol style="list-style-type: none"> 1. Remember basic of equipment design and important parameters of equipment design for Filtration and Centrifuge. 2. Get adequate knowledge about the drying, mass transfer, distillation and extraction process. 3. Apply basic knowledge and predict the reaction mechanism of sulphonation and hydrogenation. 4. Correlate and Compare various methods for oxidation and hydrolysis for different substrate. 5. Understand manufacturing of various organic molecules by alkylation and Esterification. 	4	40	60
V	21BCHCL502	Core Elective 2: Surface Coating Techniques (Ad)	<ol style="list-style-type: none"> 1. Decide the surface preparation methods suitable for different substrate materials. 2. Summarize the basic concept of electroplating & interpret testing & evaluation. Explain importance of electroplating & its applications. 3. Student should able to discover formulations of Electrolyte based on different processes. 4. Student should able to understand the fundamental principles of Paint and Coating Formulation via classification and film formation mechanisms. 5. Basic understanding of designing Solvent, Brightener and Emulsifiers for formulation of various electrolytes 	4	40	60
			<ol style="list-style-type: none"> 1. Identification of unknown inorganic salt mixture of 6 radicals, to record observation and to prepare laboratory reports according to disciplinary standards. 	3	40	60



V	21BCHCC505	Core Practical 5: Combined Practical	<ol style="list-style-type: none"> Understanding the principle of capillary and partition action with solubility difference and identify the metals, organic molecules from mixtures and decide the reaction progress. Students able to decide and design the precursor for the produced synthetic molecule as well the route with confirmation of the synthesized molecule. To estimate the molecule available in the market and check purity. Synthesis and understand the important dyes molecule and their result on the sample. 			
V	21BCHCL503	Core Elective Practical 2: Unit Operation & Processes	<ol style="list-style-type: none"> Synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment, and modern instrumentation Interpret experimental results, perform calculations of results and draw reasonable, accurate conclusions. Built ability for planning and preparing various crystals by organic reagents and solutions. Correlate various distillation methods for separation of organic mixture. Understand, planning and performing experiments for preparation of organic molecule. 	1	20	30
V	21BCHCL504	Core Elective Practical 2: Surface Coating Techniques	<ol style="list-style-type: none"> Arrangement, Set-up instrumental and deterring place of each individual component, sample object and other electrodes for electroplating. Explicate experimental results, accomplish calculations on these results and draw reasonable, accurate conclusions. Follow guided procedures for coating surface of a metal object with another metal by electroplating. Analyze amount of available metal in plating bath by various chemical analysis methods. Determine quality of coating medium/bath by evaluating physicochemical parameters. 	1	20	30
	21BCHCR501		<ol style="list-style-type: none"> Participate in the projects in industries during his or her industrial 			



V		**Core Enrichment Course/Component 3: Internship /Training/ Industrial Visit	<p>training.</p> <ol style="list-style-type: none"> Describe use of advanced tools and techniques encountered during industrial training and visit. Interact with industrial personnel and follow engineering practices and discipline prescribed in industry. Develop awareness about general workplace behavior and build interpersonal and team skills. Prepare professional work reports and presentations. 			
V	21BCHCR502	Core Enrichment Course/Component 4: Minor Project/Dissertation / Review Article / Instrumental Training	<ol style="list-style-type: none"> Identify skills and capabilities that intersect effectively with the needs of industry. Apply the theoretical concepts to solve industrial problems with teamwork and multidisciplinary approach. Students will be able to practice acquired knowledge within the chosen area of technology for project development. Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach. Present the finding of their project in a written report. 			
VI	21BCHCC601	Core 14: Spectroscopic Techniques (Ap)	<ol style="list-style-type: none"> Study of Vibrating diatomic molecule, energy levels of a diatomic molecule, simple, harmonic and an harmonic oscillator, Scattering of light and Explanation of infrared spectrometer. Recognize the principle, elementary theory and instrumentation of NMR spectroscopy and compute its practical applications. Understand the principle & theory of Mass spectrometry and outline its instrumentation & applications in structural determination. Integrate theoretical knowledge of all spectroscopic techniques to deduce structure of organic molecules. Understand & Apply the principle, various types of Atomic Absorption & Atomic Emission Spectroscopy. 	4	50	50
	21BCHCC602		<ol style="list-style-type: none"> Generate IUPAC nomenclature for heterocyclic systems and illustrate the structure, physical & chemical properties and synthesis of three and four membered heterocycles. 			



VI		Core 15: Heterocyclic Chemistry (Ad)	<ol style="list-style-type: none"> Interpret the structure, stability, aromaticity, reactivity, physical & chemical properties, and synthesis of five-membered and fused five-membered heterocycles with one hetero atom. Relate the structure, stability, aromaticity, reactivity, physical & chemical properties, and synthesis of six-membered and fused six-membered heterocycles with one hetero atom. Identify suitable properties and synthesis for heterocycles containing two hetero atoms. Apply the use of five membered and six membered heterocyclic compounds. 	4	40	60
VI	21BCHCC603	Core 16: Chemistry of Natural Products (Ad)	<ol style="list-style-type: none"> Identify and characterize various classes of natural products by their structure and knows biosynthesis of the various classes of natural products. Illustrate chemical, biological, and physiological role, along with structural identity & occurrence of Alkaloid, Terpenoids, Carbohydrates, Amino acids, Peptides, Proteins and Plant pigments. Recognize isolation, separation, purification, and structure determination of the natural products like Carbohydrates, Amino acids, Peptides and Proteins. Identify and discuss different types of natural products, their occurrence, structure, properties and use of natural products as starting materials for medicines. Design and evaluate suitable conditions for extraction and isolation of Plant pigments from multi-component natural source. 	4	40	60
VI	21BCHCC604	Core Practical6: Combined Practical:	<ol style="list-style-type: none"> Identification and separation of unknown organic mixture of two compounds, to record observation and to prepare laboratory reports according to disciplinary standards. Synthesize important hetero compounds by different reaction steps. Understanding the principle of extraction of natural compounds from the natural plants, leaves, fruits, roots, shells, skins and seeds and 	6	80	120



			<p>comparative study for different solvents.</p> <p>4. Understand the theoretical principals of the instruments more clearly and acquainted by observing the working of the spectrophotometers with skilful tact of interpretation and establishment of the structure of unknown samples</p>			
VI	21BCHCC601	Core 14: Spectroscopic Techniques (Ap)	<p>1. Study of Vibrating diatomic molecule, energy levels of a diatomic molecule, simple, harmonic and anharmonic oscillator, Scattering of light and Explanation of infrared spectrometer.</p> <p>2. Recognize the principle, elementary theory and instrumentation of NMR spectroscopy and compute its practical applications.</p> <p>3. Understand the principle & theory of Mass spectrometry and outline its instrumentation & applications in structural determination.</p> <p>4. Integrate theoretical knowledge of all spectroscopic techniques to deduce structure of organic molecules.</p> <p>5. Understand & Apply the principle, various types of Atomic Absorption & Atomic Emission Spectroscopy.</p>	4	50	50
VI	21BCHCR601	*Core Enrichment 5: Project / Skill training / Start-up	<p>1. Apply critical and analytical skills in a scientific and professional manner.</p> <p>2. Critical apprising and interpretation of published literature.</p> <p>3. Synthesize knowledge and skills previously gained and applied to an in-depth study.</p> <p>4. Select from different methodologies and forms of analysis to produce a suitable method.</p> <p>5. Present the finding of their Project/Skill Training/Start-up in a written report.</p>	14	160	240



Faculty of Science
Department of Industrial Chemistry
Program: M.Sc. Industrial Chemistry

Graduate Attributes:

- He/she will have value based knowledge with integration of process safety considerations with environmental concerns.
- Chemical engineering knowledge: apply knowledge of Heat transfer, Mass transfer, Unit process and operations for the solution of industrial engineering problems.
- Design and development of synthesis: Design novel routes of specialty chemicals and organic compounds using green chemistry approach for the sustainable environment.
- Modern technique practice: select and utilize appropriate analytical, chemical and physical techniques, resources and instruments to identify and characterize unknown chemical substances.
- Life-long learner.

Program Objective: After completion of the programme the Graduate will be able to:

PO₁	Depth and breadth of knowledge: To develop strong fundamental knowledge of chemical engineering and chemistry as per current needs.
PO₂	Practice, Operation and usage of modern tools and technology: To enhance usage, practice and operation of modern tools and technology.
PO₃	Research, numeracy and scholarship: To categorize literature review and apply knowledge to plan new research methodologies in the field of chemistry and chemical engineering.



PO₄	Professional capacity and passion of learning: To augment professional capacity and love of learning skills.
PO₅	Global, moral and aesthetic sustainability: To imbibe moral and aesthetic values for global sustainability.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:	
PEO1	: Breadth and depth of domain knowledge: To develop strong fundamental knowledge of chemical engineering and chemistry as per current needs.
PEO2	: Practice, Operation and usage of modern tools and technology: To be familiar with usage, practice and operation of modern tools and technology.
PEO3	: Research, numeracy and scholarship: To categorize literature review and apply knowledge to plan new research methodologies in the field of chemistry and chemical engineering.
PEO4	: Professional capacity and passion of learning: To enhance professional capacity and love learning skills.
PEO5	: Global, moral and aesthetic sustainability: To be enrich with moral and aesthetic values for global sustainability.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:	
PO1	: Develop fluency for the basics of chemical engineering including unit operation, mechanical operation, fluid mechanics and



		heat transfer operations.
PO2	:	Interpret the fundamental concepts chemistry including polymer, petroleum, dyes, pharmaceuticals, organic, analytical and medicinal chemistry
PO3	:	Know and follow the proper procedures and regulations for safe handling and use of chemicals
PO 4:	:	Demonstrate the ability to apply the fundamental chemistry knowledge at an advanced level
PO 5:	:	Able to use modern instrumentation and classical techniques, to design experiments, and to properly record the results of their experiment in chemistry domain
PO 6:	:	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
PO 7:	:	Interpret chemical information from peer-reviewed publications
PO 8:	:	Develop students as an effective researcher at 360°
PO 9:	:	Recognition of the need for and an ability to engage in life-long learning
PO 10:	:	Communicate chemistry topics effectively, both verbally and in writing
PO 11:	:	Understand the ethical, historic, philosophical and environmental dimensions of problems and issues facing chemists
PO 12:	:	Broad education necessary to understand the impact of chemistry and chemical engineering solutions in a global, economic, environmental and societal context



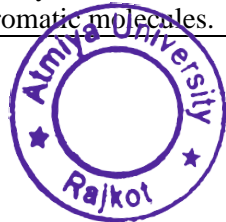
Programme Specific Outcome (PSOs):

PSO-Side Heading	PSO no.	PSO Detail
Fundamental Knowledge	PSO₁	Develop skills of chemical engineering including unit operation, unit processes, reactor designing, process calculation, process control and mathematical modelling.
	PSO₂	Interpret the fundamental concepts of chemistry including organic, physical, inorganic, analytical, polymer, petroleum, dyes, and pharmaceuticals, medicinal and material science.
Technical Skill	PSO₃	Know and follow the standard operating procedures and safety regulations for effective handling and use of chemicals.
	PSO₄	Demonstrate the ability to apply the chemistry knowledge at an advanced level.
Research Skill	PSO₅	Able to use modern instrumentation and classical techniques, to design experiments, and to properly record the results of their experiment in chemistry and chemical engineering domain.
	PSO₆	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
Critical Thinking	PSO₇	Interpret chemical information from peer-reviewed publications.
Effective Communication	PSO₈	Communicate chemistry and chemical engineering topics effectively, both verbally and in writing.
	PSO₉	Recognition of the need for, and an ability to engage in life-long learning
Ethics	PSO₁₀	Understand the ethical, historic, philosophical, and environmental dimensions of problems for global solutions in an economic, environmental, and societal context.



Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21MICCC101	Core 1: Stoichiometry & Transport Phenomena(F)	<ol style="list-style-type: none"> 1. Understand the elementary concepts of material balance with and without chemical reactions. 2. Apply various fluid flow theorem to produce mathematical equation of a fluid flow system 3. Illustrate the flow measuring, pumping and compressing systems 4. Summarize the fluidization and its application 5. Solve the fluid flow problems using dimensional analysis method 	4	40	60
I	21MICCC102	Core 2: Industrial Unit Operations (Ad)	<ol style="list-style-type: none"> 1. Recall and Understand fundamentals of mass transfer operations. 2. Explain principles of mass transfer to equipments used in gas absorption, distillation column, extraction, drying, and filtration operation. 3. Understand fundamentals of heat transfer operations. 4. Apply empirical equations to solve heat transfer problems in conduction, convection and radiation modes. 5. Design and analyze the performance of heat exchangers. 	4	40	60
I	21MICCC103	Core 3: Organic & Retrosynthesis (F)	<ol style="list-style-type: none"> 1. Understand the formation and reactivity and stability of nucleophiles, electrophiles, carbene, nitrene, ylides and alkynes. 2. Design syntheses of organic molecules and Understand mechanism of organic reactions. 3. Demonstrate Principles, mechanism and applications of various name reactions. 4. Demonstrate principles and mechanism of rearrangements and their applications 5. Analyze the disconnection and synthesis of various organic aromatic molecules. 	4	40	60



I	21MICCC104	Core Practical 1: HTO, MTO	<ol style="list-style-type: none"> 1. Plan experiments and present the experimental data meaningfully. 2. Apply theoretical concepts for data analysis and interpretation. 3. Visualize and understand chemical engineering unit operations related to heat transfer operation, and mass transfer operation. 4. To critically evaluate data collected. 5. Employ safe laboratory practices handling laboratory glassware, equipment, and chemical reagents to perform common laboratory techniques. 	3	40	60
I	21MICCC105	Core Practical 2: OS, FM	<ol style="list-style-type: none"> 1. Recognize experiments and present the experimental data meaningfully. 2. Identify theoretical concepts for data analysis and interpretation. 3. Apply and demonstrate chemical engineering unit operations related to fluid and particle mechanics, and mass transfer operations such as extraction. 4. To critically analyze data collected to determine the identity, purity, and yield of products. 5. Manage safe laboratory practices handling laboratory glassware, equipment, and chemical reagents to perform common laboratory techniques, including recrystallization, vacuum filtration, aqueous extraction, thin layer chromatography, column chromatography. 	3	40	60



I	21MICCE101	Scientific Writing (F)	<ol style="list-style-type: none"> 1. Investigate literature search using NLIST, NPTEL, Science Direct and various E-resources. 2. Understand variance between various Full paper, article, patent, communication and review article. 3. Understand the IPR policy, patent filling, significance and Intellectual patent applications. 4. Competent to draw various chemical structure, various assembly, chrial compounds, laboratory apparatus using ChemBioDraw, Chem Sketch. 5. Understand the application of chembiodraw and chemsketch for drawing reactions in various scientific journals. 	2	NA	NA
II	21MICCC201	Core 4: Heterocyclic Chemistry (Ad)	<ol style="list-style-type: none"> 1. Understand basic concept of heterocyclic chemistry and nomenclature of heterocyclic compounds using systematic IUPAC nomenclature including Five member, Six member, Benzofused five membered and six membered heterocycles. 2. Describing the classification of heterocyclic compounds according to their different types. 3. Practice to draw the heterocyclic compound's structure from name and identify the name from structure using IUPAC system. 4. Showing the multiple methods of preparation of heterocyclic compounds. 5. Identfyand recognize the chemical properties and reactivity of heterocyclic compounds using heterocyclic concept. Analyze the disconnection of heteroaromatic compounds. 	4	40	60



II	21MICCC202	Core 5: Mechanical Operations (Ad)	<ol style="list-style-type: none"> 1. Understand basic knowledge of various mechanical operations. 2. Analyze the practical importance and relevance of unit operations used for crushing, grinding and size separation in chemical industry. 3. Classify the particles based on its size in equipments. 4. Illustrate detailed overview of equipment used to perform various mechanical operations and problems associated during the implementation and applications. 5. Compare theoretical and practical concept used in industries involving mechanical operations. 	3	50	50
II	21MICCC203	Core 6: Technologies in Chemical Industries (Ad)	<ol style="list-style-type: none"> 1. Apply resources and need for membrane technology in water treatment in other process industrial plants. 2. Understand the principles of nanotechnology; characterization of nanostructured materials; and tools and equipment for producing and assembling at the nano scale. 3. Cultivate interest in the research and development of nanotechnology for future advancement of the career. 4. Understand the formulation technology used in Agrochemical industries 5. Promote interests of the fermentations, types of reactors in fermentation industries. 	3	50	50



II	21MICCC204	Core 7: Unit Processes & Reagents (Ad)	<ol style="list-style-type: none"> 1. Understand the advanced concepts of unit processes like Halogenation, Alkylation & Acylation 2. Understand the advanced concepts of unit processes like Oxidation, Hydrogenation & Reduction 3. Apply the advanced concepts of unit processes like Nitration, Sulphonation & Esterification 4. Apply the advanced concepts of organic reagents-I 5. Apply the advanced concepts of organic reagents-II 	3	50	50
II	21MICCC205	Core-Practical-3 MO & TCI	<ol style="list-style-type: none"> 1. Remember the advanced concepts of Mechanical crushers. 2. Understand the advanced concepts of Mechanical shakers. 3. Apply the advanced concepts of Mechanical separator. 4. Apply the advanced concepts of preparation of Metallic oxides NPs. 5. Apply the advanced concepts of characterization of NPs. 	3	40	60
II	21MICCC206	Core-Practical-4 MS & PC	<ol style="list-style-type: none"> 1. Remember the advanced concepts of Name reactions & rearrangements. 2. Understand the advanced concepts of multistage synthesis. 3. Apply the advanced concepts of physico-chemical exercise. 4. Apply the advanced concepts of Potentiometry, conductometry and refractometry. 5. Apply the advanced concepts of polarimeter. 	3	40	60
III	21MICCC301	Core 8: Polymer Chemistry & Technology (Ap)	<ol style="list-style-type: none"> 1. Understand step-growth and chain polymerization, with respect to mechanism and kinetics. 2. Understand polymer manufacturing processes 3. Produce synthetic polymers 4. Understand extrusion process of polymer 5. Create biodegradable and non biodegradable polymers 	3	50	50



III	21MICCC302	Core 9: Chemical Reaction Engineering (Ap)	<ol style="list-style-type: none"> 1. Apply concepts in reaction kinetics and classify reactions according to different properties. 2. Calculate the reaction rate constant and reaction activation energy using given temperature-based data. 3. Designing experiments involving chemical reactors, and analyzing and interpreting data. 4. Determine conversion and yield for chemical reactions. 5. Apply kinetic concepts in heterogeneous reactions. 	3	50	50
III	21MICCC303	Core 10: Instrumental Techniques of Analysis (Ap)	<ol style="list-style-type: none"> 1. Understand to identify the basic components of spectroscopic instrumentations. 2. Demonstrate a working knowledge of spectrometry techniques. 3. Understand a working knowledge of chromatography techniques. 4. Understand the processes responsible for NMR chemical shifts and splitting patterns 5. Understand the basic concepts of GC and HPLC techniques and its applications. 	4	50	50
III	21MICCC304	Core 11: Industrial Safety & Management (Self Study) (Ap)	<ol style="list-style-type: none"> 1. Understand Intrinsic & Extrinsic Safety, Hazards, Risk assessment methods and MSDS. 2. Understand the various process safety devices and process safety analysis method. 3. Understand the importance of GLP & GMP in industries 4. Apply the knowledge when necessity of shut down the plant 5. Understand the disaster management 	3	50	50
III	21MICDC301	DSE-Core 1: Chemical Technology-I (Ad)	<ol style="list-style-type: none"> 1. Analyze the advanced concepts of drugs and pharmaceuticals I 2. Analyze the advanced concepts of drugs and pharmaceuticals-II 3. Analyze the advanced concepts of essential oil and isolation of natural products 4. Evaluate the advanced concepts of Natural & Synthetic perfumes 5. Evaluate the advanced concepts of heat treatments & non-destructive testing technology 	4	40	60



III	21MICDC302	DSE-Core 2: Pharmaceutical Technology	<ol style="list-style-type: none"> 1. Discuss the fundamental principles for dosage form design, drug release and drug delivery. 2. Classify different dosage forms and apply principles of pharmaceutical science in formulation and dispensing the various dosage forms 3. Apply the engineering principles for formulation of solutions, suspensions and emulsions, granules and tablets 4. Formulate the dosage forms for a given API based on its properties 5. Develop a formulation process for a given API 			
III	21MICCC305	Core Practical 5: CT, PC & RE	<ol style="list-style-type: none"> 1. Create the advanced concepts of synthesis of various dyes. 2. Apply the advanced concepts of dyeing processes of synthesized dye. 3. Analyze the advanced concepts of polymer preparation by suspension and emulsion techniques. 4. Evaluate the advanced concepts of polymer preparation by Emulsion and bulk techniques. 5. Create the advanced concepts of Reaction Engineering. 	3	40	60
III	21MICCC306	Core Practical 6: ITA	<ol style="list-style-type: none"> 1. Create the advanced processes for separation of amino acids by of ascending chromatography. 2. Evaluate the advanced concepts of analytical separation. 3. Apply advanced knowledge of separation of mixture of amino acids. 4. Create the advanced processes for separation of amino acids by of Radial chromatography. 5. Apply advanced concepts of measurement of the Rf value. 	1	20	30



III	21MICCC307	Industrial Training	<ol style="list-style-type: none"> 1. Demonstrate the ability to apply concepts from chemical theory and industrial chemistry practices to real-world industrial processes, including chemical reactions, product formulation, and process optimization. 2. Gain hands-on experience with industrial-scale equipment, chemical reactors, and modern tools used in chemical manufacturing, learning to safely operate and maintain these systems. 3. Develop problem-solving skills to address challenges in industrial chemistry, such as process inefficiencies, raw material management, and sustainable production techniques. 4. Understand and apply industry standards for health, safety, and environmental protection, including adherence to local and international regulatory frameworks. 5. Develop reporting and presentation skills by preparing technical reports and delivering presentations on industrial experiences, including process outcomes, challenges faced, and solutions implemented. 	4 ^ Industrial Training is an extra credit non-compulsory course	NA	NA
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IV	21MICCC401	Core 12: Dissertation (Ap)	<ol style="list-style-type: none"> 1. Demonstrate the ability to independently design and execute research projects in the field of industrial chemistry, including defining research objectives, hypotheses, and methodologies. 2. Utilize in-depth chemical knowledge and industrial principles to address complex problems related to chemical processes, materials, or products, with a focus on innovation and practical applications. 3. Gain expertise in collecting, analyzing, and interpreting experimental or computational data, critically evaluating research outcomes to draw meaningful conclusions relevant to industrial practices. 4. Propose innovative and sustainable solutions to improve chemical processes, production efficiency, or environmental impact, integrating concepts of green chemistry and process optimization. 5. Follow best practices in research ethics, safety regulations, and responsible conduct, ensuring compliance with both academic and industrial standards. 	10	60	90
IV	21MICCC402	Core 13: Process Dynamics & Control (Ap)	<ol style="list-style-type: none"> 1. To demonstrate fundamental understanding of process control. 2. Know the concept related process, steady state, unsteady state, feed-back control. 3. Use Laplace Transform and other properties of it. 4. Obtain transfer functions related to the first order system. 5. Analyze a chemical reactor system controlled with the advanced control strategies. 	4	50	50
IV	21MICCC403	Core 14: Advance Organic Chemistry (Ap)	<ol style="list-style-type: none"> 1. Understand the advanced concepts of stereoisomerism. 2. Analyze the basic technology of cyclostereoisomerism. 3. Apply the fundamental technology of green chemistry. 4. Evaluate and create the concepts of methods in organic synthesis. 5. Evaluate and create the basic concepts of oxidizing & reducing reagents. 	4	50	50



IV	21MICDC401	DSE Core - 2: Chemical Technology-II (Ad)	<ol style="list-style-type: none"> 1. Understand the advanced concepts of ceramic & refractories industries. 2. Analyze the basic technology of soap & detergents industries. 3. Apply the fundamental technology of paint industries. 4. Evaluate and create the concepts of pigment industries. 5. Evaluate and create the basic concepts and technology of sugar industries. 	4	40	60
IV	21MICDC402	DSE Core - 2: Chemistry of Synthetic Drug (Ad)	<ol style="list-style-type: none"> 1. Classify type of disease and drugs 2. Employ the core subject knowledge of anticancer and anti-infectious, Cardiovascular and the drugs affecting on metabolic disease. 3. Well acquainted with the synthesis of some important class of drugs. 4. Knowledge about the mechanism pathways of disease and curing by medicinal compounds. 5. Critically evaluate modern methods of functional group transformations and the application of protecting groups in Drug synthesis. 	4	40	60
IV	21MICCE401	CEC- 2: STC/ Online Courses / Professional Certification Courses	<ol style="list-style-type: none"> 1. Prepare samples for IR analysis using different cells and functional group identification by analysis of spectra. 2. Knowledge about working & characteristic of each part of Gas chromatography and able to handle the instruments and can separate the mixtures of multi compounds. 3. Able to handle the Mass spectrophotometer and knowledge of working phenomena of each part of instrument. 4. Analyses the sample quantitatively to find out the % by different methods and calculations and identify it qualitatively. Preparation of sample solution of different concentrations. 5. Able to handle the instrument and identify the various elements in sample applying knowledge. 	2	NA	NA



Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	18MICCC101	Core 2: Stoichiometry & Transport Phenomena	<ol style="list-style-type: none"> 1. Understand the elementary concepts of material balance with and without chemical reactions. 2. Apply various fluid flow theorem to produce mathematical equation of a fluid flow system 3. Illustrate the flow measuring, pumping and compressing systems 4. Summarize the fluidization and its application 5. Solve the fluid flow problems using dimensional analysis method 	4	40	60
I	18MICCC102	Core 2: Industrial Unit Operations	<ol style="list-style-type: none"> 1. Recall and Understand fundamentals of mass transfer operations. 2. Explain principles of mass transfer to equipments used in gas absorption, distillation column, extraction, drying, and filtration operation. 3. Understand fundamentals of heat transfer operations. 4. Apply empirical equations to solve heat transfer problems in conduction, convection and radiation modes. 5. Design and analyze the performance of heat exchangers. 	4	40	60
I	18MICCC103	Core 3: Organic & Retrosynthesis	<ol style="list-style-type: none"> 1. Understand the formation and reactivity and stability of nucleophiles, electrophiles, carbene, nitrene, ylides and alkynes. 2. Design syntheses of organic molecules and Understand mechanism of organic reactions. 3. Demonstrate Principles, mechanism and applications of various name reactions. 4. Demonstrate principles and mechanism of rearrangements and their applications 5. Analyze the disconnection and synthesis of various organic aromatic molecules. 	4	40	60



I	18MICCC104	Core Practical 1: HTO, MTO	<ol style="list-style-type: none"> 1. Plan experiments and present the experimental data meaningfully. 2. Apply theoretical concepts for data analysis and interpretation. 3. Visualize and understand chemical engineering unit operations related to heat transfer operation, and mass transfer operation. 4. To critically evaluate data collected. 5. Employ safe laboratory practices handling laboratory glassware, equipment, and chemical reagents to perform common laboratory techniques. 	3	40	60
I	18MICCC105	Core Practical 2: OS, FM	<ol style="list-style-type: none"> 1. Recognize experiments and present the experimental data meaningfully. 2. Identify theoretical concepts for data analysis and interpretation. 3. Apply and demonstrate chemical engineering unit operations related to fluid and particle mechanics, and mass transfer operations such as extraction. 4. To critically analyze data collected to determine the identity, purity, and yield of products. 5. Manage safe laboratory practices handling laboratory glassware, equipment, and chemical reagents to perform common laboratory techniques, including recrystallization, vacuum filtration, aqueous extraction, thin layer chromatography, column chromatography. 	3	40	60
I	18MICCE01	Scientific Writing	<ol style="list-style-type: none"> 1. Investigate literature search using NLIST, NPTEL, Science Direct and various E-resources. 2. Understand variance between various Full paper, article, patent, communication and review article. 3. Understand the IPR policy, patent filling, significance and Intellectual patent applications. 4. Competent to draw various chemical structure, various assembly, chrial compounds, laboratory apparatus using ChemBioDraw, Chem Sketch. 5. Understand the application of chembiodraw and chemsketch for drawing reactions in various scientific journals. 	2	NA	NA



II	18MICCC201	Core 4: Heterocyclic Chemistry	<ol style="list-style-type: none"> 1. Understand basic concept of heterocyclic chemistry and nomenclature of heterocyclic compounds using systematic IUPAC nomenclature including Five member, Six member, Benzofused five membered and six membered heterocycles. 2. Describing the classification of heterocyclic compounds according to their different types. 3. Practice to draw the heterocyclic compound's structure from name and identify the name from structure using IUPAC system. 4. Showing the multiple methods of preparation of heterocyclic compounds. 5. Identify and recognize the chemical properties and reactivity of heterocyclic compounds using heterocyclic concept. Analyze the disconnection of heteroaromatic compounds. 	4	40	60
II	18MICCC202	Core 5: Mechanical Operations	<ol style="list-style-type: none"> 1. Understand basic knowledge of various mechanical operations. 2. Analyze the practical importance and relevance of unit operations used for crushing, grinding and size separation in chemical industry. 3. Classify the particles based on its size in equipments. 4. Illustrate detailed overview of equipment used to perform various mechanical operations and problems associated during the implementation and applications. 5. Compare theoretical and practical concept used in industries involving mechanical operations. 	3	50	50
II	18MICCC203	Core 6: Technologies in Chemical Industries	<ol style="list-style-type: none"> 1. Apply resources and need for membrane technology in water treatment in other process industrial plants. 2. Understand the principles of nanotechnology; characterization of nanostructured materials; and tools and equipment for producing and assembling at the nano scale. 3. Cultivate interest in the research and development of nanotechnology for future advancement of the career. 4. Understand the formulation technology used in Agrochemical industries 5. Promote interests of the fermentations, types of reactors in fermentation industries. 	3	50	50



II	18MICCC204	Core 7: Unit Processes & Reagents	<ol style="list-style-type: none"> 1. Understand the advanced concepts of unit processes like Halogenation, Alkylation & Acylation 2. Understand the advanced concepts of unit processes like Oxidation, Hydrogenation & Reduction 3. Apply the advanced concepts of unit processes like Nitration, Sulphonation & Esterification 4. Apply the advanced concepts of organic reagents-I 5. Apply the advanced concepts of organic reagents-II 	3	50	50
II	18MICCC205	Core-Practical-3 MO & TCI	<ol style="list-style-type: none"> 1. Remember the advanced concepts of Mechanical crushers. 2. Understand the advanced concepts of Mechanical shakers. 3. Apply the advanced concepts of Mechanical separator. 4. Apply the advanced concepts of preparation of Metallic oxides NPs. 5. Apply the advanced concepts of characterization of NPs. 	3	40	60
II	18MICCC206	Core-Practical-4 MS & PC	<ol style="list-style-type: none"> 1. Remember the advanced concepts of Name reactions & rearrangements. 2. Understand the advanced concepts of multistage synthesis. 3. Apply the advanced concepts of physico-chemical exercise. 4. Apply the advanced concepts of Potentiometry, conductometry and refractometry. 5. Apply the advanced concepts of polarimeter. 	3	40	60
III	18MICCC301	Core 8: Polymer Chemistry & Technology	<ol style="list-style-type: none"> 1. Understand step-growth and chain polymerization, with respect to mechanism and kinetics. 2. Understand polymer manufacturing processes 3. Produce synthetic polymers 4. Understand extrusion process of polymer 5. Create biodegradable and non biodegradable polymers 	3	50	50
III	18MICCC302	Core 9: Chemical Reaction Engineering	<ol style="list-style-type: none"> 1. Apply concepts in reaction kinetics and classify reactions according to different properties. 2. Calculate the reaction rate constant and reaction activation energy using given temperature-based data. 3. Designing experiments involving chemical reactors, and analyzing and interpreting data. 4. Determine conversion and yield for chemical reactions. 5. Apply kinetic concepts in heterogeneous reactions. 	3	50	50



III	18MICCC303	Core 10: Instrumental Techniques of Analysis	<ol style="list-style-type: none"> 1. Understand to identify the basic components of spectroscopic instrumentations. 2. Demonstrate a working knowledge of spectrometry techniques. 3. Understand a working knowledge of chromatography techniques. 4. Understand the processes responsible for NMR chemical shifts and splitting patterns 5. Understand the basic concepts of GC and HPLC techniques and its applications. 	4	50	50
III	18MICCC304	Core 11: Industrial Safety & Management (Self Study)	<ol style="list-style-type: none"> 1. Understand Intrinsic & Extrinsic Safety, Hazards, Risk assessment methods and MSDS. 2. Understand the various process safety devices and process safety analysis method. 3. Understand the importance of GLP & GMP in industries 4. Apply the knowledge when necessity of shut down the plant 5. Understand the disaster management 	3	50	50
III	18MICDC301	DSE-Core 1: Chemical Technology-I	<ol style="list-style-type: none"> 1. Analyze the advanced concepts of drugs and pharmaceuticals I 2. Analyze the advanced concepts of drugs and pharmaceuticals-II 3. Analyze the advanced concepts of essential oil and isolation of natural products 4. Evaluate the advanced concepts of Natural & Synthetic perfumes 5. Evaluate the advanced concepts of heat treatments & non-destructive testing technology 	4	40	60
III	18MICDC302	DSE-Core 2: Pharmaceutical Technology	<ol style="list-style-type: none"> 1. Discuss the fundamental principles for dosage form design, drug release and drug delivery. 2. Classify different dosage forms and apply principles of pharmaceutical science in formulation and dispensing the various dosage forms 3. Apply the engineering principles for formulation of solutions, suspensions and emulsions, granules and tablets 4. Formulate the dosage forms for a given API based on its properties 5. Develop a formulation process for a given API 			



III	18MICCC305	Core Practical 5: CT, PC & RE	<ol style="list-style-type: none"> 1. Create the advanced concepts of synthesis of various dyes. 2. Apply the advanced concepts of dyeing processes of synthesized dye. 3. Analyze the advanced concepts of polymer preparation by suspension and emulsion techniques. 4. Evaluate the advanced concepts of polymer preparation by Emulsion and bulk techniques. 5. Create the advanced concepts of Reaction Engineering. 	3	40	60
III	18MICCC306	Core Practical 6: ITA	<ol style="list-style-type: none"> 1. Create the advanced processes for separation of amino acids by of ascending chromatography. 2. Evaluate the advanced concepts of analytical separation. 3. Apply advanced knowledge of separation of mixture of amino acids. 4. Create the advanced processes for separation of amino acids by of Radial chromatography. 5. Apply advanced concepts of measurement of the Rf value. 	1	20	30
III	18MICCC307	Industrial Training	<ol style="list-style-type: none"> 1. Demonstrate the ability to apply concepts from chemical theory and industrial chemistry practices to real-world industrial processes, including chemical reactions, product formulation, and process optimization. 2. Gain hands-on experience with industrial-scale equipment, chemical reactors, and modern tools used in chemical manufacturing, learning to safely operate and maintain these systems. 3. Develop problem-solving skills to address challenges in industrial chemistry, such as process inefficiencies, raw material management, and sustainable production techniques. 4. Understand and apply industry standards for health, safety, and environmental protection, including adherence to local and international regulatory frameworks. 5. Develop reporting and presentation skills by preparing technical reports and delivering presentations on industrial experiences, including process outcomes, challenges faced, and solutions implemented. 	4 ^ Industrial Training is an extra credit non-compulsory course	NA	NA



IV	18MICCC401	Core 12: Dissertation	<ol style="list-style-type: none"> 1. Demonstrate the ability to independently design and execute research projects in the field of industrial chemistry, including defining research objectives, hypotheses, and methodologies. 2. Utilize in-depth chemical knowledge and industrial principles to address complex problems related to chemical processes, materials, or products, with a focus on innovation and practical applications. 3. Gain expertise in collecting, analyzing, and interpreting experimental or computational data, critically evaluating research outcomes to draw meaningful conclusions relevant to industrial practices. 4. Propose innovative and sustainable solutions to improve chemical processes, production efficiency, or environmental impact, integrating concepts of green chemistry and process optimization. 5. Follow best practices in research ethics, safety regulations, and responsible conduct, ensuring compliance with both academic and industrial standards. 	10	60	90
IV	18MICCC402	Core 13: Process Dynamics & Control	<ol style="list-style-type: none"> 1. To demonstrate fundamental understanding of process control. 2. Know the concept related process, steady state, unsteady state, feed-back control. 3. Use Laplace Transform and other properties of it. 4. Obtain transfer functions related to the first order system. 5. Analyze a chemical reactor system controlled with the advanced control strategies. 	4	50	50
IV	18MICCC403	Core 14: Advance Organic Chemistry	<ol style="list-style-type: none"> 1. Understand the advanced concepts of stereoisomerism. 2. Analyze the basic technology of cyclosteroisomerism. 3. Apply the fundamental technology of green chemistry. 4. Evaluate and create the concepts of methods in organic synthesis. 5. Evaluate and create the basic concepts of oxidizing & reducing reagents. 	4	50	50



IV	18MICDC401	DSE Core - 2: Chemical Technology-II	<ol style="list-style-type: none"> 1. Understand the advanced concepts of ceramic & refractories industries. 2. Analyze the basic technology of soap & detergents industries. 3. Apply the fundamental technology of paint industries. 4. Evaluate and create the concepts of pigment industries. 5. Evaluate and create the basic concepts and technology of sugar industries. 	4	40	60
IV	18MICDC402	DSE Core - 2: Chemistry of Synthetic Drug	<ol style="list-style-type: none"> 1. Classify type of disease and drugs 2. Employ the core subject knowledge of anticancer and anti-infectious, Cardiovascular and the drugs affecting on metabolic disease. 3. Well acquainted with the synthesis of some important class of drugs. 4. Knowledge about the mechanism pathways of disease and curing by medicinal compounds. 5. Critically evaluate modern methods of functional group transformations and the application of protecting groups in Drug synthesis. 	4	40	60
IV	18MICCE02	CEC- 2: STC/ Online Courses / Professional Certification Courses	<ol style="list-style-type: none"> 1. Prepare samples for IR analysis using different cells and functional group identification by analysis of spectra. 2. Knowledge about working & characteristic of each part of Gas chromatography and able to handle the instruments and can separate the mixtures of multi compounds. 3. Able to handle the Mass spectrophotometer and knowledge of working phenomena of each part of instrument. 4. Analyses the sample quantitatively to find out the % by different methods and calculations and identify it qualitatively. Preparation of sample solution of different concentrations. 5. Able to handle the instrument and identify the various elements in sample applying knowledge. 	2	NA	NA



Department of Industrial Chemistry
Program: B.Sc. Industrial Chemistry

Program Objective:

- The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:
- To uphold the values embodied in the institute's vision and mission.
- To imparting knowledge of both pure science and engineering to support lifelong learning while maintaining high professional ethical standards.
- To work in a team using common tools and environments to achieve project/organizational objectives.
- To pursue life-long learning as a means of enhancing the knowledge base and skills necessary to contribute to the improvement of their profession and community ensuring essential knowledge to pursue M.Sc. & thereafter Ph.D. degree in Industrial Chemistry in progression.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life-Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking
- **Sense of purpose & curiosity:** Possess intellectual curiosity to apply the knowledge to generate, develop and realize new ideas
- **Ethics & lifelong immersive learning:** Adhered to highest standards of ethics and always amenable to new ideas and actively seek out new ways of learning
- **Collaborative lifelong learning:** Search and critically appraise skill, ideas, concept and information associated with discipline.



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation		
PEO 1	:	Core competency: Develop skills of chemical sciences including unit operations, unit processes, mass & energy balance, and mathematical modelling.
PEO 2	:	Breadth of knowledge: Interpret the fundamental concepts of industrial chemistry including sustainable energy sources, heavy & fine chemicals, analytical, polymer, petroleum, dyes, pharmaceutical and material science.
PEO 3	:	Preparedness: will reflect professional behaviour and have the potential to show preparedness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities.
PEO 4	:	Professionalism: will reflect values and responsibilities in the character to make them fit to work in a multidisciplinary team and to become socio-ethically responsible citizen.
PEO 5	:	Learning environment: will show attitude of self-learning abilities and keep themselves abreast with new development in all spheres of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO 1	:	Domain knowledge: Demonstrate the knowledge of concepts, principles, and applications of chemical sciences in various fields
PO 2	:	Problem analysis: Acquire critical thinking skills to understand and solve contemporary problems with chemical sciences domain knowledge and skills
PO 3	:	Design/development of solutions: Understand the complex chemical sciences problem and design structured mechanisms or processes that meet the specified needs



PO 4	:	Conduct investigations of complex problems: Gain ability to design, conduct experiments, analyse, and interpret data for investigating problems in chemical sciences sectors.
PO 5	:	Modern tool usage: Understand standard operating procedures and acquire in-depth technical competence to handle the basic laboratory instruments
PO 6	:	The Chemical Sciences Professional and society: Understand own role in society and act in an honest and consistent manner based on a strong sense of self and personal values.
PO 7	:	Environment and sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development.
PO 8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the chemical sciences practice.
PO 9	:	Individual and teamwork: Able to function effectively as individual and as a member in multidisciplinary environment.
PO 10	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large.
PO 11	:	Project management and finance: Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environment.
PO 12	:	Life-long learning: Able to recognize the need to undertake life-long learning and acquire the capacity to do so.



Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO 1	:	Acquire knowledge on the fundamentals of chemical sciences for sound and solid base which enables them to understand the emerging pure sciences and chemical engineering concepts.
PSO 2	:	Equip the students to pursue higher education and research in reputed institutes at national and international level.
PSO 3	:	Understand knowledge of chemical sciences to find innovative solutions for environment & industry related issues.
PSO 4	:	Deduce the possibilities and impression of chemical sciences revolutions for finding sustainable ethical solutions to existing problem.
PSO 5	:	Explore problems related to chemical sciences and provide effective solution through industry-academia interactions.

Course Outcomes (COs):

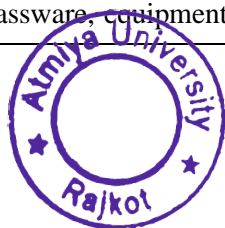
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGIC101	Industrial Chemistry (F)	<ol style="list-style-type: none"> 1. Understand SDG-2030 Goal 7 2. Summarize various industrial as well as domestic energy sources 3. Understand the processes to procure fuels from various sources 4. Recognize quality and specifications of various fuels 5. Determining Indian and international energy science. 	4	30	70
I	23UGIC102	Industrial Chemistry Practical	<ol style="list-style-type: none"> 1. Plan experiments and present the experimental data meaningfully. 2. Apply theoretical concepts for data analysis and interpretation. 3. Visualize and understand sustainable and fossil energy 	2	80	120



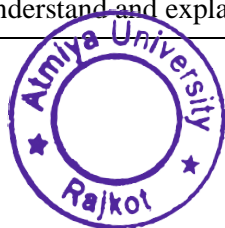
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
			<p>sources & Surface Chemistry concepts.</p> <p>4. Critically evaluate data collected.</p> <p>5. Employ safe laboratory practices handling laboratory glassware, equipment, and chemical reagents to perform common laboratory techniques.</p>			
II	23UGIC201	Industrial Chemistry (F)	<p>1. Compare direct and indirect methods of measurement of industrial parameters</p> <p>2. Explain role of Industrial instrumentation including Temperature, Pressure, Viscosity, Liquid level and Density</p> <p>3. Calibrate of the instruments applied for Temperature, Pressure, Viscosity, Liquid level and Density measurement</p> <p>4. Gain knowledge of techniques used for the measurement of industrial parameters.</p> <p>5. Determine conversion of units for measurement of industrial parameters.</p>	3	30	70
II	23UGIC202	Industrial Chemistry Practical	<p>1. Plan experiments and present the experimental data meaningfully.</p> <p>2. Apply theoretical concepts for data analysis and interpretation.</p> <p>3. Visualize and understand sustainable and fossil energy sources & Surface Chemistry concepts.</p> <p>4. Critically evaluate data collected.</p> <p>5. Employ safe laboratory practices handling laboratory glassware, equipment, and chemical reagents to perform common laboratory techniques.</p>	2	80	120
III	23UGIC301	Industrial Chemistry-III: Unit Operations (Ad)	<p>1. 1. Operate efficiently distillation column and absorber column</p> <p>2. 2. Operate efficiently equipments for crystallization and</p>	4	30	70



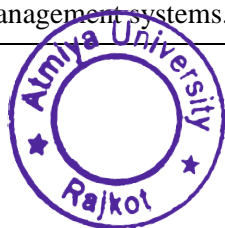
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
			<ul style="list-style-type: none"> 3. 3. Learn working and handling of industrial filters and centrifugation equipments 4. 4. Carry out drying operation 5. 5. Understand heat exchangers and mixers 			
III	23UGIC302	Industrial Chemistry-IV: Material Science (Ad)	<ul style="list-style-type: none"> 1. 1. Recognize basic engineering materials & know its types 2. 2. Recognize & understand fundamentals of metals & alloys 3. 3. Illustrate polymer chemistry & technology principles 4. 4. Understand the processes to procure polymers from various sources 5. 5. Understand SDG-2030 and its implications for polymer science 	4	30	70
III	23UGIC303	Industrial Chemistry- III: Practical	<ul style="list-style-type: none"> 1. 1. To know the fundamental concepts of unit operation 2. 2. Demonstrate skills in safe operation of laboratory equipment 3. 3. Analyse experimental data and observed phenomena 4. 4. Understand the engineering principles of each unit operation. 5. 5. Create flow diagram for various unit operations. 	2	50	50
III	23UGIC304	Industrial Chemistry- IV: Practical	<ul style="list-style-type: none"> 1. 1. Plan experiments and present the experimental data meaningfully 2. 2. Apply theoretical concepts for data analysis and interpretation. 3. 3. Visualize and understand sustainable polymer process & Surface Chemistry concepts. 4. 4. Critically evaluate data collected. 5. 5. Employ safe laboratory practices handling laboratory glassware, equipment, and chemical reagents to perform 			



Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
			common laboratory techniques.			
III	21BICCC301	Core-6: Fine Chemicals (Ad)	<ol style="list-style-type: none"> 1. Manufacture various fine chemicals via different steps of production 2. Apply various analytical reagents and common solutions in different chemical industries 3. Produce several specialty chemicals and Food additives with application in the recent trend 4. Analyze different Essential oil, general organic flavoring agents, natural and Synthetic perfumes. 5. Prepare and apply a variety of Solvents, Surfactants and Emulsifiers in different Industries. 	4	40	60
III	21BICCC302	Core-7: Heavy Chemicals (Ad)	<ol style="list-style-type: none"> 1. Apply knowledge of heavy chemicals by manufacturing heavy chemicals used in chemical Industries. 2. Analyze the practical skill by producing metal based catalyst used in chemical reaction to alter rate of reaction. 3. Obtain valuable products used in various plastic Industries as raw materials. 	4	40	60
III	21BICCC303	Core-8: Unit Operations (Ad)	<ol style="list-style-type: none"> 1. Operate efficiently distillation column and absorber column. 2. Operate efficiently equipments for crystallization and extraction. 3. Learn working and handling of industrial filters and centrifugation equipments. 4. Carry out drying operation. 5. Understand heat exchangers and mixers. 	4	40	60
III	21BICCC304	Core Practical-3: Industrial Chemistry-III Practical	<ol style="list-style-type: none"> 1. Understand the basic concepts of qualitative analysis of inorganic compounds. 2. Understand and explain the volumetric analysis based on 	3	120	200



Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
			fundamental 3. Understand the various methods involved in Quantitative analysis. 4. Able to engage in safe and accurate laboratory practices by handling refractometer. 5. Able to give an extended knowledge about solution concentration & its application.			
IV	21BICCC401	Core-9: Mass & Energy Balance (Ap)	1. Summarize basics of Mass balance calculations 2. Utilize mass balance laws and solve mass balance problems of distillation, evaporation, absorption, extraction and drying 3. Utilize mass balance laws and solve mass balance problems of filtration, mixing, dissolution and crystallization 4. Apply laws for mass balance with chemical reaction 5. Solve the energy balance problems of various chemical processes	4	80	120
IV	21BICCC402	Core-10: Unit Processes (Ap)	1. Apply science and technology of sulphonating and hydrolyzing products. 2. Apply science and technology of oxidation and hydrogenation of various aromatic and aliphatic compounds. 3. Apply science and technology of halogenation and nitration of several chemicals. 4. Apply science and technology of alkylation and esterification 5. Apply science and technology of Amination and Amoxidation.	4	50	50
IV	21BICCL401	Core Elective-1: Industrial Safety (Ad)	1. Identify the prevention of fire hazards and critical hazard management systems.	4	40	60



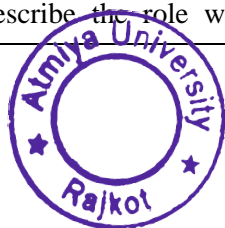
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
			<ol style="list-style-type: none"> 2. Select process hazard analysis studies, events analysis, and investigative reporting and monitoring, of the organization. 3. Make use of the regulations & guidelines responsible for implementing and maintaining quality 4. Assurance and quality control in recent trends in chemical industries. 5. Choose desired plant availability at an optimum cost within the safety prescription & monitoring techniques. 6. Develop disaster phenomenon, its different contextual aspects, impacts and public health consequences & disaster risk reduction (DRR) strategy. 			
IV	21BICCL402	Core Elective-1: Cement & Ceramics (Ad)	<ol style="list-style-type: none"> 1. Evaluate properties of various types of cements and Define, classify and compare various types building materials and cement manufacturing processes 2. Recognize crystalline and noncrystalline material and definitions, classification and calculations of equilibrium defect concentration 3. Discuss the various opportunities for a refractory materials & bricks layer in the chemical, iron and steel industry 4. Discuss the requirements of unit operations in Ceramic engineering & Cement manufacturing 5. Understand the concept of the portland cement and measure components of manufacturing process. 	4	40	60
IV	21BICCC403	Core Practical-4: Industrial Chemistry-IV Practical	<ol style="list-style-type: none"> 1. Plan experiments and present the experimental data meaningfully. 2. Apply theoretical concepts for data analysis and interpretation. 3. Explain the process flow diagram and various process 	2	40	60



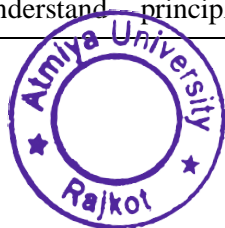
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
			<p>parameters</p> <p>4. Experiment the manufacturing of various inorganic and organic chemicals</p> <p>5. Employ safe laboratory practices, handling laboratory glassware, equipment and chemical reagents to perform common laboratory techniques.</p>			
IV	21BICCL403	Core Elective-1 Practical: Industrial Safety Practical (Ad)	<p>1. Understanding the role Occupational Health Services, Role of medical and non- medical team, required facilities and equipment etc. for implementation in Industries.</p> <p>2. Knowledge of safety officers help in case studies as such any occur in the industry student is working</p> <p>3. Understand Hazards associated to each and every plants & legislations requirement of various industries</p>	3	40	60
IV	21BICCL404	Core Elective-1: Cement & Ceramics Practical (Ad)	<p>1. Identify the characteristics of the ceramic material</p> <p>2. Apply theoretical concepts for data analysis and interpretation.</p> <p>3. Build up skills about determination of various parameters</p> <p>4. Experiment the manufacturing of various cement and ceramic products</p> <p>5. Employ safe laboratory practices, handling laboratory glassware, equipment and chemical reagents to perform common laboratory techniques.</p>	1	40	60
IV	21BICCC501	Core-11: Principles of Chemical Engineering-I (Ap)	<p>1. Design and analyze fluid flow systems, including the selection of appropriate equipment, materials, and operating conditions</p> <p>2. Design and analyze heat transfer systems, including the selection of appropriate materials and geometries to achieve the desired thermal conduction performance.</p>	5	50	50



Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
			<ol style="list-style-type: none"> Design and analyse heat transfer systems, including the selection of appropriate fluid types, flow rates, and geometries to achieve the desired thermal convective performance. Apply fundamentals of Compressor, reciprocating pumps. Apply the principle of refrigeration and understand the types of refrigeration. 			
V	21BICCC502	Core-12:Pharmaceuticals(Ap)	<ol style="list-style-type: none"> Understand the concept of Indian pharmacopoeia and pharmaceutical packaging industry Analyze the usage of different pharmaceutical excipients and surgical dressing material in pharmaceutical industry Synthesize different types of drugs and its application Apply the preparation of Industrial microbiology product Understand quality control parameters in pharmaceutical industry and extraction and cultivation of various types of phytochemicals from natural sources 	5	50	50
V	21BICCC503	Core-13:Petroleum & Petrochemicals (Ap)	<ol style="list-style-type: none"> Apply science and technology of petroleum refining and processing Analyze various chemical and physical properties of petroleum & petrochemical compounds Carry out manufacturing process of C1 & C2 compound of petroleum & petrochemical Carry out manufacturing process of C3 & C4 compound of petroleum & petrochemical Operate production & reforming of various aromatic petroleum components 	4	50	50
V	21BICCC504	Core-14:Industrial Utilities(Self-Study) (Ap)	<ol style="list-style-type: none"> Identify, evaluate, and need associated with the use of air & inert gases Describe the role water plays in process, reaction & 	4	15	0



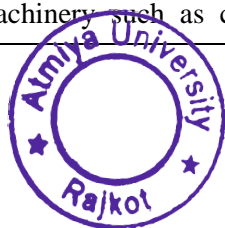
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
			<p>systems.</p> <p>3. Know the different types of insulations and Application of insulation to various industries.</p> <p>4. Identify the common types of compressors and their applications</p> <p>5. Describe boiler types & safety devices, adjustment and testing their components.</p>			
V	21BICCL501	Core Elective-2: Analytical Chemical Techniques (Ad)	<p>1. Demonstrate various analytical analysis methods</p> <p>2. Analyze various sampling procedures of solid, liquid and gas</p> <p>3. Carry out traditional chemical techniques</p> <p>4. Apply modern analytical techniques</p> <p>5. Operate spectroscopic methods & instruments</p>	4	40	60
V	21BICCL502	Core Elective-2: Chemistry of Natural Products (Ad)	<p>1. Learn the different types of alkaloids, glycosides & terpenes etc and their chemistry and medicinal importance.</p> <p>2. Identify different types of natural steroids, their occurrence, structure, isolation and properties</p> <p>3. Know the classification and properties of the terpenoids</p> <p>4. Understand the classification, role and function of each vitamin in metabolism</p> <p>5. Learn the different types of alkaloids and their chemistry and medicinal importance</p>	4	40	60
V	21BICCC506	Core Practical-5: Industrial Chemistry-V Practical	<p>1. Synthesize various pharmaceutical products</p> <p>2. Estimate the content of different pharmaceutical products.</p> <p>3. Analyze various physical & chemical properties of petroleum and petrochemicals</p>	2	40	60
V	21BICCE503	Core Elective-2	<p>1. Understand principle, construction, working and</p>	1	20	30



Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
		Practical: Analytical Chemical Techniques Practical(Ad)	<ul style="list-style-type: none"> 1. applications of analytical chemical instrumentations 2. Quantify various metals in sample using analytical instrumentations 3. Build skills about determination of various parameters by analytical techniques. 4. Determine various chemical & physical properties of sample using various analytical techniques. 5. Employ safe laboratory practices, handling laboratory glassware, equipment and chemical reagents to perform common laboratory techniques. 			
V	21BICCE504	Core Elective-2 Practical: Chemistry of Natural Products Practical (Ad)	<ul style="list-style-type: none"> 1. Get insights into plant derived therapeutic leads, perfumery and cosmetic agents. 2. Optimize the extraction technique according their chemical class. 3. Classify natural products according to their chemical structure and their occurrence and to suggest their possible biosynthetic pathways. 4. Perform a bioassay guided isolation to improve throughput for identification of potential bioactive natural products. 5. Develop industrially relevant method for quantification of different class of natural products. 	1	20	30
VI	21BICCC601	Core-16: Industrial Management (Ad)	<ul style="list-style-type: none"> 1. To understand the basic concepts, functions and processes of Industrial & Personnel Management. 2. To apply awareness about general workplace behaviour and build interpersonal and team skills. 3. To analyze use of advanced tools and techniques encountered during industrial training and visit. 4. To evaluate different types of organizational structures and Design them. 	4	40	60



Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
			5. To create an awareness of the role, function and functioning of personnel management in industrial organization.			
VI	21BICCC602	Core-17: Principles of Chemical Engineering-II (Ap)	<ol style="list-style-type: none"> 1. Developing the ability to solve problems related to evaporation, whether they are theoretical or practical in nature 2. Design and analyze process and plant design 3. To demonstrate fundamental understanding of process control 4. Understanding of the fundamental principles and concepts related to mechanical operations and understand the principles and methods of particle size reduction, including the mechanisms of crushing, grinding, and cutting 5. Gain knowledge about the various equipment and machinery used in mechanical operations, such as Jaw crushers, Roll crushers, Ballmill, Hammer mill, separators and conveyors 	5	50	50
VI	21BICCC603	Core-18: Dyes & Pigments (Ap)	<ol style="list-style-type: none"> 1. To Knowing the differences between pigments, dyes and their classification. 2. To Describe the general requirement for dye design, application procedures and fastness properties. 3. To Knowing the synthesis of the main types of industrial pigments and dyes. 4. To Knowing traditional, natural and synthetic dyes and pigments and their application. 5. To Apply knowledge and understanding 6. Dyeing of a fiber or preparation of pigments 	5	50	50
VI	21BICCC604	Core Practical-6: Industrial Chemistry-VI	<ol style="list-style-type: none"> 1. Analyze various size reduction equipment and machinery such as crushers, grinders, mills and their 	3	40	60



Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
		Practical	<p>operation, maintenance and selection criteria.</p> <p>2. Assess and optimize the energy efficiency of size reduction processes, which is crucial for reducing operating costs and environmental impact.</p> <p>3. Experiment skills in selecting appropriate dyes for specific applications, considering factors like fiber type, color fastness and end-use requirements</p>			



Faculty of Science
Department of Computer Application
Program: MCA

Program Objective:

The Master of Computer Applications (MCA) program is a postgraduate degree program that focuses on Computer Applications and Programming. The primary objective of the MCA program is to provide students with from beginner to advanced knowledge and skills in computer science, so they can excel in a career in the IT industry.

- To develop a strong foundation in the theoretical and practical aspects of computer science, including programming languages.
- To provide students with in-depth knowledge and expertise in advanced computer technologies, such as artificial intelligence, machine learning, data analytics, cloud computing, and mobile computing.
- To prepare students to become skilled IT professionals who can design, develop, and manage complex software applications and systems.
- To enhance students' problem-solving and analytical skills to tackle real-world IT challenges.
- Encourage students to stay up-to-date with the latest trends and technologies in the IT industry, and pursue lifelong learning to remain competitive and relevant.
- To encourage students to stay updated with emerging trends and technologies in the IT industry and pursue lifelong learning.

Graduate Attributes:

Here are some graduate attributes for the Master of Computer Applications (MCA) program, presented in bullet points:

- **Technical competence:** Graduates of the MCA program should possess advanced technical skills and knowledge in computer science and technology, including programming, logic building using various languages, algorithms, javascript languages, and emerging areas such as artificial intelligence, machine learning, and cloud computing.



- **Analytical and problem-solving skills:** MCA graduates should be able to analyze complex problems and develop effective solutions using critical thinking, logical reasoning, and data-driven decision-making.
- **Communication skills:** Graduates of the MCA program should be able to communicate effectively and professionally with stakeholders, clients, and colleagues, through oral presentations, technical reports, and documentation.
- **Leadership and teamwork:** MCA graduates should be able to work effectively in a team, lead projects, and collaborate with others to achieve common goals.
- **Ethical and social responsibility:** MCA graduates should be aware of ethical and social issues related to the use of technology and be able to apply ethical principles in their professional practice.
- **Lifelong learning:** MCA graduates should have a thirst for knowledge and be committed to continuous learning and self-improvement to keep up-to-date with the latest trends and technologies in the IT industry.
- **Entrepreneurship and innovation:** MCA graduates should be able to identify opportunities and create innovative solutions that can add value to organizations and society as a whole.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation	
PEO1	: Knowledge and Skills: Graduates of the MCA program will have a comprehensive understanding of computer science and its applications and will possess the technical skills required to design, develop, and maintain software systems.
PEO2	: Problem Solving and Critical Thinking: Graduates will be able to analyze complex problems, apply critical thinking and problem-solving skills, and develop effective solutions using appropriate tools and techniques.
PEO3	: Communication Skills: Graduates will be able to communicate effectively, both orally and in writing, with a range of audiences, including technical and non-technical stakeholders.



PEO4	:	Professionalism and Ethics: Graduates will understand and apply ethical principles and professional standards in their work, demonstrate a commitment to lifelong learning, and remain current with emerging technologies.
PEO5	:	Leadership and Teamwork: Graduates will be able to work effectively in teams, contribute to team goals, and demonstrate leadership skills in their professional practice.
PEO6	:	Entrepreneurship and Innovation: Graduates will be able to identify opportunities, create innovative solutions, and apply entrepreneurship skills in the development and deployment of software systems.
PEO7	:	Societal and Environmental Impact: Graduates will understand the impact of computing on society and the environment, and be able to develop software systems that are socially responsible, environmentally sustainable, and equitable.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Technical Knowledge: Graduates will possess a solid understanding of fundamental computer science concepts and technical skills required for software development and system analysis. This includes knowledge of programming languages, algorithms, mobile technology and web technologies
PO2	:	Problem Solving: Graduates will be able to analyze complex problems and develop effective solutions using appropriate tools and techniques. They will possess the ability to identify problems, collect and analyze relevant data, and evaluate alternative solutions to select the best course of action.
PO3	:	Professionalism: Graduates will be aware of and abide by professional ethics and standards, and demonstrate a commitment to continued learning and professional development. They will possess the ability to work effectively in diverse teams and demonstrate leadership skills.
PO4	:	Data Management: Graduates will have a strong understanding of database concepts and be able to design,



		implement, and maintain databases. They will be able to use database management systems (DBMS) to manage and analyze data, and design efficient and scalable database structures.
PO5	:	Leadership: Graduates will possess the ability to lead and manage teams, and facilitate effective communication and collaboration among team members. They will possess the ability to identify team strengths and weaknesses, delegate tasks and responsibilities, and provide constructive feedback to team members.
PO6	:	Entrepreneurship: Graduates will have the knowledge and skills required to develop and launch new software-based products and services. They will possess the ability to identify market opportunities, develop business plans, and manage resources to launch and sustain new ventures.
PO7	:	Innovation: Graduates will have the ability to identify and apply emerging technologies and innovative solutions to solve real-world problems. They will possess the ability to think creatively and apply innovative approaches to develop new solutions and improve existing ones.
PO8	:	Critical Thinking: Graduates will have the ability to apply analytical and logical reasoning skills to evaluate information, solve problems, and make informed decisions. They will possess the ability to analyze complex problems and identify potential solutions by evaluating evidence and making logical deductions.
PO9	:	Creativity: Graduates will have the ability to think creatively and apply innovative approaches to develop new solutions and improve existing ones. They will possess the ability to identify new approaches to problem-solving and apply creative thinking to develop new solutions.
PO10	:	Interdisciplinary Knowledge: Graduates will possess interdisciplinary knowledge that allows them to integrate various fields of knowledge to solve regular problems. They will possess the ability to integrate knowledge from various fields
PO11	:	Professional ethics: Graduates will have an understanding of professional, ethical, legal, security, and social issues and responsibilities.



PO12	:	Continuous learning: Graduates will have the ability to engage in lifelong learning, adapt to new technologies, and keep up-to-date with emerging trends in the field of computer applications.
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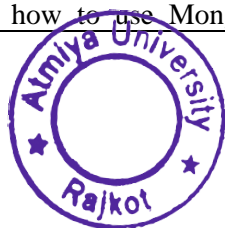
Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Proficiency in programming languages, databases, and software development tools: Graduates will have in-depth knowledge of programming languages such as Java, Python, and C, databases like MongoDB and Oracle, and software development tools like IntelliJ and Visual Studio.
PSO2	:	Ability to design, develop and implement software systems and applications to solve complex problems: Graduates will have the ability to design, develop and implement software systems and applications to solve complex problems using their understanding of software engineering methodologies, algorithms, and programming languages.
PSO3	:	Knowledge of social, legal, ethical, and professional issues related to computer applications: Graduates will have knowledge of social, legal, ethical, and professional issues related to computer applications such as privacy, security, and intellectual property.
PSO4	:	Effective leadership skills to manage and lead software development teams: Graduates will have effective leadership skills to manage and lead software development teams using their knowledge of software development methodologies and project management.
PSO5	:	Ability to engage in lifelong learning, adapt to new technologies, and keep up-to-date with emerging trends in the field of computer applications: Graduates will have the ability to engage in lifelong learning, adapt to new technologies, and keep up-to-date with emerging trends in the field of computer applications to ensure their skills and knowledge remain relevant and up-to-date.



Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23PGCA101	Core 2: Responsive Web Design and Type Script	<ol style="list-style-type: none"> 1. Identify the fundamental concepts and components of web development, such as HTML 5, CSS 3, and Bootstrap 5. 2. Explain how web development technologies and techniques work, such as responsive web design and Typescript programming. 3. Create web pages and web applications using HTML 5, CSS 3, and Bootstrap 5, and apply responsive web design principles to ensure they work across different devices. 4. Assess the effectiveness of Bootstrap 5 and techniques and recommend the most appropriate ones for a given project. 5. Apply PSD to HTML Responsive web design. 	3	30	70
I	23PGCA102	Core 2: Problem Solving Methodologies using C Language	<ol style="list-style-type: none"> 1. Apply control structures such as loops and decision-making constructs to solve programming problems that involve file handling 2. Utilize C language features to develop efficient and scalable programs that address regular problems involving file handling 3. Debug and troubleshoot C code using appropriate tools and techniques, including debugging file I/O errors 4. Write simple C programs that utilize variables, data types, and basic input/output operations, including file I/O 5. Design and implement complex algorithms using functions, arrays, pointers, and file handling operations 	3	30	70
I	23PGCA103	Core 3: Databases for Enterprise Applications	<ol style="list-style-type: none"> 1. Understand the fundamental principles of database management systems, including the differences between relational and non-relational databases. 2. Demonstrate proficiency in creating and managing Oracle databases, including configuring database parameters, managing table spaces, and monitoring database performance. 3. Learn how to use MongoDB to store and retrieve data, 	3	30	70



			<p>including understanding the differences between document-oriented databases and relational databases.</p> <p>4. Demonstrate proficiency in creating and managing MongoDB databases, including configuring data models, indexing data for efficient retrieval, and managing data replication.</p> <p>5. Analyze and troubleshoot common database issues, including query optimization, data backup and recovery, and performance tuning.</p>			
I	23PGCA104	Core 4: Web development using PHP	<p>6. Demonstrate knowledge of PHP syntax, control structures, and built-in functions</p> <p>7. Design and implement PHP programs using object-oriented programming principles</p> <p>8. Use MySQL to create and manage databases and tables, and perform basic CRUD operations</p> <p>9. Implement JavaScript to create dynamic, interactive web applications</p> <p>10. Implement best practices for web development, including security and performance optimization</p>	3	30	70
I	23PGCA105	Core Practical 1: Responsive Web Design and TypeScript	<p>6. Identify the fundamental concepts and components of web development, such as HTML 5, CSS 3, and Bootstrap 5.</p> <p>7. Explain how web development technologies and techniques work, such as responsive web design and Typescript programming.</p> <p>8. Create web pages and web applications using HTML 5, CSS 3, and Bootstrap 5, and apply responsive web design principles to ensure they work across different devices.</p> <p>9. Assess the effectiveness of different web development technologies and techniques and recommend the most appropriate ones for a given project.</p> <p>10. Apply PSD to HTML Responsive web design.</p>	2	40	60
I	23PGCA106	Core Practical 2: Problem	<p>6. Apply control structures such as loops and decision-making constructs to solve programming problems that involve file handling</p> <p>7. Utilize C language features to develop efficient and scalable programs that address regular problems involving file</p>	2		



		Solving Methodologies using C Language	<p>handling</p> <ol style="list-style-type: none"> 8. Debug and troubleshoot C code using appropriate tools and techniques, including debugging file I/O errors 9. Write simple C programs that utilize variables, data types, and basic input/output operations, including file I/O 10. Design and implement complex algorithms using functions, arrays, pointers, and file handling operations 			
I	23PGCA107	Core Practical 3 : Databases for Enterprises Applications	<ol style="list-style-type: none"> 6. Understand the fundamental principles of database management systems, including the differences between relational and non-relational databases. 7. Demonstrate proficiency in creating and managing Oracle databases, including configuring database parameters, managing tablespaces, and monitoring database performance. 8. Learn how to use MongoDB to store and retrieve data, including understanding the differences between document-oriented databases and relational databases. 9. Demonstrate proficiency in creating and managing MongoDB databases, including configuring data models, indexing data for efficient retrieval, and managing data replication. 10. Analyze and troubleshoot common database issues, including query optimization, data backup and recovery, and performance tuning. 	2	40	60
I	23PGCA108	Core Practical 4: Web development using PHP	<ol style="list-style-type: none"> 4. Demonstrate knowledge of PHP syntax, control structures, and built-in functions 5. Design and implement PHP programs using object-oriented programming principles 6. Use MySQL to create and manage databases and tables, and perform basic CRUD operations 7. Implement JavaScript to create dynamic, interactive web applications 8. Implement best practices for web development, including security and performance optimization 	2	40	60
II	23PGCA201	Core 5: Object Oriented	<ol style="list-style-type: none"> 1. Gain a solid grasp of object-oriented programming fundamentals. Understand the core concepts of classes and 	3	40	60



		Programming using Java	<p>objects as the building blocks of Java programming.</p> <ol style="list-style-type: none"> Master design principles, including Inheritance, Packages & Access Specifiers. Develop familiarity with commonly used classes from the java.lang package. Acquire advanced Java programming skills, encompassing Exception Handling, Nested Classes, the Collection Framework, and Regular Expressions, facilitating robust coding practices. Proficiently handle files and comprehend the principles of Multithreading, vital for real-world application development. Understand Java Database Connectivity (JDBC) and its application in connecting Java applications to databases, a crucial skill for building database-driven applications. 			
II	23PGCA202	Core 6: Programming with Python	<ol style="list-style-type: none"> Understand fundamental Python syntax and programming concepts. Apply Python to solve practical problems through coding. Analyse and troubleshoot Python code, identifying and correcting errors. Develop creative and innovative Python programs and projects. Apply critical thinking to design Python-based solutions for complex problems. 	3	40	60
II	23PGCA203	Core 7: Laravel For Modern Web Development	<ol style="list-style-type: none"> Define MVC Architecture and feature of Laravel with Route Describe the concept of request handling using controllers and middleware with default authentication. Apply Blade directives to build dynamic views with forms and implement validation for user input. Compare the advantages of the Query Builder over raw SQL queries for database interaction and migration. Synthesize advanced Eloquent ORM concepts with Model Relationship, accessors, mutators and collections methods for efficient data manipulation. 	3	40	60
II	23PGCA204	Core Elective-1: Dynamic Web	<ol style="list-style-type: none"> Understand ES6 features such as arrow functions, template literals, and destructuring as Advanced JavaScript 	3	50	50



		Development using React JS	<ol style="list-style-type: none"> 2. Describe the purpose of ReactJS application, structure and components with its usage. 3. Differentiate between functional and class components in React and Pass data to components using props 4. Utilize react hooks like useState, useEffect, and useRef for state management and side effects. 5. Implement routes – navigation, fetch and display data from external APIs and external library to apply style like bootstrap and tailwind. 			
II	23PGCA205	Core Elective 1: AWS Cloud Solutions	<ol style="list-style-type: none"> 1. Students will be able to critically analyze the concepts and components of cloud computing. They will also evaluate the key features and services offered by Amazon Web Services. 2. Students will gain practical proficiency in Amazon EC2 instances and develop the ability to create and manage instances, understand instance types and selection criteria, implement security measures, and effectively manage costs and billing within AWS. 3. Students will gain a basic understanding of Amazon EBS and EFS storage solutions, including their types, features, advantages, and disadvantages. They will recognize the concept of creating backups and snapshots in EBS and understand the basics of EFS use cases and lifecycle management. 4. Students will understand the fundamentals of AWS storage and scaling services, including Amazon S3, data storage, versioning, lifecycle policies, and static website hosting. They will also grasp concepts related to data migration, access management, FSx file systems, security, and scaling mechanisms to improve application performance and availability. 5. Students will apply foundational AWS knowledge to practical scenarios, configuring and managing cloud infrastructure, utilizing database services, and designing messaging solutions. 	3	50	50



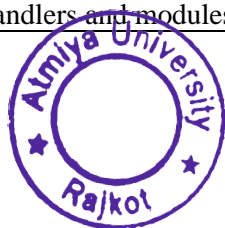
II	23PGCA206	Core Practical 5: Object Oriented Programming using Java	<ol style="list-style-type: none"> 1. Gain a solid grasp of object-oriented programming fundamentals. Understand the core concepts of classes and objects as the building blocks of Java programming. 2. Master design principles, including Inheritance, Packages & Access Specifiers. Develop familiarity with commonly used classes from the java.lang package. 3. Acquire advanced Java programming skills, encompassing Exception Handling, Nested Classes, the Collection Framework, and Regular Expressions, facilitating robust coding practices. 4. Proficiently handle files and comprehend the principles of Multithreading, vital for real-world application development. 5. Understand Java Database Connectivity (JDBC) and its application in connecting Java applications to databases, a crucial skill for building database-driven applications. 	2	40	60
II	23PGCA207	Core Practical 6: Programming with Python	<ol style="list-style-type: none"> 1. Understand fundamental Python syntax and programming concepts. 2. Apply Python to solve practical problems through coding. 3. Analyse and troubleshoot Python code, identifying and correcting errors. 4. Develop creative and innovative Python programs and projects. 5. Apply critical thinking to design Python-based solutions for complex problems. 	2	40	60
II	23PGCA208	Core Practical 7: Laravel for Modern Web Development	<ol style="list-style-type: none"> 1. Define MVC Architecture and feature of Laravel with Route 2. Describe the concept of request handling using controllers and middleware with default authentication. 3. Apply Blade directives to build dynamic views with forms and implement validation for user input. 4. Compare the advantages of the Query Builder over raw SQL queries for database interaction and migration. 5. Synthesize advanced Eloquent ORM concepts with Model Relationship, accessors, mutators and collections methods for efficient data manipulation. 	2	40	60



II	23PGCA209	Core Elective Practical 1: Dynamic Web Development using ReactJS	<ol style="list-style-type: none"> 1. Understand ES6 features such as arrow functions, template literals, and destructuring as Advanced JavaScript 2. Describe the purpose of ReactJS application, structure and components with its usage. 3. Differentiate between functional and class components in React and Pass data to components using props 4. Utilize react hooks like useState, useEffect, and useRef for state management and side effects. 5. Implement routes – navigation, fetch and display data from external APIs and external library to apply style like bootstrap and tailwind. 	2	50	50
II	23PGCA210	Core Elective Practical -1: AWS Cloud Solutions	<ol style="list-style-type: none"> 1. Students will be able to critically analyze the concepts and components of cloud computing. They will also evaluate the key features and services offered by Amazon Web Services. 2. Students will gain practical proficiency in Amazon EC2 instances and develop the ability to create and manage instances, understand instance types and selection criteria, implement security measures, and effectively manage costs and billing within AWS. 3. Students will gain a basic understanding of Amazon EBS and EFS storage solutions, including their types, features, advantages, and disadvantages. They will recognize the concept of creating backups and snapshots in EBS and understand the basics of EFS use cases and lifecycle management. 4. Students will understand the fundamentals of AWS storage and scaling services, including Amazon S3, data storage, versioning, lifecycle policies, and static website hosting. They will also grasp concepts related to data migration, access management, FSx file systems, security, and scaling mechanisms to improve application performance and availability. 5. Students will apply foundational AWS knowledge to practical scenarios, configuring and managing cloud infrastructure, utilizing database services, and designing 	2	50	50



			messaging solutions.			
III	23PGCA301	Android Application Development using Kotlin	<ol style="list-style-type: none"> 1. Gain a solid grasp of object-oriented programming fundamentals. Understand the core concepts of classes and objects as the building blocks of Kotlin programming. 2. Students will demonstrate proficiency in utilizing Android SDK features and development tools to create user interfaces with various widgets and handle user interactions effectively. 3. By the end of the course, students will be able to analyze and implement data management techniques in Android applications, including file operations, preferences, and SQLite databases, to ensure efficient storage and retrieval of information. 4. Upon completion of the course, students will be able to evaluate the integration of advanced functionalities such as location-based services and multimedia features into Android applications, assessing their impact on user experience and application functionality. 5. Students will demonstrate the ability to synthesize their knowledge of Android development principles and practices by designing and implementing fully functional Android applications, showcasing creativity and innovation in solving real-world problems. 	5	90	60
III	23PGCA302	Web Development using ASP.NET with MVC	<ol style="list-style-type: none"> 1. Recall the core principles and components of MVC architecture. 2. Explain the concept of separation of concerns in MVC development. Summarize the process of routing and URL handling in MVC. 3. Optimize an MVC ASP.NET Web application using configuration, security, and caching 4. Access databases using ADO.NET and More recent MVC ASP .NET features 5. Implement rich client applications using MVC ASP.NET AJAX and Customize Web applications through the use of HTTP handlers and modules 	5	90	60



III	23PGCA303	Machine Learning Fundamentals and Applications	<ol style="list-style-type: none"> 1. Recall fundamental machine learning concepts and terminology & demonstrate comprehension of the relationships between artificial intelligence, machine learning, and deep learning. 2. To determine regression or classification supervised learning method of ML to any real-life application and estimate accuracy of the model. 3. To be able to contrast various unsupervised learning methods and solve any real-life situation using ML and estimate accuracy of the model. 4. To Solve any fundamental text-processing and speech-recognition problem given. 5. To be able to determine filter operation on given image and construct a model to detect object from it. 	5	90	60
III	23PGCA304	Dynamic Web Development using Node.JS	<ol style="list-style-type: none"> 1. Define the basic concepts of Node.js and its runtime environment. 2. Explain the event-driven architecture and asynchronous programming model used in Node.js. 3. Develop and implement basic Node.js applications to handle HTTP requests and responses. 4. Compare and contrast different Node.js frameworks and libraries for specific use cases. 5. Design and develop scalable Node.js applications using modular and maintainable code practices. 	5	90	60
III	23PGCA305	Modern Network Technologies and Protocols	<ol style="list-style-type: none"> 1. Introduction to basic networking concepts and network devices. 2. Covers network protocols, OSI model, IP addressing, LAN technologies, wireless networking, configuring devices, LANs/VLANs setup, troubleshooting, and network security. 3. Advanced routing protocols, network optimization, monitoring, scalable architectures, and network virtualization. 4. Network security mechanisms, advanced wireless concepts, disaster recovery, and network performance optimization. 5. Designing secure networks, advanced 	3	90	60



			virtualization, automation, routing, and complex network architectures.			
III	23PGCA306	Advanced Operating Systems	<ol style="list-style-type: none"> 1. Recall the fundamental principles and components of operating systems. 2. Explain how operating systems manage computer resources and handle various system tasks. 3. Apply operating system concepts to solve practical problems related to process management, memory allocation, and file systems. 4. Analyze the performance of different scheduling algorithms and memory management techniques in operating systems. 5. Evaluate the security implications of different access control mechanisms and encryption techniques in operating systems. 	3	90	60
		Research Writing & Case Study	<ol style="list-style-type: none"> 1. Understand research methodologies, data collection, and analysis in computer applications. 2. Formulate research questions, design studies, develop clear research objectives and methodologies, interpret data effectively, and apply critical thinking to research design and development. 3. Develop clear research objectives, methodologies for projects and case studies, interpret and analyze data effectively using qualitative or quantitative techniques. 4. Communicate research findings and conclusions through reports, papers, and presentations. 5. Adhere to ethical principles, obtain consent, ensure confidentiality, and respect participants' rights. 	1	Evaluation by Remarks	Evaluation by Remarks



Faculty of Science
Department of CS. & I.T
PROGRAMS: B.C.A

OBJECTIVES OF THE PROGRAMME

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation.

- Demonstrating a substantial understanding of concepts in key areas of computer science and its applications
- Specify, design, develop, test and manage application software systems to meet the operational and business requirements of organizations.
- Work in a team using common tools and environments to achieve project objectives

GRADUATE ATTRIBUTES

- **Academic excellence:** Ability to identify opportunities or problems in scientific and business domain and to apply relevant problem-solving methodologies for developing software of the type web, mobile or desktop based using knowledge of computational and analytical skills.
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a solution in terms of design of software considering benefits for every stack holder and being able to work effectively, independently and collaboratively as part of a team in research, technology development and entrepreneurial ventures. Able to communicate effectively the same in a structured form with skills like sharp mind and flexibility for any subject or new idea.
- **Global Citizenship:** Develop sustainable computing solutions in broader economic, societal and environmental contexts.
- **Life Long Learning:** motivated to engage in independent and life-long learning in the broadest context of evolving technological challenges.



Program Outcomes (POs)

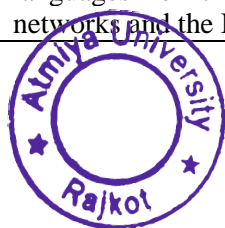
After completion of the programme the Graduate will be able to:		
PO 1	:	Domain knowledge: Demonstrate and apply the knowledge of mathematics, science and Computer Application in scientific & business domain.
PO 2	:	Problem analysis: understand and apply system analysis with software engineering techniques using knowledge or information of problem domain with various communication technologies.
PO 3	:	Design/development of solutions: Understand the complex scientific or business problems and design structured mechanisms or develop software that meet the specified needs of web based or mobile or any type of applications using research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions as a solution.
PO 4	:	Conduct investigations of complex problems: Gain ability for data gathering techniques using various methods of investigations with flexibility in determining requirements in terms of investigating complex problems by conducting experiments, analysing and interpreting data in the given domain with computer application techniques.
PO 5	:	Modern tool usage: Understand standard software development procedures and acquire in-depth technical competence to use various licensed, freeware and shareware software development tools called computer aided software engineering (CASE), designing (CASD) and management (CASE) tools.
PO 6	:	The Computer Professional and society: Understand own 'role in society and act in an honest and consistent manner based on a strong sense of self and personal values
PO 7	:	Environment and sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development
PO 8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of practice in the computer science and application.



PO 9	:	Individual and team work: Able to function effectively as individual and as a member in multidisciplinary settings
PO 10	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large
PO 11	:	Project management and finance: Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	:	Life-long learning: Able to recognize the need to undertake life-long learning and acquire the capacity to do so

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
V	18BCACC501	Core 12: Programming with C#.NET	<ol style="list-style-type: none"> 1. Understand the .NET Framework 2. Understand the foundation of C# programming 3. Possess the understanding of OOP in C#.NET 4. Understand different application of ADO.NET 5. Design Crystal Reports and Create Setup of C# Application 	4	30	70
V	18BCACC502	Core 13: Web Searching Technology and Search Engine Optimization	<ol style="list-style-type: none"> 1. Understand basics of SEO and how various search engines work 2. Learn the steps you need to prepare for, execute, and evaluate SEO initiatives. 3. Examine a number of advanced strategies and tactics 	4	30	70
V	18BCACC503	Core 14: Web Services API-JSON/XML (Self Study)	<ol style="list-style-type: none"> 1. Understand open protocols and standards used for exchanging data between applications or systems in web service. 2. Design and code data transfer scripts using XML languages for the transfer of data over business networks and the Internet. 	4	15	35



			<ol style="list-style-type: none"> 3. Understand what JSON used for data interchange. 4. Comprehend the formats for requests to and responses from a web service that uses a SOAP interface. 5. Understanding REST, Learning how to design a REST API 			
V	18BCACC504	Core Practical 9: C#.NET Practical	<ol style="list-style-type: none"> 1. Understand the .NET Framework 2. Understand the foundation of C# programming 3. Possess the understanding of OOP in C#.NET 4. Understand different application of ADO.NET 5. Design Crystal Reports and Create Setup of C# Application 	2	40	60
V	18BCADC501	DSE-Core 2: MVC Design Pattern in PHP	<ol style="list-style-type: none"> 1. Demonstrate the use of the CodeIgniter MVC Framework. 2. Design & develop MVC based application. 3. Be able to design, write, compile, execute and test Web Application in mvc framework. 4. Understand current trends of application development using php platform 	4	30	70
V	18BCADC502	DSE-Core 2: Advanced JAVA Programming	<ol style="list-style-type: none"> 1. Design console based, GUI based and web based applications 2. Understand Integrated Development Environment 3. Understand the concepts of Event Handling 4. Create, debug and run multi-tier and enterprise- level applications 5. Understand current trends of application development using Java platform 	4	30	70
V	18BCADC503	DSE-Core Practical 1: MVC Design Pattern in PHP Practical	<ol style="list-style-type: none"> 1. Demonstrate the use of the CodeIgniter MVC Framework. 2. Design & develop MVC based application. 3. Be able to design, write, compile, execute and test Web Application in mvc framework. 4. Understand current trends of application development using php platform 	2	40	60
V	18BCADC504	DSE-Core Practical 1:	<ol style="list-style-type: none"> 1. Design console based, GUI based and web based 	2	40	60



		Advanced JAVA Practical	<ul style="list-style-type: none"> 1. applications 2. Understand Integrated Development Environment 3. Understand the concepts of Event Handling 4. Create, debug and run multi-tier and enterprise- level applications 5. Understand current trends of application development using Java platform 			
VI	18BCACC601	Core 16: Programming with ASP.NET	<ul style="list-style-type: none"> 1. Design & develop web based applications. 2. Understand .NET framework. 3. Understand ASP.NET Controls 	4	30	70
VI	18BCACC602	Core 17: Network Administration	<ul style="list-style-type: none"> 1. Provide an overview of information security and network security and management. 2. Examine the practical aspects of the issues involved in secure systems and networks and industry practices being adopted to protect information systems. 3. Gain the knowledge, skills and abilities to incorporate good information security practice in any organization. 	4	30	70
VI	18BCACC603	Core Practical 11: ASP.NET Practical	<ul style="list-style-type: none"> 1. Design & develop web based applications. 2. Understand .NET framework. 3. Understand ASP.NET Controls 	2	40	60
VI	18BCADC601	DSE-Core 2: Mobile Computing using Android	<ul style="list-style-type: none"> 1. Understand fundamental of Android Operating System 2. Design and Develop Android Mobile Application. 3. Understand of SQLite and Connectivity with it. 4. Understand Location Based Service & Notifications in android. 5. Developing web service and retrieving data using JSON 6. Packaging and distributing android application 	4	30	70
VI	18BCADC602	DSE-Core 2: Developing Cross Platform Mobile Application using XAMARIN	<ul style="list-style-type: none"> 1. Understand and implement the Xamarin Forms Development KIT 2. Utilize Xamarin Studio for developing cross-platform Native Apps for Android and iOS 3. Understand the Xamarin functionality for designing 	4	30	70



			<p>the User Interface of the app</p> <ol style="list-style-type: none"> 4. Creating and managing fragments and specialized fragment classes 5. Integration of Camera API and location/maps functionality 6. Deploy and publish apps on the store 			
VI	18BCADC603	DSE-Core Practical 2: Android Practical	<ol style="list-style-type: none"> 1. Understand fundamental of Android Operating System 2. Design and Develop Android Mobile Application. 3. Understand of SQLite and Connectivity with it. 4. Understand Location Based Service & Notifications in android. 5. Developing web service and retrieving data using JSON 6. Packaging and distributing android application 	2	40	60
VI	18BCADC604	DSE-Core Practical 2: XAMARIN Practical	<ol style="list-style-type: none"> 1. Understand and implement the Xamarin Forms Development KIT 2. Utilize Xamarin Studio for developing cross-platform Native Apps for Android and iOS 3. Understand the Xamarin functionality for designing the User Interface of the app 4. Creating and managing fragments and specialized fragment classes 5. Integration of Camera API and location/maps functionality 6. Deploy and publish apps on the store 	2	40	60
III	18BCACC301	Core 6: Object Oriented Programming with C++	<ol style="list-style-type: none"> 1. Understand fundamentals of object-oriented programming in C++, including defining classes, invoking methods, etc. 2. Be aware of the important topics and principles of object-oriented software development. 3. Have the ability to write a computer program to solve specified problems. 	4	30	70
III	18BCACC302	Core 7: RDBMS using Oracle	<ol style="list-style-type: none"> 1. Understand the basic concept of database 2. Building Entity Relationship Diagrams (ERDs) and mapping ERDs 	4	30	70



			<ol style="list-style-type: none"> 3. Manipulate data in tables and create database objects 4. Analyze complex business scenarios, design and create databases using SQL 5. Create PL/SQL blocks of application code that can be shared by multiple forms, reports and data management applications 6. Describe stored procedures and functions 7. Explore the differences between SQL and PL/SQL and explore how PL/SQL is used to extend and automate SQL in administering the Oracle database 			
III	18BCACC303	Core 8: Operating System Concept with Unix / Linux	<ol style="list-style-type: none"> 1. Understand the basic concepts of operating system and Design algorithms of process and memory management 2. Understand the overview of Unix operating system and commands 3. Learn shell programming 4. Understand the overview of Linux configuration and features 5. Handling of Linux server administration 	4	30	70
III	18BCACC304	Core Practical 5: C++ Practical	<ol style="list-style-type: none"> 1. Understand fundamentals of object-oriented programming in C++, including defining classes, invoking methods, etc. 2. Be aware of the important topics and principles of object-oriented software development. 3. Have the ability to write a computer program to solve specified problems. 	2	40	60
III	18BCACC305	Core Practical 6: Oracle & Unix / Linux Practical	<ol style="list-style-type: none"> 1. Understand the basic concept of database 2. Building Entity Relationship Diagrams (ERDs) and mapping ERDs 3. Manipulate data in tables and create database objects 4. Analyze complex business scenarios, design and create databases using SQL 5. Create PL/SQL blocks of application code that can be shared by multiple forms, reports and data management applications 6. Describe stored procedures and functions 	2	40	60



			<ol style="list-style-type: none"> 7. Explore the differences between SQL and PL/SQL and explore how PL/SQL is used to extend and automate SQL in administering the Oracle database 8. Understand the basic concepts of operating system and Design algorithms of process and memory management 9. Understand the overview of Unix operating system and commands 10. Learn shell programming 11. Understand the overview of Linux configuration and features 12. Handling of Linux server administration 			
IV	18BCACC401	Core 9: Programming with JAVA	<ol style="list-style-type: none"> 1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc. 2. Understand fundamentals of object-oriented programming in Java, including defining classes, creating objects, invoking methods, using class libraries, etc. 3. Be aware of the important topics and principles of object-oriented software development. 4. To develop ability to write a computer programs to solve specified problems. 5. To develop ability to write applet programs and event handling programs. 	4	30	70
IV	18BCACC402	Core 10: Web Development using PHP	<ol style="list-style-type: none"> 1. Understand the basic concepts of scripting language and web programming 2. Understand how to implement, dry-run and debug programs. 3. Recognize the benefits of using server side scripting 4. Become equipped to make good choices about model design and use of open source scripting PHP 5. Learn how to build and maintain php websites 6. Understand how to write php scripts and use webserver 7. Understand the concept of client-server architecture 	4	30	70



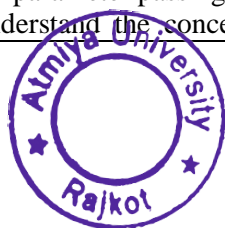
IV	18BCACC403	Core 11: System Analysis and Design	<ol style="list-style-type: none"> 1. Understand the basic concepts of system study and System analysis. 2. Understand the importance of each phase in System Development Life Cycle. 3. Understand the importance of Software development Paradigm (Models). 4. Design the system based on business requirement using tools. 5. Use the software project management tool. 	4	30	70
IV	18BCACC404	Core Practical 7: JAVA Practical	<ol style="list-style-type: none"> 1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc. 2. Understand fundamentals of object-oriented programming in Java, including defining classes, creating objects, invoking methods, using class libraries, etc. 3. Be aware of the important topics and principles of object-oriented software development. 4. To develop ability to write a computer programs to solve specified problems. 5. To develop ability to write applet programs and event handling programs. 	2	40	60
IV	18BCACC405	Core Practical 8: PHP Practical	<ol style="list-style-type: none"> 1. Understand the basic concepts of scripting language and web programming 2. Understand how to implement, dry-run and debug programs. 3. Recognize the benefits of using server side scripting 4. Become equipped to make good choices about model design and use of open source scripting PHP 5. Learn how to build and maintain php websites 6. Understand how to write php scripts and use webserver 7. Understand the concept of client-server architecture 	2	40	60
I	18BCACC101	Core 2: Problem Solving Methodology and	<ol style="list-style-type: none"> 4. Understand the basic concepts of programming. 5. Design algorithms and flow-charts to solve 	4	30	70



		Programming in C	<p>fundamental programming problems.</p> <ol style="list-style-type: none"> 6. Understand how to implement, dry-run and debug programs. 7. Understand the memory allocation of numbers, alphabets and other characters using the concept of basic, derived and user defined data types. 8. Understand how to write and use functions and parameter passing options. 9. Understand the concept of control structures including looping and branching statement. 			
I	18BCACC102	Core 2: Fundamentals of Computer	<ol style="list-style-type: none"> 1. Understand the functions of a computer. 2. Identify types and characteristics of various generations of computers. 3. Identify types and characteristics of various peripherals including storage and I/O. 4. Understand the basic concepts of networking. 5. Understand types of networks and topologies. 6. Understand emerging technology 	4	30	70
I	18BCACC103	Core Practical 1: Programming in C Practical	<ol style="list-style-type: none"> 1. Understand the basic concepts of programming. 2. Design algorithms and flow-charts to solve fundamental programming problems. 3. Understand how to implement, dry-run and debug programs. 4. Understand the memory allocation of numbers, alphabets and other characters using the concept of basic, derived and user defined data types. 5. Understand how to write and use functions and parameter passing options. 	2	40	60
II	18BCACC201	Core 3: Advanced C and Data Structure	<ol style="list-style-type: none"> 1. Understand the concept of pointers and dynamic memory allocation. 2. Design data structures including linked list, stack, queue and tree by using static or dynamic implementations. 3. Understand and implement sorting and searching techniques. 4. Understand the basic concept of file handling. 	4	30	70



			<ol style="list-style-type: none"> 5. Demonstrate different methods for traversing trees. 6. Understand the concept of recursion and describe how it can be implemented using a stack. 7. Identify the benefits of dynamic and static data structures implementations. 			
II	18BCACC202	Core 4: Computer Organization and Architecture	<ol style="list-style-type: none"> 1. Understand the basic structure and operation of a digital computer. 2. Understand different digital components of integrated circuit. 3. Implementation of fixed-point and floating-point addition, subtraction, multiplication & division. 4. Understand the major components of a computer including CPU, memory, I/O and storage. 5. Understand stack implementation by register stack and memory stack and working method of DMA. 	4	30	70
II	18BCACC203	Core 5: Web Scripting Languages	<ol style="list-style-type: none"> 1. Understand the principles of designing effective, dynamic and interactive web pages. 2. Become familiar with graphic design principles that relate to web design and learn how to implement these theories into practice. 3. Develop skills in analyzing the usability of a web site. 4. Learn the language of the web: HTML and CSS. 5. Understand and use JavaScript to enhance HTML documents 	4	30	70
II	18BCACC204	Core Practical 3: Advanced C and Data Structure Practical	<ol style="list-style-type: none"> 1. Understand the basic concepts of programming. 2. Design algorithms and flow-charts to solve fundamental programming problems. 3. Understand how to implement, dry-run and debug programs. 4. Understand the memory allocation of numbers, alphabets and other characters using the concept of basic, derived and user defined data types. 5. Understand how to write and use functions and parameter passing options. <p>Understand the concept of control structures including</p>	2	40	60



			looping and branching statement.			
II	18BCACC205	Core Practical 4: Web Scripting Languages Practical	<ol style="list-style-type: none"> 1. Understand the principles of designing effective, dynamic and interactive web pages. 2. Become familiar with graphic design principles that relate to web design and learn how to implement these theories into practice. 3. Develop skills in analyzing the usability of a web site. 4. Learn the language of the web: HTML and CSS. Understand and use JavaScript to enhance HTML documents 	2	40	60
V	21BCACC501	Core 12: Programming with C#.NET	<ol style="list-style-type: none"> 1. Identify and Understand the features and advantages of .NET framework. 2. Understand type conversion and casting, boxing and unboxing, and looping 3. Apply knowledge of C# basics and OOP concepts to develop programs. 4. Analyze the use of different types of controls and their properties in GUI development. 5. Create complex GUI applications that utilize various types of controls and their properties. 	4	30	70
V	21BCACC502	Core 13: Web Searching Technology and Search Engine Optimization	<ol style="list-style-type: none"> 1. Understand Basics of SEO 2. Understanding Audience & Algorithm-Based Ranking Systems 3. Make use of SEO techniques for websites 4. Tools and techniques 5. Tracking Results and Measuring Success 	4	30	70
V	21BCACC503	Core 14: Web Services API- JSON/XML (Self Study)	<ol style="list-style-type: none"> 1. Understand open protocols and standards used for exchanging data between applications or systems in web service. 2. Design and code data transfer scripts using XML languages for the transfer of data over business networks and the Internet. 3. Understand what JSON used for data interchange. 	4	30	70



			<ol style="list-style-type: none"> 4. Comprehend the formats for requests to and responses from a web service that uses a SOAP interface. 5. Understanding REST, Learning how to design a REST API 			
V	21BCACC505	Core Practical 9: C#.NET	<ol style="list-style-type: none"> 1. Identify and Understand the features and advantages of .NET framework. 2. Understand type conversion and casting, boxing and unboxing, and looping 3. Apply knowledge of C# basics and OOP concepts to develop programs. 4. Analyze the use of different types of controls and their properties in GUI development. 5. Create complex GUI applications that utilize various types of controls and their properties. 	2	40	60
V	21BCACL501	Core-Elective 1: Advanced JAVA Programming	<ol style="list-style-type: none"> 1. Understand JDBC to communicate application with database using Java. 2. Understand Graphical User Interface programming with event handling. 3. Server side technology concepts to create dynamic web applications. 4. Understand use of Java Server Pages for web application. 5. Create web-based and event-driven GUI apps that reflect real-world scenarios. 	-	-	-
V	21BCACL502	Core-Elective 1: MVC Design Pattern with PHP	<ol style="list-style-type: none"> 1. Understand the concepts of Object Oriented Programming using PHP 2. Implements constructors, default constructors, inheritance, interfaces, abstract classes and abstract methods 3. Describe the advance PHP concepts next level of programming in PHP 4. Understand how MVC frameworks work, making it easier to define Model-View-Controller (MVC) 5. Apply to build a custom MVC Framework from absolute scratch and create an application based 	-	-	-



			on PHP OOP			
V	21BCACL503	Core-Elective Practical 1: Advanced JAVA Programming	<ol style="list-style-type: none"> 1. Understand JDBC to communicate application with database using Java. 2. Understand Graphical User Interface programming with event handling. 3. Server side technology concepts to create dynamic web applications. 4. Understand use of Java Server Pages for web application. 5. Create web-based and event-driven GUI apps that reflect real-world scenarios. 	-	-	-
V	21BCACL504	Core-Elective Practical 1: MVC Design Pattern with PHP	<ol style="list-style-type: none"> 1. Understand the concepts of Object Oriented Programming using PHP 2. Implements constructors, default constructors, inheritance, interfaces, abstract classes and abstract methods 3. Describe the advance PHP concepts next level of programming in PHP 4. Understand how MVC frameworks work, making it easier to define Model-View-Controller (MVC) 5. Apply to build a custom MVC Framework from absolute scratch and create an application based on PHP OOP 	-	-	-
VI	21BCADC501	DSE-Core 2: MVC Design Pattern in PHP	<ol style="list-style-type: none"> 1. Demonstrate proficiency in ASP.NET, framework usage, and adherence to coding standards. 2. Utilize ASP.NET controls effectively, including standard, rich, and navigation controls. 3. Implement data validation and state management techniques in ASP.NET applications. 4. Develop applications with ADO.NET for database interaction. 5. Create and deploy web services, and configure them in ASP.NET applications. 	-	-	-
VI	21BCADC503	DSE-Core Practical 1: MVC Design Pattern in	<ol style="list-style-type: none"> 1. Demonstrate proficiency in ASP.NET, framework usage, and adherence to coding 	-	-	-



		PHP Practical	<p>standards.</p> <ol style="list-style-type: none"> 2. Utilize ASP.NET controls effectively, including standard, rich, and navigation controls. 3. Implement data validation and state management techniques in ASP.NET applications. 4. Develop applications with ADO.NET for database interaction. 5. Create and deploy web services, and configure them in ASP.NET applications. 			
VI	21BCACC601	Core 16: Network Administration	<ol style="list-style-type: none"> 1. Demonstrate a sound understanding of network fundamentals. 2. Identify and assess transmission media, network sharing, and firewall technologies. 3. Apply network routing, IP addressing, and cryptographic principles. 4. Implement public key infrastructure and message authentication for secure communication. 5. Acquire the skills needed for proficient network and server administration. 	4	30	70
VI	21BCACC602	Core 17: Programming with ASP.NET	<ol style="list-style-type: none"> 1. Demonstrate proficiency in ASP.NET, framework usage, and adherence to coding standards. 2. Utilize ASP.NET controls effectively, including standard, rich, and navigation controls. 3. Implement data validation and state management techniques in ASP.NET applications. 4. Develop applications with ADO.NET for database interaction. 5. Create and deploy web services, and configure them in ASP.NET applications. 	4	30	70
VI	21BCACC603	Core Practical 10: ASP.NET	<ol style="list-style-type: none"> 1. Demonstrate proficiency in ASP.NET, framework usage, and adherence to coding standards. 2. Utilize ASP.NET controls effectively, including standard, rich, and navigation controls. 3. Implement data validation and state management 	2	40	60



			<p>techniques in ASP.NET applications.</p> <ol style="list-style-type: none"> 4. Develop applications with ADO.NET for database interaction. 5. Create and deploy web services, and configure them in ASP.NET applications. 			
VI	21BCACL601	Core-Elective 2: Mobile Computing using Android	<ol style="list-style-type: none"> 1. Develop proficiency in Android application design and development. 2. Create user-friendly Android interfaces. 3. Implement data storage and SQLite connectivity in Android apps. 4. Utilize APIs and location-based services, and implement notifications. 5. Understand web services and deploy Android applications effectively. 	2	40	60
VI	21BCACL602	Core-Elective 2: Developing Cross Platform Mobile Application using XAMARIN	<ol style="list-style-type: none"> 1. Understand the fundamentals of Xamarin.Forms for cross-platform app development. 2. Create a functional Xamarin.Forms application. 3. Proficiently use XAML and apply themes for UI design. 4. Implement database access within Xamarin.Forms apps. 5. Develop expertise in web services integration and app deployment for Xamarin.Forms applications. 	2	40	60
VI	21BCACL603	Core-Elective Practical 2: Android	<ol style="list-style-type: none"> 1. Develop proficiency in Android application design and development. 2. Create user-friendly Android interfaces. 3. Implement data storage and SQLite connectivity in Android apps. 4. Utilize APIs and location-based services, and implement notifications. 5. Understand web services and deploy Android applications effectively. 	2	40	60
VI	21BCACL604	Core-Elective Practical 2: XAMARIN	<ol style="list-style-type: none"> 1. Understand the fundamentals of Xamarin.Forms for cross-platform app development. 2. Create a functional Xamarin.Forms application. 	2	40	60



			<ol style="list-style-type: none"> 3. Proficiently use XAML and apply themes for UI design. 4. Implement database access within Xamarin.Forms apps. 5. Develop expertise in web services integration and app deployment for Xamarin.Forms applications. 			
III	21BCACC301	Core 6: Operating System	<ol style="list-style-type: none"> 1. How the operating system works and flow operating system 2. Understand the different commands for unix operating system 3. Understand the basic shell programming in unix to perform various task 4. Installation of linux operating system and their desktop environment ,dual boot concept introduce 5. Configuration and troubleshoot of various linux server 	4	30	70
III	21BCACC302	Core 7: Relational Database Management	<ol style="list-style-type: none"> 1. Understand the basic concept of database. 2. Building Entity Relationship Diagrams (ERDs) and mapping ERDs and Normalization Techniques. 3. Manipulate data in Tables and to implement and execute SQL Queries. 4. To perform complex queries and manage the data. 5. Understand other SQL database Objects. 6. Create PL/SQL blocks of application code that can be shared by multiple forms, reports and data management applications and describe stored procedure, triggers and functions. 	4	30	70
III	21BCACC303	Core 8: Object Oriented Programming with C++	<ol style="list-style-type: none"> 1. Understand fundamentals of object-oriented programming in C++, including defining classes, invoking methods, etc. 2. Understand the concept of class and object 3. Understand and develop basic C++ programs, 	4	30	70



			<p>Understand and develop programs with concepts of class, objects, operator overloading, inheritance etc.</p> <p>4. Understand file handling and develop programs for writing data into a file and reading data from a file.</p> <p>5. Analyze the problem and develop programs</p>			
III	21BCACC304	Core Practical 5: Oracle & Unix/Linux	<p>1. Understand the basic concept of database.</p> <p>2. Building Entity Relationship Diagrams (ERDs) and mapping ERDs and Normalization Techniques.</p> <p>3. Manipulate data in Tables and to implement and execute SQL Queries.</p> <p>4. To perform complex queries and manage the data.</p> <p>5. Understand other SQL database Objects.</p> <p>6. Create PL/SQL blocks of application code that can be shared by multiple forms, reports and data management applications and describe stored procedure, triggers and functions.</p>	2	40	60
III	21BCACC305	Core Practical 6: C++	<p>1. Understand fundamentals of object-oriented programming in C++, including defining classes, invoking methods, etc.</p> <p>2. Understand the concept of class and object</p> <p>3. Understand and develop basic C++ programs, Understand and develop programs with concepts of class, objects, operator overloading, inheritance etc.</p> <p>4. Understand file handling and develop programs for writing data into a file and reading data from a file.</p> <p>5. Analyze the problem and develop programs</p>	2	40	60
IV	21BCACC401	Core 9: System Analysis and Design	<p>1. Understand the basic concepts of system study and System analysis.</p> <p>2. Understand the importance of each phase in</p>	4	30	70



			<p>System Development Life Cycle.</p> <ol style="list-style-type: none"> Understand the importance of Software development Paradigm (Models). Design the system based on business requirement using tools. Use the software project management tool. 			
IV	21BCACC402	Core 10: Programming with JAVA	<ol style="list-style-type: none"> Design, create, build, and debug Java applications and applets. Apply algorithmic thinking to solve programming problems. Write and apply decision structures for determining different operations and looping statement. Write Java programs using object-oriented programming techniques including classes, objects, methods, instance variables, composition, inheritance, and polymorphism. Write programs using graphical user interface (GUI) components and Java's Event Handling Model. 	4	30	70
IV	21BCACC403	Core 11: Web Programming -II	<ol style="list-style-type: none"> Understand the basic concepts of scripting language and web programming Understand how to implement, dry-run and debug programs. Recognize the benefits of using server side scripting Become equipped to make good choices about model design and use of open source scripting PHP Learn how to build and maintain php websites Understand how to write php scripts and use webserver Understand the concept of client-server architecture 	4	30	70
IV	21BCACC404	Core Practical 7: JAVA	<ol style="list-style-type: none"> Design, create, build, and debug Java 	2	40	60



			<p>applications and applets.</p> <ol style="list-style-type: none"> Apply algorithmic thinking to solve programming problems. Write and apply decision structures for determining different operations and looping statement. Write Java programs using object-oriented programming techniques including classes, objects, methods, instance variables, composition, inheritance, and polymorphism. Write programs using graphical user interface (GUI) components and Java's Event Handling Model. 			
IV	21BCACC405	Core Practical 8: Web Programming -II	<ol style="list-style-type: none"> Understand the basic concepts of scripting language and web programming Understand how to implement, dry-run and debug programs. Recognize the benefits of using server side scripting Become equipped to make good choices about model design and use of open source scripting PHP Learn how to build and maintain php websites Understand how to write php scripts and use webserver Understand the concept of client-server architecture 	2	40	60
I	21BCACC101	Core 2: Fundamentals of Computer	<ol style="list-style-type: none"> Understand Basics of Computer Classify network types and devices. Explain applications of internet. Understand use of Emerging technologies Protect own pc from virus. 	4	30	70
I	21BCACC102	Core 2: Problem Solving Methodology and Programming in C	<ol style="list-style-type: none"> Understand the basic concepts of programming. Understanding concepts how to design algorithms and flow-charts to solve fundamental programming problems. 	4	30	70



			<ol style="list-style-type: none"> 3. Draw flowcharts and algorithms. 4. Understand the static and dynamic memory allocation of numbers, alphabets and other characters using the concept of basic, derived and user defined data types. 5. Define and use functions with parameter passing options. 6. Write Programs for data writing and reading into file using in built file handling functions 			
I	21BCACC103	Core Practical 1: C Practical	<ol style="list-style-type: none"> 1. Understand how to draw flowchart and write an algorithm for any problem. 2. Understand & apply different conditional and loop statement 3. Write program using information of problem domain of a particular problem. 4. Understand concept of reusability and apply it using user defined function. 5. Understand and Solve underflow and overflow problem using pointers and structures. 	2	40	60
I	21BCACC104	Core Practical 2: PC Software	<ol style="list-style-type: none"> 1. Work with operating systems and manage setting of devices 2. Documentation with word processor with necessary formatting and editing. 3. Creating charts in spreadsheet software with page layout feature. 4. Use library functions for date, mathematics, text etc. 5. Prepare presentations with necessary animations. 	2	40	60
II	21BCACC201	Core 3: Computer Organization and Architecture	<ol style="list-style-type: none"> 1. Recognize the basic structure and operation of a digital computer. 2. Understand the different digital components of integrated circuit. 3. Understand the fixed-point and floating-point representation, addition, subtraction, multiplication & division. 4. Understand the major components of a computer 	4	30	70



			including CPU, memory, I/O and storage. 5. Implementation of register stack, memory stack and working method of DMA.			
II	21BCACC202	Core 4: Data Structure using C	<ol style="list-style-type: none"> 1. Understand the concept of dynamic memory allocation to overcome underflow and overflow problem 2. Design data structures including linked list, stack, queue and tree by using static or dynamic implementations. 3. Understand and implement sorting and searching techniques considering time and space complexity. 4. Apply different methods for traversing trees. 5. Study real life problems and apply own solutions to solve it. 	4	30	70
II	21BCACC203	Core 5: Web Programming -I	<ol style="list-style-type: none"> 1. Understand Hypertext Markup Language (HTML) in web programming language 2. To give awareness about the tags used for table, forms and an insight to HTML5 3. Describe the functions of CSS to improve web page design 4. Understand Client-side scripting language as web programming language using JavaScript 5. Design an interactive website online content using JavaScript 	4	30	70
II	21BCACC204	Core Practical 3: Data Structure using C	<ol style="list-style-type: none"> 1. Understand the concept of dynamic memory allocation to overcome underflow and overflow problem 2. Design data structures including linked list, stack, queue and tree by using static or dynamic implementations. 3. Understand and implement sorting and searching techniques considering time and space complexity. 4. Apply different methods for traversing trees. 5. Study real life problems and apply own solutions to solve it 	4	30	70



II	21BCACC205	Core Practical 4: Web Programming -I	<ol style="list-style-type: none"> 1. Understand Hypertext Markup Language (HTML) in web programming language 2. To give awareness about the tags used for table, forms and an insight to HTML5 3. Describe the functions of CSS to improve web page design 4. Understand Client-side scripting language as web programming language using JavaScript 5. Design an interactive website online content using JavaScript 	4	30	70
I	23UGCA101	Problem Solving Methodology and Programming in C	<ol style="list-style-type: none"> 1. Understand the basic concepts of programming. 2. Understanding concepts how to design algorithms and flow-charts to solve fundamental programming problems. 3. Draw flowcharts and algorithms. 4. Understand the static and dynamic memory allocation of numbers, alphabets and other characters using the concept of basic, derived and user defined data types. 5. Define and use functions with parameter passing options. 6. Write Programs for data writing and reading into file using in built file handling functions 	4	30	70
I	23UGCA102	Fundamentals of Computer	<ol style="list-style-type: none"> 1. Understand Basics of Computer 2. Input - Output and Storage devices 3. Introduction of Networking & Website Basics 4. Basics of HTML 5. HTML Form & Elements 	4	30	70
I	23UGCA103	C Practical	<ol style="list-style-type: none"> 1. Understand how to draw flowchart and write an algorithm for any problem. 2. Understand& apply different conditional and loop statement 3. Write program using information of problem domain of a particular problem. 4. Understand concept of reusability and apply it using user defined function. 	2	40	60



			5. Understand and Solve underflow and overflow problem using pointers and structures.			
I	23UGCA104	PC Software Practical	<ol style="list-style-type: none"> 1. Work with operating systems and manage setting of devices 2. Documentation with word processor with necessary formatting and editing. 3. Creating charts in spreadsheet software with page layout feature. 4. Use library functions for date, mathematics, text etc. 5. Prepare presentations with necessary animations. 	2	40	60
II	23UGCA202	Computer Organization and Architecture	<ol style="list-style-type: none"> 1. Recognize the basic structure and operation of a digital computer. 2. Understand the different digital components of integrated circuit. 3. Understand the fixed-point and floating-point representation, addition, subtraction, multiplication & division. 4. Understand the major components of a computer including CPU, memory, I/O and storage. 5. Implementation of register stack, memory stack and working method of DMA. 	4	30	70
II	23UGCA201	Data Structure using C	<ol style="list-style-type: none"> 1. Understand the concept of dynamic memory allocation to overcome underflow and overflow problem 2. Design data structures including linked list, stack, queue and tree by using static or dynamic implementations. 3. Understand and implement sorting and searching techniques considering time and space complexity. 4. Apply different methods for traversing trees. 5. Study real life problems and apply own solutions to solve it. 	4	30	70
II	23UGCA203	Data Structure using C Practical	<ol style="list-style-type: none"> 1. Understand the concept of dynamic memory allocation to overcome underflow and overflow 	2	40	60



			<p>problem</p> <ol style="list-style-type: none"> 2. Design data structures including linked list, stack, queue and tree by using static or dynamic implementations. 3. Understand and implement sorting and searching techniques considering time and space complexity. 4. Apply different methods for traversing trees. 5. Study real life problems and apply own solutions to solve it. 			
II	23UGCA204	Web Programming -I Practical	<ol style="list-style-type: none"> 1. Understand Hypertext Markup Language (HTML) in web programming language 2. To give awareness about the tags used for table, forms and an insight to HTML5 3. Describe the functions of CSS to improve web page design 4. Understand Client-side scripting language as web programming language using JavaScript 5. Design an interactive website online content using JavaScript 	2	40	60



Faculty of Science
Department of Computer Science
Program: M.Sc. I.T.

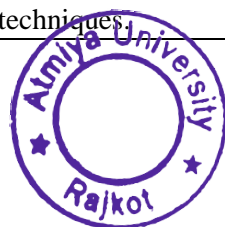
OBJECTIVES OF THE PROGRAMME

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their post-graduation:

- To develop mastery of emerging technologies in IT infrastructures, software development, IT systems management including IT security and to appreciate the necessity for continuing professional development.
- To demonstrate understanding of and apply current theories, models and techniques for the software development process.
- Explain and apply appropriate information technologies to help an individual or organization to achieve its goals and objectives.
- Manage the information technology resources of an individual or organization.
- Specify, design, develop, test and manage application software systems to meet the operational and business requirements of organizations.
- Anticipate the changing direction of information technology and evaluate and communicate the likely utility of new technologies to an individual or organization.

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	20MITCC101	Core 2: Structured Object Oriented Analysis and Design Methodology	<ol style="list-style-type: none"> 1. Understand the SDLC Model with Object Oriented Concept. 2. Understand of Technical Metrics for Object Oriented Systems. 3. Apply Object Oriented Analysis and Designing methodologies. 4. Test Object Oriented System using testing techniques. 	4	40	60



			5. Design Object Oriented System for Application.			
I	20MITCC102	Core 2: Advanced Web Development in LARAVEL	<ol style="list-style-type: none"> 1. Understand the basic components of an object-oriented program. 2. Implement and Customize User Interface. 3. Implement security system in web application 4. Design ORM Model using Relational Database Management System. 5. Simulate the real world application with all desired aspects for web application 	4	40	60
I	20MITCC103	Core 7: Programming with Python	<ol style="list-style-type: none"> 1. Understand basic data types of Python programming. 2. Explain basic principles of Python programming language. 3. Implement Object oriented Concepts. 4. Implement various operations on file. 5. Implement regular expression for validation. 6. Integration of python application with database. 7. Test CRUD operations on database. 8. Create console-based applications using python. 	4	40	60
I	20MITCC104	Core Practical 1: LARAVEL Practical	<ol style="list-style-type: none"> 1. Understand the basic components of an object-oriented program. 2. Implement and Customize User Interface. 3. Implement security system in web application 4. Design ORM Model using Relational Database Management System. 5. Simulate the real world application with all desired aspects for web application 	2	40	60
I	20MITCC106	Project	<ol style="list-style-type: none"> 1. Memorize the fundamental knowledge of core concepts 2. Identify a real world problem with it's solution 3. Demonstrate the concepts and apply them to different situation 4. Determine best solution based on experiments 	3	60	40



			5. Develop application and evaluate research report			
II	20MITCC201	Core 4: Application Development using Advanced Android	<ol style="list-style-type: none"> List features and development tools of android. Understand views and view groups Demonstrate activity and fragment lifecycle Use SQLite database, files and preference to store data Implement notification, messaging 	4	50	50
II	20MITCC202	Core 5: Cloud Computing with AWS	<ol style="list-style-type: none"> Understand the concepts of Cloud Computing. Understand storage and explore Linux installation Execute EC2 instance and route53 Understand and execute MSSQL & Aurora Understand concept of Virtual Private Cloud Explore application Service Security option and monitoring tools 	4	50	50
II	20MITCC203	Core 6: WEB PROGRAMMING USING ADVANCED ASP.NET	<ol style="list-style-type: none"> Gain a thorough understanding of the philosophy and architecture of Web applications using ASP.NET Acquire a working knowledge of Web application development using Web Forms and Visual Studio Optimize an ASP.NET Web application using configuration, security, and caching Access databases using ADO.NET and More recent ASP .NET features Implement rich client applications using ASP.NET AJAX and Customize Web applications through the use of HTTP handlers and modules 	4	50	50
II	20MITCC204	Core Practical 3: Application Development using Advanced Android	<ol style="list-style-type: none"> List features and development tools of android. Understand views and view groups Demonstrate activity and fragment lifecycle Use SQLite database, files and preference to store data Implement notification, messaging Integrate camera, audio, video, map and location 	2	60	40



		Practical	services in android app			
II	20MITCC206	Project	<ol style="list-style-type: none"> 1. Memorize the fundamental knowledge of core concepts 2. Identify a real world problem with it's solution 3. Demonstrate the concepts and apply them to different situation 4. Determine best solution based on experiments 5. Develop application and evaluate research report 	3	60	40
III	20MITCC301	Core 7: MVC Design Pattern in .NET	<ol style="list-style-type: none"> 1. Gain a thorough understanding of the philosophy and architecture of Web applications using MVC ASP.NET 2. Acquire a working knowledge of Web application development using Web Forms and Visual Studio 3. Optimize an MVC ASP.NET Web application using configuration, security, and caching 4. Access databases using ADO.NET and More recent MVC ASP .NET features 5. Implement rich client applications using MVC ASP.NET AJAX and Customize Web applications through the use of HTTP handlers and modules 	6	60	40
III	20MITCC302	Core 8: Front-End Development using JavaScript Framework	<ol style="list-style-type: none"> 1. Understand Advanced JavaScript ES6 with different concepts. 2. Describe ReactJS application structure and importance of it 3. Demonstrate functional front-end web application using React 4. Organizing a various React features including components and forms 5. Build powerful, fast, user-friendly and reactive web apps 	6	60	40
III	20MITCC303	Core Practical 9:	<ol style="list-style-type: none"> 1. Apply branching and merging concepts in your projects 2. Configure upstream and downstream for your 	3	60	40



		Open Source Repository GitHub (Self-Study)	<ul style="list-style-type: none"> project 3. Create and push merge requests 4. Understand how to work on Open-source projects using Git 5. Implement different Git workflow strategies in Real-time projects 6. Understand of using Github Website 7. Test application on various version. 8. Create application using GitHub teamwork features 			
III	20MITDC302	DSE Core 1: Hybrid Mobile Computing using Flutter	<ul style="list-style-type: none"> 1. Understand basic knowledge of mobile computing with cross-platform using flutter 2. Understand the flutter environment installation and configuration 3. Demonstrate the concepts of Control flow, Iteration and functions in Dart Programming 4. Inspect available different UI Widgets in Flutter 5. Design a real-time mobile application using Flutter 	6	60	40
III	20MITCC304	Project	<ul style="list-style-type: none"> 1. Memorize the fundamental knowledge of core concepts 2. Identify a real-world problem with its solution 3. Demonstrate the concepts and apply them to different situation 4. Determine best solution based on experiments 5. Develop application and evaluate research report 	3	60	40



Department of CS. & I.T
Program: B. Sc. Information technology

OBJECTIVES OF THE PROGRAMME

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

- Explain and apply appropriate information technologies to help an individual or organization to achieve its goals and objectives.
- Demonstrating a substantial understanding of concepts in key areas of computer science and its applications
- Specify, design, develop, test and manage application software systems to meet the operational and business requirements of organizations.
- Work in a team using common tools and environments to achieve project objectives

GRADUATE ATTRIBUTES

- **Academic excellence:** Ability to identify opportunities or problems in scientific and business domain and to apply relevant problem-solving methodologies for developing software of the type web, mobile or desktop based using knowledge of computational and analytical skills.
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a solution in terms of design of software considering benefits for every stack holder and being able to work effectively, independently and collaboratively as part of a team in research, technology development and entrepreneurial ventures. Able to communicate effectively the same in a structured form with skills like sharp mind and flexibility for any subject or new idea.
- **Global Citizenship:** Develop sustainable computing solutions in broader economic, societal and environmental contexts.
- **Life Long Learning:** motivated to engage in independent and life-long learning in the broadest context of evolving technological challenges.



Program Outcomes (POs)

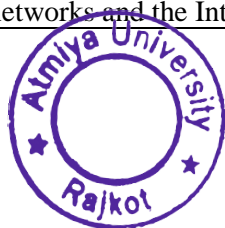
After completion of the programme the Graduate will be able to:		
PO 1	:	Domain knowledge: Demonstrate and apply the knowledge of mathematics, science and Computer Application in scientific & business domain.
PO 2	:	Problem analysis: understand and apply system analysis with software engineering techniques using knowledge or information of problem domain with various communication technologies.
PO 3	:	Design/development of solutions: Understand the complex scientific or business problems and design structured mechanisms or develop software that meet the specified needs of web based or mobile or any type of applications using research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions as a solution.
PO 4	:	Conduct investigations of complex problems: Gain ability for data gathering techniques using various methods of investigations with flexibility in determining requirements in terms of investigating complex problems by conducting experiments, analysing and interpreting data in the given domain with computer application techniques.
PO 5	:	Modern tool usage: Understand standard software development procedures and acquire in-depth technical competence to use various licensed, freeware and shareware software development tools called computer aided software engineering (CASE), designing (CASD) and management (CASE) tools.
PO 6	:	The Computer Professional and society: Understand own 'role in society and act in an honest and consistent manner based on a strong sense of self and personal values
PO 7	:	Environment and sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development
PO 8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of practice in the computer science and application.



PO 9	:	Individual and team work: Able to function effectively as individual and as a member in multidisciplinary settings
PO 10	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large
PO 11	:	Project management and finance: Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	:	Life-long learning: Able to recognize the need to undertake life-long learning and acquire the capacity to do so

Course Outcomes (COs):

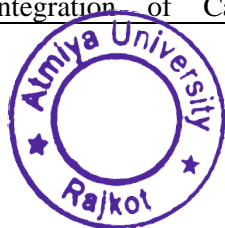
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
V	18BITCC501	Core 12: Programming with C#.NET	<ol style="list-style-type: none"> 1. Understand the .NET Framework 2. Understand the foundation of C# programming 3. Possess the understanding of OOP in C#.NET 4. Understand different application of ADO.NET 5. Design Crystal Reports and Create Setup of C# Application 	4	30	70
V	18BITCC502	Core 13: Web Searching Technology and Search Engine Optimization	<ol style="list-style-type: none"> 1. Understand basics of SEO and how various search engines work 2. Learn the steps you need to prepare for, execute, and evaluate SEO initiatives. 3. Examine a number of advanced strategies and tactics 	4	30	70
V	18BITCC503	Core 14: Web Services API-JSON/XML (Self Study)	<ol style="list-style-type: none"> 1. Understand open protocols and standards used for exchanging data between applications or systems in web service. 2. Design and code data transfer scripts using XML languages for the transfer of data over business networks and the Internet. 	4	15	35



			<ol style="list-style-type: none"> Understand what JSON used for data interchange. Comprehend the formats for requests to and responses from a web service that uses a SOAP interface. Understanding REST, Learning how to design a REST API 			
V	18BITCC504	Core Practical 9: C#.NET Practical	<ol style="list-style-type: none"> Understand the .NET Framework Understand the foundation of C# programming Possess the understanding of OOP in C#.NET Understand different application of ADO.NET Design Crystal Reports and Create Setup of C# Application 	2	40	60
V	18BITDC501	DSE-Core 2: MVC Design Pattern in PHP	<ol style="list-style-type: none"> Demonstrate the use of the CodeIgniter MVC Framework. Design & develop MVC based application. Be able to design, write, compile, execute and test Web Application in mvc framework. Understand current trends of application development using php platform 	4	30	70
V	18BITDC502	DSE-Core 2: Advanced JAVA Programming	<ol style="list-style-type: none"> Design console based, GUI based and web based applications Understand Integrated Development Environment Understand the concepts of Event Handling Create, debug and run multi-tier and enterprise- level applications Understand current trends of application development using Java platform 	4	30	70
V	18BITDC503	DSE-Core Practical 1: MVC Design Pattern in PHP Practical	<ol style="list-style-type: none"> Demonstrate the use of the CodeIgniter MVC Framework. Design & develop MVC based application. Be able to design, write, compile, execute and test Web Application in mvc framework. Understand current trends of application development using php platform 	2	40	60
V	18BITDC504	DSE-Core Practical 1: Advanced JAVA	<ol style="list-style-type: none"> Design console based, GUI based and web based applications 	2	40	60



		Practical	<ol style="list-style-type: none"> 2. Understand Integrated Development Environment 3. Understand the concepts of Event Handling 4. Create, debug and run multi-tier and enterprise- level applications 5. Understand current trends of application development using Java platform 			
VI	18BITCC601	Core 16: Programming with ASP.NET	<ol style="list-style-type: none"> 1. Design & develop web based applications. 2. Understand .NET framework. 3. Understand ASP.NET Controls 	4	30	70
VI	18BITCC602	Core 17: Network Administration	<ol style="list-style-type: none"> 1. Provide an overview of information security and network security and management. 2. Examine the practical aspects of the issues involved in secure systems and networks and industry practices being adopted to protect information systems. 3. Gain the knowledge, skills and abilities to incorporate good information security practice in any organization. 	4	30	70
VI	18BITCC603	Core Practical 11: ASP.NET Practical	<ol style="list-style-type: none"> 1. Design & develop web based applications. 2. Understand .NET framework. 3. Understand ASP.NET Controls 	2	40	60
VI	18BITDC601	DSE-Core 2: Mobile Computing using Android	<ol style="list-style-type: none"> 1. Understand fundamental of Android Operating System 2. Design and Develop Android Mobile Application. 3. Understand of SQLite and Connectivity with it. 4. Understand Location Based Service & Notifications in android. 5. Developing web service and retrieving data using JSON 6. Packaging and distributing android application 	4	30	70
VI	18BITDC602	DSE-Core 2: Developing Cross Platform Mobile Application using XAMARIN	<ol style="list-style-type: none"> 1. Understand and implement the Xamarin Forms Development KIT 2. Utilize Xamarin Studio for developing cross-platform Native Apps for Android and iOS 3. Understand the Xamarin functionality for designing the User Interface of the app 4. Creating and managing fragments and specialized fragment classes 5. Integration of Camera API and location/maps 	4	30	70



			functionality 6. Deploy and publish apps on the store			
VI	18BITDC603	DSE-Core Practical 2: Android Practical	<ol style="list-style-type: none"> 1. Understand fundamental of Android Operating System 2. Design and Develop Android Mobile Application. 3. Understand of SQLite and Connectivity with it. 4. Understand Location Based Service & Notifications in android. 5. Developing web service and retrieving data using JSON 6. Packaging and distributing android application 	2	40	60
VI	18BITDC604	DSE-Core Practical 2: XAMARIN Practical	<ol style="list-style-type: none"> 1. Understand and implement the Xamarin Forms Development KIT 2. Utilize Xamarin Studio for developing cross-platform Native Apps for Android and iOS 3. Understand the Xamarin functionality for designing the User Interface of the app 4. Creating and managing fragments and specialized fragment classes 5. Integration of Camera API and location/maps functionality 6. Deploy and publish apps on the store 	2	40	60
III	18BITCC301	Core 6: Object Oriented Programming with C++	<ol style="list-style-type: none"> 1. Understand fundamentals of object-oriented programming in C++, including defining classes, invoking methods, etc. 2. Be aware of the important topics and principles of object-oriented software development. 3. Have the ability to write a computer program to solve specified problems. 	4	30	70
III	18BITCC302	Core 7: RDBMS using Oracle	<ol style="list-style-type: none"> 1. Understand the basic concept of database 2. Building Entity Relationship Diagrams (ERDs) and mapping ERDs 3. Manipulate data in tables and create database objects 4. Analyze complex business scenarios, design and create databases using SQL 5. Create PL/SQL blocks of application code that can be 	4	30	70



			<p>shared by multiple forms, reports and data management applications</p> <ol style="list-style-type: none"> Describe stored procedures and functions Explore the differences between SQL and PL/SQL and explore how PL/SQL is used to extend and automate SQL in administering the Oracle database 			
III	18BITCC303	Core 8: Operating System Concept with Unix / Linux	<ol style="list-style-type: none"> Understand the basic concepts of operating system and Design algorithms of process and memory management Understand the overview of Unix operating system and commands Learn shell programming Understand the overview of Linux configuration and features Handling of Linux server administration 	4	30	70
III	18BITCC304	Core Practical 5: C++ Practical	<ol style="list-style-type: none"> Understand fundamentals of object-oriented programming in C++, including defining classes, invoking methods, etc. Be aware of the important topics and principles of object-oriented software development. Have the ability to write a computer program to solve specified problems. 	2	40	60
III	18BITCC305	Core Practical 6: Oracle & Unix / Linux Practical	<ol style="list-style-type: none"> Understand the basic concept of database Building Entity Relationship Diagrams (ERDs) and mapping ERDs Manipulate data in tables and create database objects Analyze complex business scenarios, design and create databases using SQL Create PL/SQL blocks of application code that can be shared by multiple forms, reports and data management applications Describe stored procedures and functions Explore the differences between SQL and PL/SQL and explore how PL/SQL is used to extend and automate SQL in administering the Oracle database Understand the basic concepts of operating system and Design algorithms of process and memory management 	2	40	60



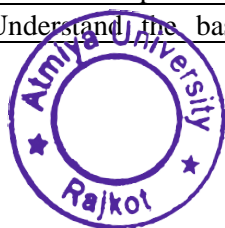
			<ul style="list-style-type: none"> 9. Understand the overview of Unix operating system and commands 10. Learn shell programming 11. Understand the overview of Linux configuration and features 12. Handling of Linux server administration 			
IV	18BITCC401	Core 9: Programming with JAVA	<ul style="list-style-type: none"> 1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc. 2. Understand fundamentals of object-oriented programming in Java, including defining classes, creating objects, invoking methods, using class libraries, etc. 3. Be aware of the important topics and principles of object-oriented software development. 4. To develop ability to write a computer programs to solve specified problems. 5. To develop ability to write applet programs and event handling programs. 	4	30	70
IV	18BITCC402	Core 10: Web Development using PHP	<ul style="list-style-type: none"> 1. Understand the basic concepts of scripting language and web programming 2. Understand how to implement, dry-run and debug programs. 3. Recognize the benefits of using server side scripting 4. Become equipped to make good choices about model design and use of open source scripting PHP 5. Learn how to build and maintain php websites 6. Understand how to write php scripts and use webserver 7. Understand the concept of client-server architecture 	4	30	70
IV	18BITCC403	Core 11: System Analysis and Design	<ul style="list-style-type: none"> 1. Understand the basic concepts of system study and System analysis. 2. Understand the importance of each phase in System Development Life Cycle. 3. Understand the importance of Software development Paradigm (Models). 4. Design the system based on business requirement using 	4	30	70



			tools. 5. Use the software project management tool.			
IV	18BITCC404	Core Practical 7: JAVA Practical	<ol style="list-style-type: none"> 1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc. 2. Understand fundamentals of object-oriented programming in Java, including defining classes, creating objects, invoking methods, using class libraries, etc. 3. Be aware of the important topics and principles of object-oriented software development. 4. To develop ability to write a computer programs to solve specified problems. 5. To develop ability to write applet programs and event handling programs. 	2	40	60
IV	18BITCC405	Core Practical 8: PHP Practical	<ol style="list-style-type: none"> 1. Understand the basic concepts of scripting language and web programming 2. Understand how to implement, dry-run and debug programs. 3. Recognize the benefits of using server side scripting 4. Become equipped to make good choices about model design and use of open source scripting PHP 5. Learn how to build and maintain php websites 6. Understand how to write php scripts and use webserver 7. Understand the concept of client-server architecture 	2	40	60
I	18BITCC101	Core 2: Problem Solving Methodology and Programming in C	<ol style="list-style-type: none"> 4. Understand the basic concepts of programming. 5. Design algorithms and flow-charts to solve fundamental programming problems. 6. Understand how to implement, dry-run and debug programs. 7. Understand the memory allocation of numbers, alphabets and other characters using the concept of basic, derived and user defined data types. 8. Understand how to write and use functions and parameter passing options. 	4	30	70



			9. Understand the concept of control structures including looping and branching statement.			
I	18BITCC102	Core 2: Fundamentals of Computer	<ol style="list-style-type: none"> 1. Understand the functions of a computer. 2. Identify types and characteristics of various generations of computers. 3. Identify types and characteristics of various peripherals including storage and I/O. 4. Understand the basic concepts of networking. 5. Understand types of networks and topologies. 6. Understand emerging technology 	4	30	70
I	18BITCC103	Core Practical 1: Programming in C Practical	<ol style="list-style-type: none"> 1. Understand the basic concepts of programming. 2. Design algorithms and flow-charts to solve fundamental programming problems. 3. Understand how to implement, dry-run and debug programs. 4. Understand the memory allocation of numbers, alphabets and other characters using the concept of basic, derived and user defined data types. 5. Understand how to write and use functions and parameter passing options. <p>Understand the concept of control structures including looping and branching statement.</p>	2	40	60
II	18BITCC201	Core 3: Advanced C and Data Structure	<ol style="list-style-type: none"> 1. Understand the concept of pointers and dynamic memory allocation. 2. Design data structures including linked list, stack, queue and tree by using static or dynamic implementations. 3. Understand and implement sorting and searching techniques. 4. Understand the basic concept of file handling. 5. Demonstrate different methods for traversing trees. 6. Understand the concept of recursion and describe how it can be implemented using a stack. 7. Identify the benefits of dynamic and static data structures implementations. 	4	30	70
II	18BITCC202	Core 4: Computer	1. Understand the basic structure and operation of a	4	30	70



		Organization and Architecture	<p>digital computer.</p> <ol style="list-style-type: none"> Understand different digital components of integrated circuit. Implementation of fixed-point and floating-point addition, subtraction, multiplication & division. Understand the major components of a computer including CPU, memory, I/O and storage. Understand stack implementation by register stack and memory stack and working method of DMA. 			
II	18BITCC203	Core 5: Web Scripting Languages	<ol style="list-style-type: none"> Understand the principles of designing effective, dynamic and interactive web pages. Become familiar with graphic design principles that relate to web design and learn how to implement these theories into practice. Develop skills in analyzing the usability of a web site. Learn the language of the web: HTML and CSS. Understand and use JavaScript to enhance HTML documents 	4	30	70
II	18BITCC204	Core Practical 3: Advanced C and Data Structure Practical	<ol style="list-style-type: none"> Understand the basic concepts of programming. Design algorithms and flow-charts to solve fundamental programming problems. Understand how to implement, dry-run and debug programs. Understand the memory allocation of numbers, alphabets and other characters using the concept of basic, derived and user defined data types. Understand how to write and use functions and parameter passing options. <p>Understand the concept of control structures including looping and branching statement.</p>	2	40	60
II	18BITCC205	Core Practical 4: Web Scripting Languages Practical	<ol style="list-style-type: none"> Understand the principles of designing effective, dynamic and interactive web pages. Become familiar with graphic design principles that relate to web design and learn how to implement these theories into practice. Develop skills in analyzing the usability of a web site. 	2	40	60



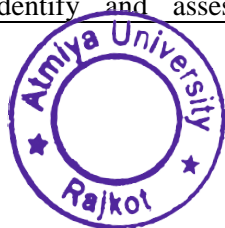
			4. Learn the language of the web: HTML and CSS. Understand and use JavaScript to enhance HTML documents			
V	21BITCC501	Core 12: Programming with C#.NET	<ol style="list-style-type: none"> 1. Identify and Understand the features and advantages of .NET framework. 2. Understand type conversion and casting, boxing and unboxing, and looping 3. Apply knowledge of C# basics and OOP concepts to develop programs. 4. Analyze the use of different types of controls and their properties in GUI development. 5. Create complex GUI applications that utilize various types of controls and their properties. 	4	30	70
V	21BITCC502	Core 13: Web Searching Technology and Search Engine Optimization	<ol style="list-style-type: none"> 1. Understand Basics of SEO 2. Understanding Audience & Algorithm-Based Ranking Systems 3. Make use of SEO techniques for websites 4. Tools and techniques 5. Tracking Results and Measuring Success 	4	30	70
V	21BITCC503	Core 14: Web Services API- JSON/XML (Self Study)	<ol style="list-style-type: none"> 1. Understand open protocols and standards used for exchanging data between applications or systems in web service. 1. Design and code data transfer scripts using XML languages for the transfer of data over business networks and the Internet. 3. Understand what JSON used for data interchange. 4. Comprehend the formats for requests to and responses from a web service that uses a SOAP interface. 5. Understanding REST, Learning how to design a REST API 	4	30	70
V	21BITCC505	Core Practical 9: C#.NET	<ol style="list-style-type: none"> 1. Identify and Understand the features and advantages of .NET framework. 6. Understand type conversion and casting, boxing and unboxing, and looping 7. Apply knowledge of C# basics and OOP concepts to 	2	40	60



			<p>develop programs.</p> <ol style="list-style-type: none"> Analyze the use of different types of controls and their properties in GUI development. Create complex GUI applications that utilize various types of controls and their properties. 			
V	21BITCL501	Core-Elective 1: Advanced JAVA Programming	<ol style="list-style-type: none"> Understand JDBC to communicate application with database using Java. Understand Graphical User Interface programming with event handling. Server side technology concepts to create dynamic web applications. Understand use of Java Server Pages for web application. Create web-based and event-driven GUI apps that reflect real-world scenarios. 	-	-	-
V	21BITCL502	Core-Elective 1: MVC Design Pattern with PHP	<ol style="list-style-type: none"> Understand the concepts of Object Oriented Programming using PHP Implements constructors, default constructors, inheritance, interfaces, abstract classes and abstract methods Describe the advance PHP concepts next level of programming in PHP Understand how MVC frameworks work, making it easier to define Model-View-Controller (MVC) Apply to build a custom MVC Framework from absolute scratch and create an application based on PHP OOP 	-	-	-
V	21BITCL503	Core-Elective Practical 1: Advanced JAVA Programming	<ol style="list-style-type: none"> Understand JDBC to communicate application with database using Java. Understand Graphical User Interface programming with event handling. Server side technology concepts to create dynamic web applications. Understand use of Java Server Pages for web application. Create web-based and event-driven GUI apps that 	-	-	-



			reflect real-world scenarios.			
V	21BITCL504	Core-Elective Practical 1: MVC Design Pattern with PHP	<ol style="list-style-type: none"> 1. Understand the concepts of Object Oriented Programming using PHP 2. Implements constructors, default constructors, inheritance, interfaces, abstract classes and abstract methods 3. Describe the advance PHP concepts next level of programming in PHP 4. Understand how MVC frameworks work, making it easier to define Model-View-Controller (MVC) 5. Apply to build a custom MVC Framework from absolute scratch and create an application based on PHP OOP 	-	-	-
VI	21BITDC501	DSE-Core 2: MVC Design Pattern in PHP	<ol style="list-style-type: none"> 6. Demonstrate proficiency in ASP.NET, framework usage, and adherence to coding standards. 1. Utilize ASP.NET controls effectively, including standard, rich, and navigation controls. 2. Implement data validation and state management techniques in ASP.NET applications. 3. Develop applications with ADO.NET for database interaction. 4. Create and deploy web services, and configure them in ASP.NET applications. 	-	-	-
VI	21BITDC503	DSE-Core Practical 1: MVC Design Pattern in PHP Practical	<ol style="list-style-type: none"> 1. Demonstrate proficiency in ASP.NET, framework usage, and adherence to coding standards. 2. Utilize ASP.NET controls effectively, including standard, rich, and navigation controls. 3. Implement data validation and state management techniques in ASP.NET applications. 4. Develop applications with ADO.NET for database interaction. 5. Create and deploy web services, and configure them in ASP.NET applications. 	-	-	-
VI	21BITCC601	Core 16: Network Administration	<ol style="list-style-type: none"> 1. Demonstrate a sound understanding of network fundamentals. 2. Identify and assess transmission media, network 	4	30	70



			<p>sharing, and firewall technologies.</p> <ol style="list-style-type: none"> Apply network routing, IP addressing, and cryptographic principles. Implement public key infrastructure and message authentication for secure communication. Acquire the skills needed for proficient network and server administration. 			
VI	21BITCC602	Core 17: Programming with ASP.NET	<ol style="list-style-type: none"> Demonstrate proficiency in ASP.NET, framework usage, and adherence to coding standards. Utilize ASP.NET controls effectively, including standard, rich, and navigation controls. Implement data validation and state management techniques in ASP.NET applications. Develop applications with ADO.NET for database interaction. Create and deploy web services, and configure them in ASP.NET applications. 	4	30	70
VI	21BITCC603	Core Practical 10: ASP.NET	<ol style="list-style-type: none"> Demonstrate proficiency in ASP.NET, framework usage, and adherence to coding standards. Utilize ASP.NET controls effectively, including standard, rich, and navigation controls. Implement data validation and state management techniques in ASP.NET applications. Develop applications with ADO.NET for database interaction. Create and deploy web services, and configure them in ASP.NET applications. 	2	40	60
VI	21BITCL601	Core-Elective 2: Mobile Computing using Android	<ol style="list-style-type: none"> Develop proficiency in Android application design and development. Create user-friendly Android interfaces. Implement data storage and SQLite connectivity in Android apps. Utilize APIs and location-based services, and implement notifications. Understand web services and deploy Android applications effectively. 	2	40	60



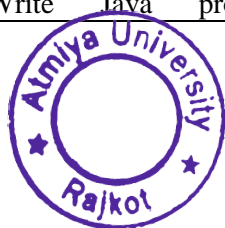
VI	21BITCL602	Core-Elective 2: Developing Cross Platform Mobile Application using XAMARIN	<ol style="list-style-type: none"> 1. Understand the fundamentals of Xamarin.Forms for cross-platform app development. 2. Create a functional Xamarin.Forms application. 3. Proficiently use XAML and apply themes for UI design. 4. Implement database access within Xamarin.Forms apps. 5. Develop expertise in web services integration and app deployment for Xamarin.Forms applications. 	2	40	60
VI	21BITCL603	Core-Elective Practical 2: Android	<ol style="list-style-type: none"> 1. Develop proficiency in Android application design and development. 2. Create user-friendly Android interfaces. 3. Implement data storage and SQLite connectivity in Android apps. 4. Utilize APIs and location-based services, and implement notifications. 5. Understand web services and deploy Android applications effectively. 	2	40	60
VI	21BITCL604	Core-Elective Practical 2: XAMARIN	<ol style="list-style-type: none"> 1. Understand the fundamentals of Xamarin.Forms for cross-platform app development. 2. Create a functional Xamarin.Forms application. 3. Proficiently use XAML and apply themes for UI design. 4. Implement database access within Xamarin.Forms apps. 5. Develop expertise in web services integration and app deployment for Xamarin.Forms applications. 	2	40	60
III	21BITCC301	Core 6: Operating System	<ol style="list-style-type: none"> 1. How the operating system works and flow operating system 2. Understand the different commands for unix operating system 3. Understand the basic shell programming in unix to perform various task 4. Installation of linux operating system and their desktop environment ,dual boot concept introduce 5. Configuration and troubleshoot of various linux server 	4	30	70



III	21BITCC302	Core 7: Relational Database Management	<ol style="list-style-type: none"> 1. Understand the basic concept of database. 2. Building Entity Relationship Diagrams (ERDs) and mapping ERDs and Normalization Techniques. 3. Manipulate data in Tables and to implement and execute SQL Queries. 4. To perform complex queries and manage the data. 5. Understand other SQL database Objects. 	4	30	70
III	21BITCC303	Core 8: Object Oriented Programming with C++	<ol style="list-style-type: none"> 1. Understand fundamentals of object-oriented programming in C++, including defining classes, invoking methods, etc. 2. Understand the concept of class and object 3. Understand and develop basic C++ programs, Understand and develop programs with concepts of class, objects, operator overloading, inheritance etc. 4. Understand file handling and develop programs for writing data into a file and reading data from a file. 5. Analyze the problem and develop programs 	4	30	70
III	21BITCC304	Core Practical 5: Oracle & Unix/Linux	<ol style="list-style-type: none"> 1. Understand the basic concept of database. 2. Building Entity Relationship Diagrams (ERDs) and mapping ERDs and Normalization Techniques. 3. Manipulate data in Tables and to implement and execute SQL Queries. 4. To perform complex queries and manage the data. 5. Understand other SQL database Objects. 	2	40	60
III	21BITCC305	Core Practical 6: C++	<ol style="list-style-type: none"> 1. Understand fundamentals of object-oriented programming in C++, including defining classes, invoking methods, etc. 2. Understand the concept of class and object 3. Understand and develop basic C++ programs, Understand and develop programs with concepts of class, objects, operator overloading, inheritance etc. 4. Understand file handling and develop programs for writing data into a file and reading data from a file. 5. Analyze the problem and develop programs 	2	40	60
IV	21BITCC401	Core 9: System Analysis and Design	<ol style="list-style-type: none"> 1. Understand the basic concepts of system study and System analysis. 	4	30	70



			<ol style="list-style-type: none"> 2. 3. Understand the importance of each phase in System Development Life Cycle. 4. 5. Understand the importance of Software development Paradigm (Models). 6. Design the system based on business requirement using tools. 7. Use the software project management tool. 			
IV	21BITCC402	Core 10: Programming with JAVA	<ol style="list-style-type: none"> 1. Design, create, build, and debug Java applications and applets. 2. Apply algorithmic thinking to solve programming problems. 3. Write and apply decision structures for determining different operations and looping statement. 4. Write Java programs using object-oriented programming techniques including classes, objects, methods, instance variables, composition, inheritance, and polymorphism. 5. Write programs using graphical user interface (GUI) components and Java's Event Handling Model. 	4	30	70
IV	21BITCC403	Core 11: Web Programming -II	<ol style="list-style-type: none"> 1. Understand the basic concepts of scripting language and web programming 2. Understand how to implement, dry-run and debug programs. 3. Recognize the benefits of using server side scripting 4. Become equipped to make good choices about model design and use of open source scripting PHP 5. Learn how to build and maintain php websites 	4	30	70
IV	21BITCC404	Core Practical 7: JAVA	<ol style="list-style-type: none"> 1. Design, create, build, and debug Java applications and applets. 2. Apply algorithmic thinking to solve programming problems. 3. Write and apply decision structures for determining different operations and looping statement. 4. Write Java programs using object-oriented 	2	40	60



			<p>programming techniques including classes, objects, methods, instance variables, composition, inheritance, and polymorphism.</p> <p>5. Write programs using graphical user interface (GUI) components and Java's Event Handling Model.</p>			
IV	21BITCC405	Core Practical 8: Web Programming -II	<p>1. Understand the basic concepts of scripting language and web programming</p> <p>2. Understand how to implement, dry-run and debug programs.</p> <p>3. Recognize the benefits of using server side scripting</p> <p>4. Become equipped to make good choices about model design and use of open source scripting PHP</p> <p>5. Learn how to build and maintain php websites</p>	2	40	60
I	21BITCC101	Core 2: Fundamentals of Computer	<p>1. Understand Basics of Computer</p> <p>2. Classify network types and devices.</p> <p>3. Explain applications of internet.</p> <p>4. Understand use of Emerging technologies</p> <p>5. Protect own pc from virus.</p>	4	30	70
I	21BITCC102	Core 2: Problem Solving Methodology and Programming in C	<p>1. Understand the basic concepts of programming.</p> <p>2. Understanding concepts how to design algorithms and flow-charts to solve fundamental programming problems.</p> <p>3. Draw flowcharts and algorithms.</p> <p>4. Understand the static and dynamic memory allocation of numbers, alphabets and other characters using the concept of basic, derived and user defined data types.</p> <p>5. Define and use functions with parameter passing options.</p> <p>6. Write Programs for data writing and reading into file using in built file handling functions</p>	4	30	70
I	21BITCC103	Core Practical 1: C Practical	<p>1. Understand how to draw flowchart and write an algorithm for any problem.</p> <p>2. Understand & apply different conditional and loop statement</p> <p>3. Write program using information of problem domain of a particular problem.</p>	2	40	60



			<ol style="list-style-type: none"> Understand concept of reusability and apply it using user defined function. Understand and Solve underflow and overflow problem using pointers and structures. 			
I	21BITCC104	Core Practical 2: PC Software	<ol style="list-style-type: none"> Work with operating systems and manage setting of devices Documentation with word processor with necessary formatting and editing. Use library functions for date, mathematics, text etc. Prepare presentations with necessary animations. 	2	40	60
II	21BITCC201	Core 3: Computer Organization and Architecture	<ol style="list-style-type: none"> Recognize the basic structure and operation of a digital computer. Understand the different digital components of integrated circuit. Understand the fixed-point and floating-point representation, addition, subtraction, multiplication & division. Understand the major components of a computer including CPU, memory, I/O and storage. Implementation of register stack, memory stack and working method of DMA. 	4	30	70
II	21BITCC202	Core 4: Data Structure using C	<ol style="list-style-type: none"> Understand the concept of dynamic memory allocation to overcome underflow and overflow problem Design data structures including linked list, stack, queue and tree by using static or dynamic implementations. Understand and implement sorting and searching techniques considering time and space complexity. Apply different methods for traversing trees. Study real life problems and apply own solutions to solve it. 	4	30	70
II	21BITCC203	Core 5: Web Programming -I	<ol style="list-style-type: none"> Understand Hypertext Markup Language (HTML) in web programming language To give awareness about the tags used for table, forms and an insight to HTML5 Describe the functions of CSS to improve web page 	4	30	70



			<p>design</p> <ol style="list-style-type: none"> Understand Client-side scripting language as web programming language using JavaScript Design an interactive website online content using JavaScript 			
II	21BITCC204	Core Practical 3: Data Structure using C	<ol style="list-style-type: none"> Understand the concept of dynamic memory allocation to overcome underflow and overflow problem Design data structures including linked list, stack, queue and tree by using static or dynamic implementations. Understand and implement sorting and searching techniques considering time and space complexity. Apply different methods for traversing trees. Study real life problems and apply own solutions to solve it. 	4	30	70
II	21BITCC205	Core Practical 4: Web Programming -I	<ol style="list-style-type: none"> Understand Hypertext Markup Language (HTML) in web programming language To give awareness about the tags used for table, forms and an insight to HTML5 Describe the functions of CSS to improve web page design Understand Client-side scripting language as web programming language using JavaScript Design an interactive website online content using JavaScript 	4	30	70
I	23UGCA101	Problem Solving Methodology and Programming in C	<ol style="list-style-type: none"> Understand the basic concepts of programming. Understanding concepts how to design algorithms and flow-charts to solve fundamental programming problems. Draw flowcharts and algorithms. Understand the static and dynamic memory allocation of numbers, alphabets and other characters using the concept of basic, derived and user defined data types. Define and use functions with parameter passing options. Write Programs for data writing and reading into file 	4	30	70



			using in built file handling functions			
I	23UGCA102	Fundamentals of Computer	<ol style="list-style-type: none"> 1. Understand Basics of Computer 2. Input - Output and Storage devices 3. Introduction of Networking & Website Basics 4. Basics of HTML 5. HTML Form & Elements 	4	30	70
I	23UGCA103	C Practical	<ol style="list-style-type: none"> 1. Understand how to draw flowchart and write an algorithm for any problem. 2. Understand & apply different conditional and loop statement 3. Write program using information of problem domain of a particular problem. 4. Understand concept of reusability and apply it using user defined function. 5. Understand and Solve underflow and overflow problem using pointers and structures. 	2	40	60
I	23UGCA104	PC Software Practical	<ol style="list-style-type: none"> 1. Work with operating systems and manage setting of devices 2. Documentation with word processor with necessary formatting and editing. 3. Creating charts in spreadsheet software with page layout feature. 4. Use library functions for date, mathematics, text etc. 5. Prepare presentations with necessary animations. 	2	40	60
II	23UGCA202	Computer Organization and Architecture	<ol style="list-style-type: none"> 1. Recognize the basic structure and operation of a digital computer. 2. Understand the different digital components of integrated circuit. 3. Understand the fixed-point and floating-point representation, addition, subtraction, multiplication & division. 4. Understand the major components of a computer including CPU, memory, I/O and storage. 5. Implementation of register stack, memory stack and working method of DMA. 	4	30	70
II	23UGCA201	Data Structure using C	<ol style="list-style-type: none"> 1. Understand the concept of dynamic memory allocation 	4	30	70



			<p>to overcome underflow and overflow problem</p> <ol style="list-style-type: none"> Design data structures including linked list, stack, queue and tree by using static or dynamic implementations. Understand and implement sorting and searching techniques considering time and space complexity. Apply different methods for traversing trees. Study real life problems and apply own solutions to solve it. 			
II	23UGCA203	Data Structure using C Practical	<ol style="list-style-type: none"> Understand the concept of dynamic memory allocation to overcome underflow and overflow problem Design data structures including linked list, stack, queue and tree by using static or dynamic implementations. Understand and implement sorting and searching techniques considering time and space complexity. Apply different methods for traversing trees. Study real life problems and apply own solutions to solve it. 	2	40	60
II	23UGCA204	Web Programming -I Practical	<ol style="list-style-type: none"> Understand Hypertext Markup Language (HTML) in web programming language To give awareness about the tags used for table, forms and an insight to HTML5 Describe the functions of CSS to improve web page design Understand Client-side scripting language as web programming language using JavaScript Design an interactive website online content using JavaScript 	2	40	60



Faculty of Science
Department of Mathematics
Program: M.Sc. Mathematics

Program Objective:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with
- **Graduate Attributes:**
- with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking

Graduate Attributes for Post-Graduate Programs

- **Core Competence:** Possess discipline-relevant knowledge and competencies and able to link them to local, national and global issues to seek positive and sustainable solutions
- **Transferable global & impactful societal skills:** Ability to create knowledge through research and innovations by social immersions and transferring them to impact through problem solving at local and global levels.
- **Adaptability and Resilience:** Demonstrate resilience, perseverance and positivity in unfamiliar situations and adapt their skills and knowledge to excel in new environment
- **Sense of purpose & curiosity:** Possess intellectual curiosity to apply the knowledge to generate, develop and realize new ideas
- **Ethics & lifelong immersive learning:** Adhered to highest standards of ethics and always amenable to new ideas and actively seek out new ways of learning

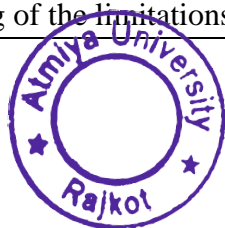


Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Depth and breadth of knowledge: To prepare efficient mathematics graduates with strong fundamental knowledge and advanced mathematical skills to cater the needs of academics and industries related to mathematics.
PEO2	:	Practice, Operation and usage of modern tools and technology: To provide graduates who can skilfully utilize the mathematical tools including mathematical software to assess, identify and solve problems significant to industries & society.
PEO3	:	Professional capacity and passion of learning: To train mathematics graduates with skills to enhance professional capacity and exhibit life-long learning skills through constant knowledge up-gradation.
PEO4	:	Research, numeracy, scholarship and data literacy: To develop ability among graduates to apply advanced knowledge of mathematics to demonstrate the active participation in mathematical research work to provide solutions of mathematical problems.
PEO5	:	Global, moral and aesthetic sustainability: To enrich the mathematics graduates with moral and aesthetic values for global sustainability.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain knowledge: An understanding of the nature, practice & application of the chosen science area of study.
PO2	:	Problem analysis: Make decisions to develop solutions to given situations/questions, formulate strategies to identify, define and solve problems including, as necessary, global perspectives and be finding out the solutions of problems that make the students feel independent and capable.
PO3	:	Conduct investigations of complex problems: Demonstrate the ability to plan and execute safely a series of experiments related to mathematics and allied discipline in a scientific way, required for further research at a higher level
PO4	:	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern tools for research or production purpose with an understanding of the limitations.



PO5	:	Environment and sustainability: Analyse global environmental problems and critically evaluate evidence to formulate and organize sustainable strategies.
PO6	:	Ethics: Apply ethical principles and commit to professional ethics, responsibilities.
PO7	:	Individual and team work: Exhibit leadership qualities with ability to function effectively as an individual and in a team.
PO8	:	Communication: Knowledge of standard mathematical terminology and notation and the ability to use them properly and to clearly present mathematical concepts, statements, and arguments both in written and oral form.
PO9	:	Life-long learning: Able to integrate and appraise information/knowledge from a variety of sources throughout the life.

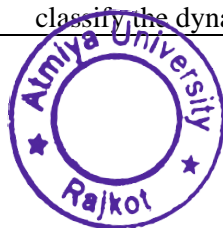
Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Be able to utilize modern tools and technology to comprehend and apply mathematical literature for effective problem solving. Analyze and perform a broad variety of mathematical experiments using mathematical software and internet.
PSO2	:	Be able to develop and apply new theories of mathematics to solve a broad variety of problems involving mathematics.
PSO3	:	Exhibit the capacity to identify, formulate, and solve problems pertaining to mathematics through research.
PSO4	:	Be able to do research in Mathematics and other related fields and, to carry out research projects in Mathematics.

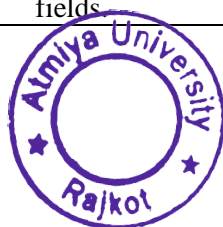


Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
II	23PGMT220	Languages and Numerical Methods	<ol style="list-style-type: none"> To interpret regular languages To differentiate Deterministic and Non deterministic Finite automation. Identify whether graphs are Hamiltonian and/or Eulerian. Learn the concept of planar graph. Learn how to apply bisection method, Newton-Raphson's method, False position method, Iteration method and Horner's method to obtain approximate solution. 	3	40	60
I	21MMTCC101	Core 2: Group Theory (F)	<ol style="list-style-type: none"> Understand basic principles of algebraic structure of group, abelian group, cyclic group. Focus and analyze the homomorphic image of group. Extend the concepts of automorphism and product of sets to the structure of group. Understand the special classes of groups: Finite Abelian Groups and the converse of well-known Lagrange's theorem. Able to understand class equation and its applications. 	4	40	60
I	21MMTCC102	Core 2: Topology (Ad)	<ol style="list-style-type: none"> Recognize and interpret the topological structures and their characterizations. Identify and understand the subspace topology and product topology. Identify and classify the types of topologies including quotient topology and metric topology. Understand differentiate and apply the hierarchy of the topological spaces and their characterizations. Understand and apply the continuity of functions, connectedness, compactness. 	4	40	60
I	21MMTCC103	Core 3: Fundamentals of Classical Mechanics (F)	<ol style="list-style-type: none"> Understand and describe elementary principles of motion. Understand and criticize equations of motion and classify the dynamical systems. 	4	40	60



			<ol style="list-style-type: none"> 3. Derive and utilize Lagrange's equation of motions. 4. Identify, understand and solve two body central force problem. 5. Identify, understand and solve problems related to Equations of Motion and Rigid bodies. 			
I	21MMTCC104	Core 4: Theory of Differential Equations (Ap)	<ol style="list-style-type: none"> 1. Understand the meaning of Ordinary Differential Equations. 2. Understand and solve Partial differential equation. 3. Identify and solve Gauss hypergeometric equation. 4. Understand, identify and solve Cauchy Problem including Charpit's method. 5. Understand, identify and solve Cauchy Problem including Jacobi's method. 	4	40	60
I	21MMTCC105	Core Practical 1: Numerical Methods using Scilab	<ol style="list-style-type: none"> 1. Understand the concept of open-source mathematical software including SCILAB. 2. Understand and utilize the user interface of SCILAB including console, file browser, variable browser, the command history and general commands including clc & clear 3. Utilize pre-defined mathematical constants, variables and operators of Scilab, Input and utilize inbuilt matrix commands and library functions to write programs. 4. Solve numerical problems using Scilab programs. 5. Interpolate the value using tabulated data and numerical methods combined with customized Scilab program. 	2	50	50
I	21MMTID101	DSE-Core-1: Theory of Computation (Ap)	<ol style="list-style-type: none"> 1. To interpret regular languages 2. To differentiate Deterministic and Non deterministic Finite automation 3. To apply context free Grammar in models 4. To explain the pushdown automata 5. To differentiate CFL and NCFL 	4	50	50
II	21MMTCC201	Core 5: Advanced Ring Theory and Field Extensions (Ad)	<ol style="list-style-type: none"> 1. More conceptual learning of the structure of ring, Recognize and understand the concept of Ideals. 2. Understand advanced (extended) algebraic structures like polynomial ring, division ring, field and extension fields. 	4	40	60



			<ol style="list-style-type: none"> 3. Recognize and understand different types and principles of the structures. 4. Identify the standard results regarding concepts of extension fields and Galois field. 5. Explore the applications of the extension fields to geometry and other fields of mathematics. 			
II	21MMTCC202	Core 6: Real Analysis (Ad)	<ol style="list-style-type: none"> 1. Understand basic principles set theory, Borel set, σ-Algebra, outer measurable sets and Lebesgue measurable sets. 2. Analyze the Lebesgue measurable function. 3. Understand the concept of Lebesgue Integral and Riemann Integration. 4. Extend the concepts of Lebesgue integration to differentiation of integration. 5. More conceptual learning of the structure of L^p Spaces and completeness of the space. 	4	40	60
II	21MMTCC203	Core 7: Theory of Partial Differential Equations (Ap)	<ol style="list-style-type: none"> 1. Identify and understand the higher order partial differential equations. 2. Classify the higher order partial differential equations. 3. Distinguish between linear and nonlinear the higher order partial differential equations. 4. Identify and understand the higher order partial differential equations with variable coefficients. 5. Understand and solve the given Boundary value problems and Equipotential surfaces. 	4	40	60
II	21MMTCC204	Core 8: Advanced Classical Mechanics (Ad)	<ol style="list-style-type: none"> 1. Understand, define and verify Rigid Body Equations of Motion. 2. Understand and compare theory of relativity in classical mechanics. 3. Formulate covariant four-dimensional equations 4. Derive the Hamilton's equation of motion. 5. Understand and utilize the Canonical transformations and generating functions. 	4	40	60
II	21MMTCC205	Core Practical 2: Introduction to Latex	<ol style="list-style-type: none"> 1. Understand the purpose and nature of LaTeX. 2. Understand how LaTeX differs from a word processor. 3. Install and utilize LaTeX and its related components 	2	50	50



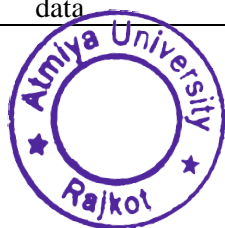
			<p>successfully on personal computer</p> <ol style="list-style-type: none"> 4. Create document using LaTeX including the features like line break, fonts size, page breaks. 5. Utilize LaTeX and its templates to compose Mathematical documents, presentations, and reports. 6. Identify, remember and effectively utilize symbols useful for mathematical type setting. 7. Create complete document including title page, index, chapters, tables graphics and bibliography 			
II	21MMTID202	DSE-Core 1: Statistical Methods (F)	<ol style="list-style-type: none"> 1. Understand the concept of statistical parameters. 2. Understand sampling and sampling distributions also measures of dispersion. 3. Apply the techniques of correlation, regression, and Random Variables 4. Remember, understand and apply the analytical techniques of statistics. 5. Test the hypotheses using various techniques and interpret the result. 	4	50	50
I & II	21CEWE01	SEC 1: Wisdom & Ethics for Success in Life (WESL)	<ol style="list-style-type: none"> 1. Differentiate the career success, academic success and life success 2. Identify the correct priority order in life and illustrate the human goal 3. Understand that the relationships are definite. 4. Understand the Interconnectedness between all the orders in existence. 	2	100	-
II	21IMBAID101	Business Mathematics (PG)IMBA-1	<ol style="list-style-type: none"> 1. Apply basic mathematics of money concept in routine business operations. 2. Identify daily operations of business which are related to profit, loss, selling price, discount, commission & brokerage, etc 3. Solve mathematical problems by using matrices. 4. Recognize mathematical progression in business 	4	30	70
III	21MMTCC301	Core 9: Complex Analysis (Ad)	<ol style="list-style-type: none"> 1. Understand the concept of complex plane and generalize the concept of coordinate plane. 2. Determine continuity/differentiability/analyticity of a complex function and find the derivative of a function. 	4	40	60



			<ol style="list-style-type: none"> 3. Evaluate a contour integral using parameterization, fundamental theorem of calculus and Cauchy's integral formula. 4. Analyze and classify the singularities of complex function in given region. 5. Compute the residue of a function and use the residue theory to evaluate a contour integral or an integral over the real line. 			
III	21MMTCC302	Core 10: Discrete Mathematics (Ad)	<ol style="list-style-type: none"> 1. Write an argument using logical notation and determine if the argument is or is not valid. 2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described. 3. Understand the basic principles of sets and operations in sets. 4. Demonstrate an understanding of relations and functions and be able to determine their properties. 5. Demonstrate different traversal methods for trees and graphs 	4	40	60
III	21MMTCC303	Core 11: Advanced Topics in Linear Algebra (Ad)	<ol style="list-style-type: none"> 1. Remember the basic principles of linear transformation describe characteristic roots and understand representation of linear transformation by matrix. 2. Analyze the Canonical forms. 3. Identify rational canonical forms and Demonstrate Jordan forms 4. Develop matrices in F_n and explain eigen value, determinant and trace 5. Recognize and understand the concept of important transformation and real quadratic forms. 	4	40	60
III	21MMTCC304	Core 12: Self-Study Course: Optimization Techniques. (Ap)	<ol style="list-style-type: none"> 1. Understand basic principles of Operation Research Techniques of strategic decision planning. 2. Focus and analyze the optimum utilization of constraint resources in various span of human life. 3. Extend the concepts of Minimax & Maximin principles. 4. Understand the project management by critical path method. 	4	40	60



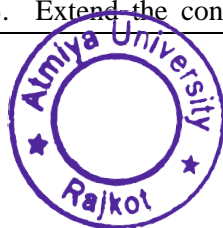
			5. Understand the project management by project evaluation and review techniques			
III	21MMTCC305	Core Practical 3: Mathematical Coding in Python	<ol style="list-style-type: none"> 1. Understand the coding of Python. 2. Understand and utilize the strings, arrays, and creation of mathematics function in python. 3. Understanding and creating coding for calculus and numbers in Python. 4. Solve polynomials and equation in python. 5. Plot the graphs of conic sections and complex numbers. 	2	50	50
III	21MMTDC301	DSE-Core 1: Financial Mathematics (Ap)	<ol style="list-style-type: none"> 1. List the financial markets, distinguish between various options. 2. Differentiate between options and contracts; define the terms like portfolio, sensitivity to volatility, risk –free investment and solution of problems on option pricings. 3. Introduce simple model for asset prices, proof of Ito’s lemma and its extension. 4. Black - Scholes Differential equation and its solution. 5. Analyze the variations in Black – Scholes model 	4	50	50
III	21MMTDC302	DSE-Core 2: Mathematical Transforms (Ad)	<ol style="list-style-type: none"> 1. Understand concepts of Laplace transform and their applications 2. Find the solution of linear ordinary and partial Differential equations with constant coefficients under suitable initial and boundary conditions 3. Understand and analyze the properties of Hankel transform 4. Understand the Z-transforms and their properties 5. Understand Wavelets Transforms and their properties 	4	50	50
III	21MMTGE301	Research Tool: Basic Mathematical Statistics	<ol style="list-style-type: none"> 1. Understand sampling and sampling distributions also measures of central tendency. 2. Produce and interpret numerical summary statistics using mean, median, mode, range, standard deviation and variance. 3. Apply the techniques of correlation and regression. 4. construct and analyze graphical displays to summarized data 	2	100	-



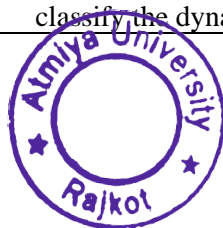
			5. Understand basic concepts of probability including independence and conditional probability.			
IV	21MMTCC401	Core13: Advanced Topics in Number Theory (Ad)	<ol style="list-style-type: none"> 1. Explain the principles of Number systems, divisibility, and primes 2. Explain Congruences and Chinese remainder theorem and compute congruence-related problems and their solutions. 3. Understand the Diophantine equation and apply methods to solve the Diophantine equation and convert real-world problems to finding their solutions 4. Explain Farey fraction and continued fractions. (By recalling the concept of rational and irrational numbers). 5. Explain the meaning of approximation to irrational and classify continued fractions. 	4	40	60
IV	21MMTCC402	Core 14: Functional Analysis(Ad)	<ol style="list-style-type: none"> 1. Understand the concept of Normed Linear Spaces and Banach Spaces. 2. Classify the weak and strong convergence of sequences. 3. Apply uniform boundedness theorem. 4. Understand the structures of Inner Product Spaces and Hilbert Spaces. 5. Apply the Hahn-Banach Theorem. 	4	40	60
IV	21MMTCC403	Core 15: Graph Theory (Ap)	<ol style="list-style-type: none"> 1. Understand and apply the fundamental concepts in graph theory 2. Characterize the Euler and Hamiltonian Graphs 3. Analyse principles and concepts of graph theory in practical situations 4. Validate and critically assess a mathematical proof 5. Describe and apply some basic algorithms for graphs 	4	40	60
IV	21MMTCC404	Core 16: Mathematical Statistics (Ad)	<ol style="list-style-type: none"> 1. To understand the concept of probability and their need in real life. 2. To translate the real-life situations in mathematical form and solve them using some discrete and continuous probability distributions. 3. To translate the real-life situations in mathematical form and solve them continuous probability distributions 4. To understand one sample tests and their real life case 	4	40	60



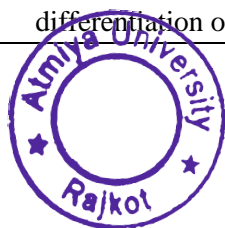
			<p>studies.</p> <p>5. To understand two sample tests and their real life case studies.</p>			
IV	21MMTDC401	DSE-Core 1: Differential Geometry (Ap)	<ol style="list-style-type: none"> 1. Define functions of class K, regular curve, Unit speed curve, re-parameterization of curves, Curvature of a curve. 2. Compute arc length and re-parameterization of a curve by its arc length. 3. Define Frenet - Serret apparatus, prove Frenet - Serret theorem, compute the Frenet - Serret apparatus for the given curve. 4. Define simple surface and study of various surfaces. 5. Define first and second fundamental forms as well as Christoffel symbols, compute first - second fundamental forms and Christoffel symbols for the given surface. 	3	50	50
IV	21MMTDC402	DSE-Core 1: Introduction to Fuzzy Set Theory (Ap)	<ol style="list-style-type: none"> 1. Understand Fuzzy set and differentiate fuzzy set with crisp set. 2. Understand and apply the concept of fuzzy number. 3. Explain and apply the concept of relation in the light of fuzzy sets. 4. Understand function with fuzzy constraints. 5. Understand Fuzzy logic and differentiate fuzzy logic with Boolean logic. 	3	50	50
IV	21MMTCC406	Core Practical 4: Introduction to R software	<ol style="list-style-type: none"> 1. Understand the coding of R Software. 2. Understand and utilize the basic operations in R software. 3. Understanding and utilize data management in R software. 4. Import external data in various file formats in R software. 5. Plot the graphs and use the statistical functions in R software. 	2	50	50
I	18MMTCC101	Core 2: Group and Ring Theory	<ol style="list-style-type: none"> 1. Understand basic principles of algebraic structure of group, abelian group, cyclic group. 2. Focus and analyse the homomorphic image of group. 3. Extend the concepts of automorphism and product of 	4	40	60



			<p>sets to the structure of group.</p> <ol style="list-style-type: none"> Understand the special classes of groups: Finite Abelian Groups and the converse of well-known Lagrange's theorem More conceptual learning of the structure of ring, Recognize and understand the concept of Ideals. 			
I	18MMTCC102	Core 2: Topology	<ol style="list-style-type: none"> Recognize and interpret the topological structures and their characterizations Identify and understand the subspace topology and product topology Identify and classify the types of topologies including quotient topology and metric topology. Understand differentiate and apply the hierarchy of the topological spaces and their characterizations Understand and apply the continuity of functions 	4	40	60
I	18MMTCC103	Core 3: Functions of Several Variables	<ol style="list-style-type: none"> Identify and define functions of the form $T: R^n \rightarrow R^m$ Understand the concepts including limit, continuity for the functions of several variables. Understand the concepts of partial derivative of first and higher order for functions of several variables Recognize and understand the concepts of tensor algebra on finite dimensional vector spaces Understand and apply alternating and symmetric tensors, wedge products, vector fields and forms as well as their basic properties. 	4	40	60
I	18MMTCC104	Core 4: Theory of Differential Equations	<ol style="list-style-type: none"> Understand the meaning of Ordinary Differential Equations Understand and solve Partial differential equation. Identify and solve Gauss hyper geometric equation Understand, identify and solve Cauchy Problem including Charpit's and Jacobi's method. 	4	40	60
I	18MMTID101	(DSE-ID) –I: Fundamentals of Classical Mechanics	<ol style="list-style-type: none"> Understand and describe elementary principles of motion. Understand and criticize equations of motion and classify the dynamical systems 	4	50	50



			<ol style="list-style-type: none"> 3. Derive and utilize Lagrange's equation of motions 4. Identify, understand and solve two body central force problem. 5. Identify, understand and solve problems related to Equations of Motion and Rigid bodies. 			
I	18MMTCC105	Core Practical 1: Numerical Methods using Scilab	<ol style="list-style-type: none"> 1. Understand the concept of open source mathematical software including SCILAB. 2. Understand and utilize the user interface of SCILAB including console, file browser, variable browser, the command history and general commands including clc & clear 3. Utilize pre-defined mathematical constants, variables and operators of Scilab, Input and utilize inbuilt matrix commands and library functions to write programs. 4. Solve numerical problems using Scilab programs 5. Interpolate the value using tabulated data and numerical methods combined with customized Scilab program. 	2	60	40
II	18MMTCC201	Core 5: Advanced Ring Theory and Field Extensions	<ol style="list-style-type: none"> 1. Understand advanced (extended) algebraic structures like polynomial ring, division ring, field and extension fields. 2. Recognize and understand different types and principles of the structures. 3. Identify the standard results regarding concepts of extension fields and Galois field. 4. Explore the applications of the extension fields to geometry and other fields of mathematics. 5. Analyze and extend the concept of modules and types of modules. 	4	40	60
II	18MMTCC202	Core 6: Real Analysis and Measure Theory	<ol style="list-style-type: none"> 1. Understand basic principles set theory, Borel set, - Algebra, outer measurable sets and Lebesgue measurable sets. 2. Analyse the Lebesgue measurable function. 3. Understand the concept of Lebesgue Integral and Riemann Integration. 4. Extend the concepts of Lebesgue integration to differentiation of integration. 	4	40	60



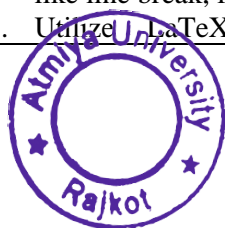
			5. More conceptual learning of the structure of L Spaces and completeness of the space.			
II	18MMTCC203	Core 7: Theory of Partial Differential Equations	<ol style="list-style-type: none"> 1. Identify and understand the higher order partial differential equations. 2. Classify the higher order partial differential equations. 3. Distinguish between linear and non linear the higher order partial differential equations. 4. Identify and understand the higher order partial differential equations with variable coefficients. 5. Understand and solve the given Boundary value problems and Equipotential surfaces. 	4	40	60
II	18MMTCC204	Core 8: Advanced Classical Mechanics	<ol style="list-style-type: none"> 1. Understand, define and verify Rigid Body Equations of Motion 2. Understand and compare theory of relativity in classical mechanics. 3. Formulate covariant four dimensional equations 4. Derive the Hamilton's equation of motion. 5. Understand and utilize the Canonical transformations and Generating functions. 	4	40	60
II	18MMTCC205	Core Practical 2: Introduction to Latex	<ol style="list-style-type: none"> 1. Understand the purpose and nature of LaTeX. 2. Understand how LaTeX differs from a word processor. 3. Install and utilize LaTeX and its related components successfully on personal computer. 4. Create document using LaTeX including the features like line break, fonts size, page breaks. 5. Utilize LaTeX and its templates to compose Mathematical documents,presentations, and reports. 6. Create complete document including title page, index, chapters, tables graphics and bibliography 	2	60	40
II	18MMTID202	DSE-ID 2: Statistical Methods	<ol style="list-style-type: none"> 1. Understand the concept of statistical parameters 2. Understand sampling and sampling distributions also measures of dispersion. 3. Apply the techniques of correlation, regression, and Random Variables 4. Remember, understand and apply the analytical 	4	50	50



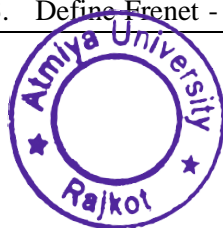
			<p>techniques of statistics</p> <p>5. Test the hypotheses using various techniques and interpret the result.</p>			
II	18MITID202	Core 4: Graph Theory	<p>1. Solve problems using basic graph theory</p> <p>2. Identify whether graphs are Hamiltonian and/or Eulerian</p> <p>3. Formulate graph theoretic models to solve real world problems</p> <p>4. Use of algorithms to solve the problem</p> <p>5. The students will be able to apply principles and concepts of graph theory in practical situations</p>	4	50	50
III	18MMTCC301	Core 9: Complex Analysis	<p>1. Understand the concept of complex plane and generalize the concept of coordinate plane.</p> <p>2. Determine continuity/differentiability/analyticity of a complex function and find the derivative of a function.</p> <p>3. Evaluate a contour integral using parameterization, fundamental theorem of calculus and Cauchy's integral formula.</p> <p>4. Compute the residue of a function and use the residue theory to evaluate a contour integral or an integral over the real line.</p> <p>5. Analyze and classify the singularities of complex function in given region.</p>	4	40	60
III	18MMTCC302	Core 10: Discrete Mathematics	<p>1. Write an argument using logical notation and determine if the argument is or is not valid.</p> <p>2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.</p> <p>3. Understand the basic principles of sets and operations in sets</p> <p>4. Demonstrate an understanding of relations and functions and be able to determine their properties.</p> <p>5. Demonstrate different traversal methods for trees and graphs</p>	4	40	60



III	18MMTCC303	Core 11: Advanced Topics in Linear Algebra	<ol style="list-style-type: none"> 1. Remember the basic principles of linear transformation describe characteristic roots and understand representation of linear transformation by matrix. 2. Analyze the Canonical forms 3. Identify rational canonical forms and Demonstrate Jordan forms 4. Develop matrices in F_n and explain Eigen value, determinate and trace 5. Recognize and understand the concept of important transformation and real quadratic forms. 	4	40	60
III	18MMTCC304	Core 12: Self-Study Course: Optimization Techniques.	<ol style="list-style-type: none"> 1. Understand basic principles of Operation Research Techniques of strategic decision planning. 2. Focus and analyze the optimum utilization of constraint resources in various span of human life. 3. Extend the concepts of Minimax & Maximin principles. 4. Understand the project management by critical path method & project evaluation and review techniques 5. Understand the theory of queue. 	4	40	60
III	18MMTDC301	DSE-Core - I : Financial Mathematics	<ol style="list-style-type: none"> 1. List the financial markets, distinguish between various options 2. Differentiate between options and contracts; define the terms like portfolio, sensitivity to volatility, risk –free investment and solution of problems on option pricing. 3. Introduce simple model for asset prices, proof of Ito’s lemma and its extension. 4. Black - Scholes Differential equation and its solution. 5. Define discrete dividend structure one jump conditions for the same 	4	50	50
III	18MMTGE301	GE : Research Tool: Introduction to Latex	<ol style="list-style-type: none"> 1. Understand the purpose and nature of LaTeX. 2. Understand how LaTeX differs from a word processor. 3. Install and utilize LaTeX and its related components successfully on personal computer. 4. Create document using LaTeX including the features like line break, fonts size, page breaks. 5. Utilize LaTeX and its templates to compose 	2	60	40



			Mathematical documents, presentations, and reports. 6. Create complete document including title page, index, chapters, tables graphics and bibliography			
IV	18MMTCC401	Core13: Advanced Topics in Number Theory	<ol style="list-style-type: none"> 1. Explain the principles of Number systems, divisibility and prime 2. Explain about Congruences and Chinese remainder theorem and compute congruence related problems and their solution 3. Understand Diophantine equation and apply methods to solve Diophantine equation and convert real world problem in find their solution 4. Recall rational and irrational and explain Farey fraction and continued fraction 5. Explain meaning of approximation to irrational and classify continued fraction. 	4	40	60
IV	18MMTCC402	Core 14: Functional Analysis	<ol style="list-style-type: none"> 1. Understand the concept of Normed Linear Spaces and Banach Spaces. 2. Classify the weak and strong convergence of sequences. 3. Apply uniform boundedness theorem 4. Understand the structures of Inner Product Spaces and Hilbert Spaces 5. Apply the Hahn-Banach Theorem. 	4	40	60
IV	18MMTCC403	Core 15: Advanced Topics in Graph Theory	<ol style="list-style-type: none"> 1. Understand and apply the fundamental concepts in graph theory 2. Characterize the Euler and Hamiltonian Graphs 3. Analyze the principles and concepts of graph theory in practical situations 4. Validate and critically assess a mathematical proof 5. Describe and apply some basic algorithms for graphs 	4	40	60
IV	18MMTCC404	Core 16: Differential Geometry	<ol style="list-style-type: none"> 1. Define functions of class K, regular curve, Unit speed curve, re- parameterization of curves, Curvature of a curve. 2. Compute arc length and re- parameterization of a curve by its arc length. 3. Define Frenet - Serret apparatus ,prove Frenet - Serret 	4	40	60



			<p>theorem, compute the Frenet - Serret apparatus for the given curve.</p> <ol style="list-style-type: none"> 4. Define simple surface and study of various surfaces 5. Define first and second fundamental forms as well as Christoffel symbols ,compute first - second fundamental forms and Christoffel symbols for the given surface. 			
IV	18MMTDC401	DSE-Core - II : Mathematical Statistics	<ol style="list-style-type: none"> 1. Provide a concise and clear description of a statistical problem 2. Provide a description of the method used for analysis, including a discussion of advantages, disadvantages, and necessary assumptions. 3. Provide a discussion of the results and of the statistical analysis. 4. Provide a conclusion to the study including a discussion of limitations of the analysis 5. Provide a derivation for mathematical statistics problems. 	4	60	40



Department of Mathematics
Programs: B.Sc. Mathematics

Program Objective:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with
- **Graduate Attributes:**
- h others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking

Graduate attributes for Under Graduate Programs

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core competency: will develop the competency to pursue higher education or successful professional career with synergistic combination of the knowledge and skills of mathematics and allied sciences.
PEO2	:	Breadth of knowledge: will show capabilities of independently designing, executing and interpreting mathematical problems by integrating the interdisciplinary knowledge of Mathematics and other domains.
PEO3	:	Preparedness: will reflect professional behaviour and have the potential to show preparedness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities.
PEO4	:	Professionalism: will reflect values and responsibilities in the character to make them fit to work in a multidisciplinary team and to become socio-ethically responsible citizen.
PEO5	:	Learning environment: will show attitude of self-learning abilities and keep themselves abreast with new development in all spheres of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain knowledge: Demonstrate the knowledge of concepts, principles and applications of Mathematics in various fields.
PO2	:	Problem analysis: Acquire critical thinking skills to understand and solve contemporary problems with knowledge



		and skills.
PO3	:	Design/development of solutions: Make decisions to develop solutions to given situations/questions, formulate strategies to identify, define and solve problems including, as necessary, global perspectives.
PO4	:	Conduct investigations of complex problems: Gain ability to design, conduct experiments, analyse and interpret data for investigating problems in Mathematics and allied sectors
PO5	:	Modern tool usage: The ability to acquire, develop, employ and integrate a range of technical, practical and professional skills, in appropriate and ethical ways within a professional context, autonomously and collaboratively and across a range of disciplinary and professional areas.
PO6	:	The Mathematics Professional and society: An awareness of the role of science within a global culture and willingness to contribute to the shaping of community views on complex issues where the methods and findings of science are relevant.
PO7	:	Environment and sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development
PO8	:	Ethics: Apply ethical principles and commit to professional ethics, responsibilities and norms.
PO9	:	Individual and team work: Able to function effectively as individual and as a member in multidisciplinary settings.
PO10	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large.
PO11	:	Project management and finance: Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.



PO12	:	Life-long learning: Able to recognize the need to undertake life-long learning and acquire the capacity to do so.
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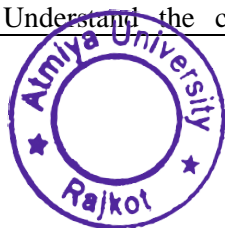
Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Understand the advanced concepts of mathematics and demonstrate the ability to apply the knowledge of mathematics at an advanced level.
PSO2	:	Collect, organize and adapt contemporary knowledge effectively and utilize appropriate computational tools independently and analyse and perform a broad variety of mathematical experiments using mathematical software and the internet.
PSO3	:	Develop and apply new theories of mathematics to solve a broad variety of problems involving mathematics.
PSO4	:	Apply critical thinking skills for sustainable development and develop the knowledge and skills to secure employment.
PSO5	:	Exhibit the capacity to identify, formulate, and solve problems pertaining to mathematics through research and critically evaluate the theoretical results and recognize the need for, and an ability to engage in life-long learning.



Course Outcomes (COs):

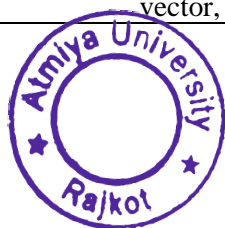
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGMT101	Core 2: Mathematics (F) (Set Theory and Calculus)	<ol style="list-style-type: none"> 1. Recall and demonstrate the concept of Sets, Functions and Relations. 2. Understand and develop the concept of Limit and continuity of functions of one variable. 3. Recognize and apply concept of Successive differentiation. 4. Define and illustrate the concept of Mean value theorems. Illustrate and apply for the expansion of function using Taylor's series. 5. Recognize and apply concept of Indeterminate Forms. 	4	30	70
I	23UGMT102	Core Practical 1: Mathematics**(Practical on Set Theory and Calculus)	<ol style="list-style-type: none"> 1. Understand and demonstrate the concept of sets, functions and relations. 2. Recall and develop the concept of limit and continuity of functions of one variable. 3. Recognize and apply concept of differentiation and Successive differentiation. 4. Define and illustrate the concept of Mean value theorems and Taylor's theorem. 5. Identify and analyze the concept of indeterminate forms. 	2	20	30
II	23UGMT201	Core 2: Mathematics(F) (Matrix Algebra and Multivariate Calculus)	<ol style="list-style-type: none"> 1. Define and utilize the concept of matrix 2. Understand the concept of Rank, determinant and Cayley Hamilton theorem. 3. Solve the systems of linear equations using concept of matrix 4. Sketch curves in Cartesian and polar coordinate systems 5. Find the length of an arc and area enclosed by the given curve 	4	30	70
II	23UGMT202	Core Practical 1: Mathematics (Practical Based on Matrix	<ol style="list-style-type: none"> 1. Define and utilize the concept of matrix 2. Understand the concept of Rank, determinant and 	2	20	30



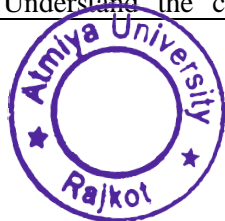
		Algebra and Multivariate Calculus)	<p>Cayley Hamilton theorem.</p> <ol style="list-style-type: none"> Solve the systems of linear equations using concept of matrix Sketch curves in Cartesian and polar coordinate systems Find the length of an arc and area enclosed by the given curve 			
II	23UGMT220	Statistics for Business	<ol style="list-style-type: none"> Understand the purposes, calculation and to interpret the measures of central tendency (mean, medium and mode) for a set of data. Demonstrate the concepts about probability, factorial and counting. Define concepts of sampling and stages of sampling process. Apply the concepts of statistical quality control to business. Understand time series to get knowledge about observation and identify the variation. 	4	40	60
II	23UGMT221	Advanced of Mathematical and Statistical Techniques for Computer Science(F)	<ol style="list-style-type: none"> Interpolate mathematical and statistical skills and knowledge which will be beneficial to develop proficiency in analytical reasoning. Demonstrate skills of solving real world problems. Associate basic methods of mathematics and statistics in computing to design and analyze algorithms, computability theory and graphics. Identify a problem and examine different methods to its solutions and K3 evaluate merits and demerits of each. Distinguish a logical argument from a fallacious one in mathematical reasoning as well as in everyday life. 	4	40	60
III	23UGMT301	Mathematics-III (Theory of Ordinary Differential Equations & its applications)	<ol style="list-style-type: none"> Classify differential equations by order, linearity and homogeneity. Apply the proper method in finding the general solution of a given differential equation. Use the suitable method in finding the solution of a given first order and higher degree differential equation. 	4	30	70



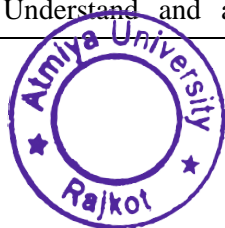
			<ol style="list-style-type: none"> Identify the suitable method in finding the solution of a linear differential equation with constant coefficients. Use the suitable method in finding the solution of a linear differential equation with variable coefficients. Apply the ordinary differential equations on different problems. 			
III	23UGMT302	Mathematics-IV(Advanced Calculus)	<ol style="list-style-type: none"> Solve the existence of limits and calculate the limit (if exist) of function of several variables. Utilize the concept of limit to verify the continuity of function of several variables. Classify the differentiability of function of several variables. Illustrate the partial derivatives of given function of several variables. Understand Euler's theorem and implement the same to compute problems related to the Euler's Theorem. Explain relation between Beta and Gamma function. Apply Duplication formula and Reduction formulae. 	4	30	70
III	23UGMT303	Practicals on Differential Equations and Advanced Calculus Using Mathematical Softwares.	<ol style="list-style-type: none"> Learn to use the differentiability and the concept of limit and continuity of function of several variables. Find the graphical interpretation with the help of different tools of mathematical software. Discuss to enter differential equations in computer algebra systems. Calculate general solution of ordinary differential equation . Discuss solution curve using computer algebra system. 	4	50	50
III	23UGMT320	Basic Mathematics	<ol style="list-style-type: none"> Understand the concept of set theory, operation on set, Venn diagram, and application of it. Understand vector algebra, scalar product, and vector product. Establish relation between Beta and Gamma function. Understand and utilize the fundamental concepts of a matrix with the application. Calculate the characteristic root, Eigen value, Eigen vector, and inverse of the matrix. 	4	30	70



III	23UGMT321	Practicals on Basic Mathematics	<ol style="list-style-type: none"> 1. Understand the concept of set theory, operation on set, Venn diagram, and application of it. 2. Understand vector algebra, scalar product, and vector product. 3. Establish relation between Beta and Gamma function. 4. Understand and utilize the fundamental concepts of a matrix with the application. 5. Calculate the characteristic root, Eigen value, Eigenvector, and inverse of the matrix. 	2	50	50
III	23UGMT322	Fundamental Mathematics for Management	<ol style="list-style-type: none"> 1. Understand permutations of different things and similar things and combinations. 2. Define arithmetic and geometric progression and utilize it to find sum of first nth terms. 3. Define determinants and understand their properties. 4. Define and utilize the concept of matrix. Understand types of matrix and different operations of matrices. 5. Utilize the concept of binomial theorem. 	3	40	60
I	21ULCEN101	Development of Functional English	<ol style="list-style-type: none"> 1. Understand and interpret text related to science, leading to cultivation of the reading habit. 2. Infer the true meaning of the text 3. Recall the essential grammatical aspects of the language 4. Articulate their ideas and thoughts through speaking 5. Execute the values received through literature 	3	40	60
I	21BMTCC101	Core 2: Differential Calculus (F)	<ol style="list-style-type: none"> 1. Verify the existence of limit and calculate the limit, if exists, of single variable function and utilize the concept of limit to verify the continuity of single variable function. 2. Remember and understand the consequences of various mean value theorems for differentiable functions. 3. State and prove Leibnitz rule and implement the rule to compute the n^{th} derivative of given functions. 4. Apply the Hospital's rule for limits to calculate the limit of function of a single variable. 5. Obtain the series expansion of a given function. 	4	30	70
I	21BMTCC102	Core 2: Matrix Algebra (F)	<ol style="list-style-type: none"> 1. Define and utilize the concept of the Matrix. 2. Understand the concept of Rank of a Matrix and 	4	30	70



			<p>compute the rank of a given Matrix.</p> <ol style="list-style-type: none"> Understand Eigenvalue and find the inverse using Cayley Hamilton theorem. Understand and utilize the elementary row operation to obtain echelon forms of a given Matrix and solve the systems of linear equations using the concept of Matrix. Understand Diagonalization and Compute any power of a given Matrix. 			
I	21BMTIC101	IDC 1: Physics: Electricity and Modern Physics	<ol style="list-style-type: none"> D.C.Circuits & A.C.Circuits analysis Network Theorems & Multimeter Structure of The Atom Wave Mechanics Particle accelerators and cosmic rays 	4	30	70
I	21BMTCC103	Core Practical 1: Practicals on Differential Calculus and Matrix Algebra using mathematical software	<ol style="list-style-type: none"> Understand the domain and range of given functions including polynomials, and hyperbolic functions and plot graph of the same through mathematical software. Learn how to use mathematical software to understand limits & continuity and L-Hospital Rule to calculate the limit of function of a single variable. Find the expansions as well as graphical interpretation of them with the help of different tools of mathematical software. Understand and utilize the Cayley-Hamilton theorem to find the inverse of the given Matrix. Utilize direct methods including Gauss elimination method, Gauss Jordan method and Cramer's rule to solve the system of linear equations and find any power of a Matrix by Diagonalization and Cayley Hamilton theorem. 	4	100	-
I	21BMTIC102	IDC 1 Practical: Physics: Electricity and Modern Physics	<ol style="list-style-type: none"> Basic measurement methods Basic circuit analysis Use of rotational mechanic to evaluate different parameters of solid body. Material properties of body Circuit fabrication 	1	30	70
II	21ULCEN201	Functional English	<ol style="list-style-type: none"> Understand and analyze a text related to science, 	3	40	60



			<p>leading to the cultivation of the reading habit.</p> <ol style="list-style-type: none"> infer the true meaning of the text Recall the essential grammatical aspects of the language Articulate their ideas, perspectives and thoughts through speaking Implement the morals and values received through literature 			
II	21BMTCC201	Core 3: Differential Equations (Ap)	<ol style="list-style-type: none"> Classify differential equations by order, linearity, and homogeneity. Apply the proper method in finding the general solution of a given differential equation. Use the suitable method in finding the solution of a given first order and higher degree differential equation. Identify the suitable method in finding the solution of a linear differential equation with constant coefficient Use the suitable method in finding the solution of a linear differential equation with variable coefficient Define and derive the partial differential equation and identify its order and degree of it. 	3	30	70
II	21BMTCC202	Core 4: Advanced Calculus (Ad)	<ol style="list-style-type: none"> Solve the existence of limits and calculate the limit (if exist) of function of several variable. Utilize the concept of limit to verify the continuity of function of several variables. Classify the differentiability of function of several variables. Illustrate the partial derivatives of given function of several variables. Understand Euler's Theorem and implement the same to compute problems related to the Euler's Theorem. Explain relation between Beta and Gamma function. Apply Duplication formula and Reduction formulae. 	3	30	70
II	21BMTCC203	Core 5: Complex Variables (F)	<ol style="list-style-type: none"> Locate and represent the complex numbers algebraically, and plot geometrically in the argand plane. Demonstrate and express the arithmetic operations on complex numbers using either the rectangular form or 	3	30	70



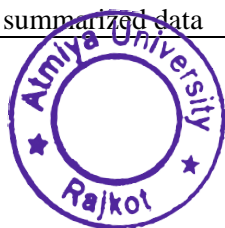
			<p>the trigonometric form.</p> <ol style="list-style-type: none"> 3. Compute and use the magnitude and the argument of a complex number to translate between the rectangular form and the trigonometric form of a complex number. 4. Compute the n^{th} power or root of a complex number using De Moivre's theorem, and apply the results. 5. Understand and verify the differentiability, continuity and limit of function of a complex variable. 			
II	21BMTIC201	IDC 2: Physics: Electronics and Radiation Physics	<ol style="list-style-type: none"> 1. Understand the different types to semiconductor diodes and their biasing methods 2. Understand performance parameters of different types of rectifier circuits 3. Understand various types of special purpose diodes and their applications. 4. Understand the production of X-rays and its properties and applications. 5. Understand different phenomena taking place in natural Radioactivity. 	4	30	70
II	21BMTCC204	Core Practical 2: Practical on Differential equations and Advanced Calculus using mathematical software.	<ol style="list-style-type: none"> 1. Learn to use the differentiability and the concept of limit and continuity of function of several variables. 2. Find the graphical interpretation with the help of different tools of mathematical software. 3. Discuss to enter differential equation in computer algebra system 4. Calculate general solution of ordinary differential equation 5. Discuss solution curve using computer algebra system 	3	100	-
II	21BMTIC202	IDC Practical 2: Physics Practical: Electronics and Radiation Physics Practical	<ol style="list-style-type: none"> 1. Apply Boolean algebra to reduce Boolean expression. 2. Understand different types of Number Systems & Codes. 3. Understand Logic Gates & apply Mapping Techniques. 4. Design Combinational Logic Circuit. 	1	40	60
I & II	21AEHV01	AECC 3: Human Values for Holistic Living (HVHL)	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self 	3	100	-



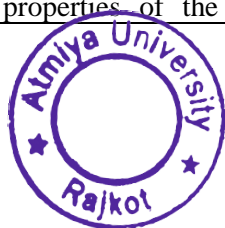
			<p>exploration.</p> <ol style="list-style-type: none"> Identify the relations between human-human and they have the ability to fulfill the expectations in relations. Understand required skills to understand the laws of nature. 			
III	21ULCEN301	Advanced English & Correspondence	<ol style="list-style-type: none"> Demonstrate understanding of facts and ideas by organizing, comparing and analyzing given articles and passages from the domain of science. Applying acquired knowledge, facts and techniques by inferring the true meaning of a given text. Interpret and apply advanced concepts of grammar to enrich the linguistic skills of the students. Articulate varied thoughts and perspectives and understand the importance of Formal Writing by learning different forms of Correspondence Utilize ethics and moral based knowledge acquired from value-based literature. 	3	40	60
III	21BMTCC301	Core 6: Fundamentals of Mathematical Analysis (F)	<ol style="list-style-type: none"> Define, demonstrate and utilize the concept of convergence of sequence Define, demonstrate and utilize the concept of convergence of series Define, demonstrate and utilize the concept of Riemann integration Explain the concept of fundamental and mean value theorem of integral calculus Define and use of improper integration 	4	30	70
III	21BMTCC302	Core 7: Basics of Numerical Analysis (F)	<ol style="list-style-type: none"> Analyze data and find proper curves to fit the data given. Understand the meaning of roots and find the roots of given equations including Equation with Rational Coefficients and Irrational Roots. Solve and criticize Simultaneous Linear Algebraic Equations. Find finite differences and study other difference operators. Understand and analyze interpolation with equal 	4	30	70



			interpolation			
III	21BMTCC303	Core 8: Discrete Mathematics (Ad)	<ol style="list-style-type: none"> 1. Understand and utilize the fundamental concepts of Discrete Mathematics and understand and verify the different types of relations 2. Identify and apply basic concepts of set theory, arithmetic, logic, proof techniques, and binary relations. 3. Learn about partially ordered sets, lattices and their types. 4. Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems. 5. Understand and apply the concepts of Boolean Algebra and its forms 	4	30	70
III	21UFSDE306	DSE 1: (From DSE Cluster) Basic Mathematics	<ol style="list-style-type: none"> 1. Understand geometrical concepts including Line, Circle, Area, and Volume. 2. Identify and interpret the relationship among coordinate systems including Polar, Spherical & Cylindrical coordinates. 3. Analyze the functional relationship among variables including Trigonometric functions, Exponential functions, Logarithmic functions, and Complex variables. 4. Understand and utilize the fundamental concepts of calculus including limits and continuity and differentiation. 5. Calculate the mean, median, mode, variance, and standard deviation of given data. 	4	40	60
III	21UFSDE307	DSE 1: (From DSE Cluster) Advanced Mathematics	<ol style="list-style-type: none"> 1. Define and utilize the concept of the Matrix. 2. Understand and solve the system of linear equations 3. Understand the concept of rank of a matrix and compute the rank of a given Matrix. 4. Understand the different types of coordinates and find a relation between them 5. Understand the concept of vectors and its applications 	4	40	60
III	21UFSDE308	DSE 1: (From DSE Cluster) Introduction to Statistical Methods	<ol style="list-style-type: none"> 1. Produce and interpret numerical summary statistics 2. Construct and analyze graphical displays to summarized data 	4	40*	60*



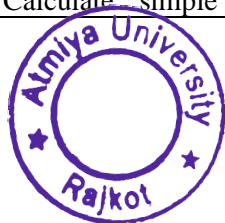
			<ol style="list-style-type: none"> 3. Interpret numerical summary of statistical data using mean, median and mode. 4. Calculate and apply measures of central tendency and dispersion. 5. Understand basic concepts of probability including union, intersection and difference of events. 			
III	21BMTCC304	Core Practical 3: Practicals based on Numerical Methods	<ol style="list-style-type: none"> 1. Understand how to find the value of the derivative of a polynomial at a point by synthetic division method. 2. Identify the nature of roots of the equations after the transformations 3. Understand the numerical approximations to the roots of an equation by sketching the graph. 4. Learn how to apply bisection method, Newton-Raphson's method, False position method, Iteration method and Horner's method to obtain approximate solution 5. Find the nth root of a positive integer by applying Newton-Raphson's method. 	3	100	-
IV	21ULCEN401	Effective Communicative Skills	<ol style="list-style-type: none"> 1. To construct and organize the text with 2. To discover and analyze the true sense of moral through story and poems 3. To interpret the combination of Science and imagination through articles 4. To improve the language with the verity of words 5. To compose a formal speech 	3	40	60
IV	21BMTCC401	Core 9: Fundamentals of Linear Algebra (F)	<ol style="list-style-type: none"> 1. Understand and define the concept of a vector space and its properties. 2. Analyze and evaluate the concept of linear combination and span. Apply further to decide the set of vectors are linearly dependent or independent. 3. Explore the concept of subspace and solve the problems based on sum and direct sum of subspaces. 4. Identify and critically analyze basis and dimension of vector space. 5. Learn concept of Inner product space. Applying the properties of the inner product, the norm and the 	4	30	70



			Cauchy Schwartz inequality in an inner product space. Constructing an orthonormal basis for an inner product space by using the Gram Schmidt process			
IV	21BMTCC402	Core 10: Integral and Vector Calculus (Ad)	<ol style="list-style-type: none"> Evaluate the double integral in general and polar co-ordinates as well. Reverse the order of integration for a double integration Evaluate a triple integral to find volume in rectangular co-ordinates, cylindrical coordinates and spherical co-ordinates. Evaluate the function using Laplace transform. Understand the difference between vector point function and scalar point function. Compute the derivatives and line integrals of vector functions and learn their applications 	4	30	70
IV	21BMTDL401	DSE Core Elective 1: Basics of Number Theory (Ap)	<ol style="list-style-type: none"> Apply Mathematical Induction and Binomial Theorem Understand the concept of the division Algorithm, GCD, and LCM Implement Euclidian Algorithm and Linear Diophantine Equation Understand Prime and Their Distribution Understand and apply the Theory of Congruences 	4	30	70
IV	21BMTDL402	DSE Core Elective 1: Introduction to Coordinate Geometry (Ap)	<ol style="list-style-type: none"> Demonstrate understanding of the principles and concepts of Basic geometry Demonstrate understanding of the principles and concepts of polar, spherical & cylindrical co-ordinates Understand concept of general and Cartesian equation of sphere and derive equation of sphere in different forms and solve problems related to sphere, intersection with a line and plane and tangent plane. Obtain equation of cone, enveloping cone, quadric cone, right circular cone and prove their results Derive equation of cylinder, right circular cylinder, enveloping cylinder and solve problems related to cylinder 	4	30	70
IV	21BMTCC403	Core Practical 4: Practical on Calculus and	<ol style="list-style-type: none"> Explain the nature of solution curve using computer algebra system. 	3	100	-



		Plotting of Graphs Using Mathematical Software	<ol style="list-style-type: none"> Utilize the software to compute derivative and integration. Plot the 2D and 3D graphs of mathematical functions using software Analyze the mathematical functions using commands of software Utilize the different tools of mathematical software to understand the mathematical concepts 			
IV	21UFSDE406	DSE 2: Mathematical Tools for Basic Sciences	<ol style="list-style-type: none"> Understand the concept of set theory, operation on set, Venn diagram, and application of it Understand vector algebra, scalar product, and vector product. Understand the concept of definite and indefinite integration. Understand and utilize the fundamental concepts of a matrix with the application. Calculate the characteristic root, eigenvalue, eigenvector, and inverse of the matrix 	4	40	60
IV	21UFSDE407	DSE 2: Probability and Distributions	<ol style="list-style-type: none"> Identify direction of a linear relationship between two variables using correlation and predict how much a dependent variable changes based on adjustments to an independent variable using regression Understand the nature of any random experiment and construct sample space Learn the concept of random variables and probability distribution Determines the probability of observing a specified number of successful outcomes in a specified number of trials by binomial distribution Determines the probability when individual events happen at random and independently 	4	40	60
I	21BCPIC101	Mathematics for Business	<ol style="list-style-type: none"> Learn ratio and proportion, law of indices, exponents and logarithms Define and utilize the concept of matrix. Understand types of matrix and different operations of matrices. Calculate simple interest, compound interest and 	4	40	60



			<p>amount of annuity.</p> <p>4. Understand permutations of different things and similar things and combinations.</p> <p>5. Define arithmetic and geometric progression and utilize it to find sum of first nth terms.</p>			
I	21BCM101	Mathematics for Business	<p>1. Understand permutations of different things and similar things and combinations</p> <p>2. Define arithmetic and geometric progression and utilize it to find the sum of first nth terms.</p> <p>3. Define determinants and understand their properties</p> <p>4. Define and utilize the concept of matrix. Understand types of matrices and different operations of matrices.</p> <p>5. Calculate simple interest, compound interest and amount of annuity.</p>	4	40	60
I	22BBAIC201	Mathematics for Management	<p>1. Understand permutations of different things and similar things and combinations</p> <p>2. Define arithmetic and geometric progression and utilize it to find sum of first nth terms</p> <p>3. Define determinants and understand their properties</p> <p>4. Define and utilize the concept of matrix. Understand types of matrix and different operations of matrices</p> <p>5. Understand the calculation related to interest, annuity, percentage and profit and loss</p>	4	40	60
V	21BMTCC501	Core 11: Group Theory (Ad)	<p>1. Understand the basic ideas and notions of abstract algebra</p> <p>2. Define and recognize the abstract mathematical structures including group and subgroups. Define of Permutation groups</p> <p>3. State and criticize the properties of groups. Define cyclic groups and prove theorems related to it.</p> <p>4. Define and recognize the Homomorphism of groups.</p> <p>5. Define and recognize the Isomorphism and automorphism of groups</p>	4	30	70
V	21BMTCC502	Core 12: Linear Transformation and its Applications (Ad)	<p>1. Understand the basics of linear transformation and define its characterization</p> <p>2. Define rank and nullity of linear transformation and</p>	4	30	70



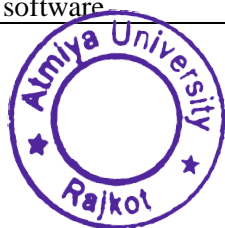
			<p>solve the problems based on Rank – Nullity Theorem.</p> <ol style="list-style-type: none"> Classify various types of linear transformation and define its relation with matrices. Explore the concept of linear operator and categorize its properties Define real quadratic form. Identify and critically analyze definiteness of real quadratic form 			
V	21BMTCC503	Core 13: Self Study Course: Applications of Mathematical Tools (F)	<ol style="list-style-type: none"> Solve and apply the problems of Differential Calculus Learn and apply integral calculus Understand and Apply the fundamental concepts of ODE Develop demonstrate capacity to model physical phenomena using PDE's (in particular using the heat and wave equations). Understand and apply the Number Theory. 	3-4	40	60
V	21BMTCL501	Core Elective 2: Advanced Topics in Mathematical Analysis (Ap)	<ol style="list-style-type: none"> Understand the concept of metric space and its structure. Determine closed-ness of the given set with respect to given metric Discuss and criticize the properties of Countable sets and Cantor set. Evaluate and determine the compactness of the given sets in a metric space. Analyze and criticize the connectedness of sets in metric space 	4	30	70
V	21BMTCL502	Fuzzy Set Theory (Ap)	<ol style="list-style-type: none"> Understand Fuzzy set and differentiate fuzzy set with crisp set. Understand and apply Fuzzy operations Understand and apply the concept of fuzzy number Explain and apply the concept of relation in the light of fuzzy sets. Understand function with fuzzy constraints 	4	30	70
V	21BMTCC505	Core Practical 5: Introduction to Python.	<ol style="list-style-type: none"> Remember the syntax and semantics of Python Programming Language Understand Python functions to facilitate code reuse and manipulate strings 	3	100	-



			<ol style="list-style-type: none"> 3. Apply the process of structuring the data using lists, tuples and dictionaries 4. Analyze the use of built-in functions to navigate the file system. 5. Create various kinds of plots using PyLab & GUI applications in Python 			
VI	21BMTCC601	Core 15: Ring Theory (Ad)	<ol style="list-style-type: none"> 1. Define and recognize the abstract mathematical structures including Rings and sub-rings 2. Understand the basic of ideals and Quotient rings. 3. Define and recognize the prime and maximal Ideals of given rings 4. Define and recognize the homomorphism of rings and utilize its properties. 5. Understand the basic ideas and notions of polynomial rings. 	4	30	70
VI	21BMTCC602	Core 16: Complex Analysis (Ad)	<ol style="list-style-type: none"> 1. Understand the basic ideas and notions of limit, continuity and differentiability of complex functions. 2. Evaluate a contour integral with an integrand which have singularities lying inside or outside the simple closed contour 3. Recognize and apply the Cauchy's integral formula and the generalized Cauchy's integral formula 4. Classify zeros and singularities of an analytic functions and find the Laurent's series of a rational function. 5. Understand concept of residues, evaluate contour integrals and solve polynomial equations. 	4	30	70
VI	21BMTCC603	Core 17: Graph Theory (F)	<ol style="list-style-type: none"> 1. Understand and utilize the fundamental concepts, types of a graph and incidence relation in graph theory. 2. Define and understand walk, paths, circuits. Learn about Euler graphs and Hamiltonian graphs and improve the proof writing skills 3. Define tree and some properties of tree. Define cut-set, connectivity and separability 4. Define planner graphs and their dual graphs. State and 	4	30	70



			<p>5. prove Kuratowski's first and second non-planar graph.</p> <p>5. Define and understand the vector associated with a graph, Coloring, Covering, Partitioning and Matrix representation of a graph.</p>			
VI	21BMTCC604	Core 18: Numerical Analysis	<p>1. Understand the concept of interpolation.</p> <p>2. Analyze and process data with equal or unequal interval and interpolate the same for given non-tabulated values.</p> <p>3. Perform numerical differentiation using various formulae including Gregory-Newton's forward difference formula and Sterling's formula</p> <p>4. Perform numerical integration using various formulae including Trapezoidal rule, Simpson's 1/3 rule and Simpson's 3/8 rule</p> <p>5. Solve ordinary differential equations numerically using method including Taylor's series method, Picard's method, Euler's method, Runge's method and Runge-Kutta methods.</p>	4	30	70
VI	21BMTCC605	Core 19: Mathematical Programming	<p>1. Understand the importance and scope of the subject Operations Research.</p> <p>2. Solve linear programming problems with the methods including Simplex Method</p> <p>3. Solve Transportation Problems and relate with real life applications</p> <p>4. Develop and formulate problems in mathematical terms from given real life problems.</p> <p>5. Understand, analyze and effectively solve the problems related to the theory of games</p>	4	30	70
VI	21BMTCC606	Core Practical 6: Fundamentals of R Software	<p>1. Understand the coding of R Software</p> <p>6. Understand and utilize the basic operations in R software.</p> <p>7. Understanding and utilize data management in R software</p> <p>8. Understand and utilize the concept of function in R software</p> <p>9. Plot the graphs and use the statistical functions in R software</p>	3	100	-



Faculty of Science
Department of Physics
Program: B.Sc. Physics.

1. Graduate attributes for Under Graduate Programs

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking

Program Outcomes (POs):

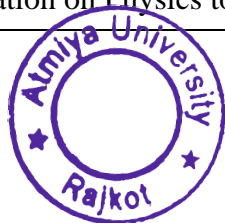
After completion of the program the Graduate will be able to:		
PO 1	:	Domain knowledge: Exhibit the information on ideas, standards and uses of Physics in different fields.
PO 2	:	Problem analysis: Secure basic speculation abilities to comprehend and take care of contemporary issues with Physics area information and abilities.
PO 3	:	Design/development of solutions: Comprehend the complex physical phenomena and configuration organized systems or cycles that meet the predetermined necessities.
PO 4	:	Conduct investigations of complex problems: Gain capacity to configuration, direct examinations, break down and decipher information for exploring issues in Physics and united areas.
PO 5	:	Modern tool usage: Comprehend standard working strategies and procure top to bottom specialized skill to deal



		with the essential research facility instruments.
PO 6	:	The Physics Professional and society: Comprehend own's part in the public arena and act in a fair and predictable way dependent on a solid self-appreciation and individual qualities.
PO 7	:	Environment and sustainability: Comprehend complex natural issues identified with physical science and their interrelationships and requirement of interdisciplinary spaces for practical turn of events.
PO 8	:	Ethics: Apply moral norms and spotlight on capable ethics and commitments and principles of the Physical practice.
PO 9	:	Individual and team work: Ready to work successfully as individual and as a part in multidisciplinary settings.
PO 10	:	Communication: Convey adequately utilizing various modes with academic local area as well as with the general public on the loose.
PO 11	:	Project management and finance: Comprehend the standards of the executives of the fund and apply these to one's own work, as a part and pioneer in a group, to oversee projects and in multidisciplinary conditions.
PO 12	:	Life-long learning: Ready to perceive the need to embrace long lasting learning and gain the ability to do as such.

Programme Specific Outcome (PSOs):

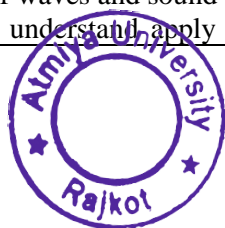
After completion of the program the Graduate will:		
PSO 1	:	Obtain information on the essentials of Physics for sound and strong base which empowers them to comprehend the arising and progressed designing ideas in Physical sciences.
PSO 2	:	To prepare the understudies to seek after advanced education and examination in presumed organizations at public and worldwide level.
PSO 3	:	Have the option to comprehend information on Physics to discover imaginative answers for worldwide issues.



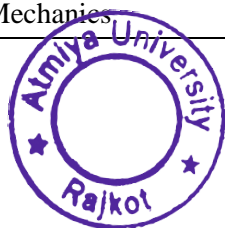
PSO 4	:	Conclude the potential outcomes and impression of transformations in Physical sciences and examination for discovering supportable moral answers for existing issue.
PSO 5	:	Have the option to investigate issues identified with Physical science and give compelling arrangements through industry-the scholarly world associations.

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGCH101	Physics - I (F)	<ol style="list-style-type: none"> 1. Students can understand apply and analyze different concepts of Work, Energy and Power/ Conservation Laws. 2. Students can understand apply and analyze different concepts of A.C. & D.C. Circuits. 3. Students can understand apply and analyze different concepts of Elastic behavior of solids. 4. Students can understand apply and analyze different concepts of Oscillations 5. Students can understand apply and analyze different concepts of Rotational Mechanics. 	4	30	70
I	23UGPY102	Practical: Physics-I	<ol style="list-style-type: none"> 1. Identifies different electrical components 2. Analysis functions of different D.C. and A.C. circuits 3. Design different D.C. circuits 4. Understand different connection rules of electrical circuits 	2	50	50
II	23UGPY201	Physics-II	<ol style="list-style-type: none"> 1. Students can understand apply and analyze different concepts of the General Properties X- ray 2. Students can understand apply and analyze different concepts of Radioactivity 3. Students can understand apply and analyze different concepts of the concept of waves and sound 4. Students can understand apply and analyze different concepts of 	4	40	60



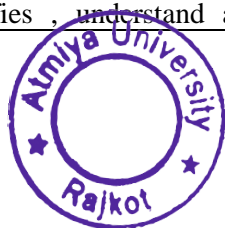
			<p>Different atomic models</p> <p>5. Students can understand apply and analyze different concepts of Different transistors and their types</p> <p>Understanding Number systems and logic gates</p>			
II	23UGPY202	Practical: Physics-II	<p>1. Understand, Applies and analyze concepts of the different types to Structures of The Atom and their modelling</p> <p>2. Understand, Applies and analyze concepts of propagation of Sound & Acoustics for the application purpose</p> <p>3. Understand, Applies and analyze concepts of the production of X-rays and its properties and applications.</p> <p>4. Understand, Applies and analyze concepts of different phenomena taking place in natural Radioactivity.</p> <p>5. Understand, Applies and analyze concepts of fundamentals of material science</p>	2	50	50
III	23UGPY301	Physics-III	<p>6. Students can understand apply and analyze different concepts of electrostatics.</p> <p>7. Students can understand apply and analyze different concepts of magneto statics.</p> <p>8. Students can understand apply and analyze different concepts of Electric field in matter.</p> <p>9. Students can understand apply and analyze different concepts of Magnetic field inside matter.</p> <p>10. Students can understand apply and analyze different concepts of Problem solving in Electrostatics and Magneto statics.</p>	4	70	30
III	23UGPY302	Physics-IV	<p>1. Students can understand apply and analyze different concepts of Vectors.</p> <p>2. Students can understand apply and analyze different concepts of Fourier Series.</p> <p>3. Students can understand apply and analyze different concepts of Gravitation.</p> <p>4. Students can understand apply and analyze different concepts of Lagrangian Mechanics.</p>	4	70	30



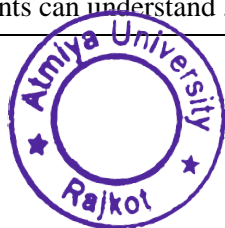
			5. Students can understand apply and analyze different concepts of Hamiltonian Mechanics.			
III	23UGPY303	Practical: Physics-III	<ol style="list-style-type: none"> 1. Determining magnetic moment of a given magnet 2. Comparison of magnetic field of different magnets 3. Determining the magnetic field due to steady current in the solenoid. 4. Various electrical Phenomena such as Ohm's law using tangent galvanometer 5. Determining the horizontal component of earth's magnetic field 	2	50	50
III	23UGPY304	Practical: Physics-IV	<ol style="list-style-type: none"> 1. To study Vector algebra by hand on experiments and development of computational skills. 2. To study earth's gravity and determining acceleration due to gravity. 3. To determine Mechanical properties of solids through various hands on experiments. 4. Explore rotational dynamics through hands on experiments to determine moment of inertia, torque and angular acceleration of the bodyof the body. 5. Explore Fluid Mechanics through hands on experiment on viscosity measurement. 	2	50	50



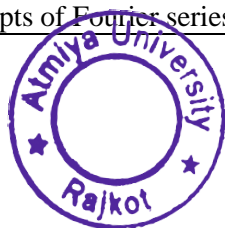
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21BPYCC101	Core 1 : Properties of matter physics and Newtonian mechanics (F)	<ol style="list-style-type: none"> 1. Students can understand , applies and analyze concepts of work, Energy And Power/ Conservation Laws 2. Students can understand , applies and analyze concepts of gravitation and gravitational field intensity 3. Students can understand , applies and analyze concepts of Elastic behavior of solids 4. Students can understand , applies and analyze concepts of Oscillations theory and analysis 5. Students can understand , applies and analyze concepts of Waves 	4	30	70
I	21BPYCC102	Core 2 :Fundamentals of Electronics(F)	<ol style="list-style-type: none"> 1. Students can understand , applies and analyze concepts of Energy Bands in Solids 2. Students can understand , applies and analyze concepts of Transport Phenomena in Semiconductors 3. Students can understand , applies and analyze concepts of Diode Characteristics 4. Students can understand , applies and analyze concepts of Diode Theory and Circuits 5. Students can understand , applies and analyze concepts of Special Purpose Diode 	4	30	70
I	21BPYCC102	Core Practical 1 :Properties of Matter & Newtonian mechanics and FOE practical	<ol style="list-style-type: none"> 1. Students can design different practical Work, Energy And Power/ Conservation Laws 2. Students can design different practical of different pendulum system 3. Students can design practical to determine different elastic constant 4. Students can design setup for verifying laws of vibrating string 	4	40	60
I	21BCHIC101/ 21BMTIC101	IDC 1 : Physics : Electricity and Modern physics	<ol style="list-style-type: none"> 1. Student will able to apply and evaluate concepts D.C. Circuits & A.C. Circuits 2. Identifies , understand and analyze different Network, 	4	30	70



			<p>Theorems related to & Multimeter</p> <ol style="list-style-type: none"> 3. Applies and Evaluate different concepts of Structure of The Atom 4. Applies and evaluate different concepts of wave mechanics 5. Identifies , understand and applies Particle accelerators and cosmic rays 			
I	21BCHIC102/ 21BMTIC102	IDC 1 : Physics Practical : Electricity and Modern physics practical	<ol style="list-style-type: none"> 1. Identifies different electrical components 2. Analysis functions of different D.C. and A.C. circuits 3. Design different D.C. circuits 4. Understand different connection rules of electrical circuits 			
I	21BPYCC201	Core 3: Modern Physics & Sound (Ad)	<ol style="list-style-type: none"> 1. Understand, Applies and analyze concepts of the different types to Structures of The Atom and their modelling 2. Understand, Applies and analyze concepts of propagation of Sound & Acoustics for the application purpose 3. Understand, Applies and analyze concepts of the production of X-rays and its properties and applications. 4. Understand, Applies and analyze concepts of different phenomena taking place in natural Radioactivity. 5. Understand, Applies and analyze concepts of fundamentals of material science 	4	70	30
II	21BPYCC202	Core 4: Digital Electronics (F)	<ol style="list-style-type: none"> 1. Understand, Applies and analyze concepts of Boolean algebra to reduce Boolean expression. 2. Understand, Applies and analyze concepts of different types of Number Systems & Codes. 3. Understand, Applies and analyze concepts of Logic Gates & apply Mapping Techniques. 4. Understand, Applies and analyze concepts of Design Combinational Logic Circuit. 	4	70	30
II	21BPYCC203	Core Practical 2: Modern Physics and Sound & DE Practical Combined Practical	<ol style="list-style-type: none"> 1. Students can design different resonating systems 2. Students can design different crystal growth system 3. Students can design different Logic circuit 4. Students can design different digital circuits 	6	70	30
II	21BCHIC201/	IDC 2 : Physics :	<ol style="list-style-type: none"> 1. Students can understand , Apply and analysis concepts 	4	30	70



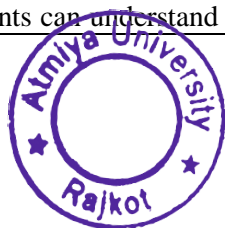
	21BMTIC201	Electronics and radiation physics	<p>different types to semiconductor diodes and their biasing methods</p> <ol style="list-style-type: none"> 2. Students can understand , Apply and analysis concepts of parameters of different types of rectifier circuits 3. Students can understand, Apply and analysis concepts of parameters various types of special purpose diodes and their applications. 4. Students can understand, Apply and analysis concepts of parameters the production of X-rays and its properties and applications. 5. Students can understand, Apply and analysis concepts of parameters different phenomena taking place in natural Radioactivity. 			
II	21BCHIC202/ 21BMTIC202	IDC 2 : Physics Practical: Electronics and radiation physics practical	<ol style="list-style-type: none"> 1. Student can design different electrical circuit 2. Student can evaluate performance of different electrical circuit 3. Student can design and test combination of electrical circuit 4. Students can hypothesize performance of combination of different electrical circuit 	2	40	60
III	21BPYCC301	Core 5: Electromagnetism(A d)	<ol style="list-style-type: none"> 1. Students can understand apply and analyze different concepts of electrostatics 2. Students can understand apply and analyze different concepts of magneto statics 3. Students can understand apply and analyze different concepts of Electric field in matter 4. Students can understand apply and analyze different concepts of Magnetic field inside matter 5. Students can understand apply and analyze different concepts of Problem solving in Electrostatics and Magneto statics 	4	30	70
III	21BPYCC302	Core 6: Mathematical and classical physics (Ad)	<ol style="list-style-type: none"> 1. Students can understand apply and analyze different concepts of Vectors 2. Students can understand apply and analyze different concepts of Fourier series 	4	30	70



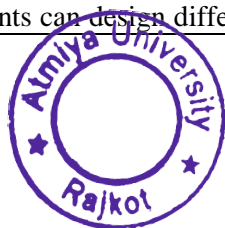
			<ol style="list-style-type: none"> 3. Students can understand apply and analyze different concepts of Rotational Motion 4. Students can understand apply and analyze different concepts of Lagrangian Formulation 5. Students can understand apply and analyze different concepts of Variational principle 			
III	21BPYCC303	Core 7: Quantum mechanics (Ad)	<ol style="list-style-type: none"> 1. Students can understand apply and analyze different concepts of Schrodinger equation and Stationary States 2. Students can understand apply and analyze different concepts of Wave particle duality and Schrodinger equation 3. Students can understand apply and analyze different concepts of Particle in potential well and Box 4. Students can understand apply and analyze different concepts of General Formalism of Wave Mechanics 5. Students can understand apply and analyze different concepts of Harmonic oscillator and angular momentum 	4	30	70
III	21BPYCC304	Core Practical 3: Combined Practical	<ol style="list-style-type: none"> 1. Students can design different arrangements of Magneto statics 2. Students can design different arrangements of Magnetic effect of electric current 3. Students can design different arrangements of mechanical properties of solids 4. Students can design different practical of mathematical methods as an important tool to understand the physics 5. Students can design different practical of Electromagnetism 	3	40	60
III	21UFSDE305	DSE-1: Introduction to Electronic, electricity and radiation physics	<ol style="list-style-type: none"> 1. Students can understand, apply and analyze different concepts of semiconductor diodes and their biasing methods. 2. Students can understand, apply and analyze different concepts of performance parameters of different types of rectifier circuits. 3. Students can understand, apply and analyze different concepts of various types of special purpose diodes and their applications. 4. Students can understand, apply and analyze different 	3	40	60



			<p>concepts of the duality of matter and uncertainty principle.</p> <p>5. Students can understand, apply and analyze different concepts of different phenomena taking place in natural Radioactivity.</p>			
IV	21BPYCC401	Core 8: (Ad) Thermodynamics and statistical mechanics	<ol style="list-style-type: none"> 1. Students can understand apply and analyze the Laws of thermodynamics 2. Students can understand apply and analyze Entropy and its relevance with nature and real life situations 3. Students can understand apply and analyze the Theory of Radiation and its relevance with blackbody 4. Students can understand apply and analyze Thermodynamic Potentials explaining state of thermodynamic system 5. Students can understand apply and analyze Statistical Physics for different particle distribution statistics 	4	30	70
IV	21BPYCC402	Core 9: (Ad) Mathematical Physics 2	<ol style="list-style-type: none"> 1. Students can understand apply and analyze the First order differential equation 2. Students can understand apply and analyze the Second order and partial differential equations 3. Students can understand apply and analyze the Complex Numbers and Functions Of Complex Variable, Analytic Function 4. Students can understand apply and analyze Laplace and Inverse Laplace Transforms 5. Students can understand apply and analyze Special functions. 	4	30	70
IV	21BPYCL401	Core Elective 1: Amplifier and oscillator circuits	<ol style="list-style-type: none"> 1. Students can understand apply and analyze the concepts of oscillation actions and circuit 2. Students can understand apply and analyze the importance and function of OP-Amp. 3. Students can understand apply and analyze Learner will able to understand different applications of OP-Amp. 4. Students can understand apply and analyze Concepts of regulated and unregulated power supply. 5. Students can understand apply and analyze Different types 	4	30	70



			of transistor amplifier circuits circuit .			
IV	21BPYCL402	Core Elective 2: Linear Integrated Circuits	<ol style="list-style-type: none"> 1. Students can understand apply and analyze concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve engineering problems 2. Students can understand apply and analyze skills to design simple circuits using OP-AMP 3. Students can understand apply and analyze various techniques to develop A/D and D/A convertors 4. Students can understand apply and analyze develop simple filter circuits and various amplifiers and can solve problems related to it. 	4	30	70
IV	21UTDE22	TDE-1 : Energy Science and Engineering	<p>Upon completion of this course, the learner will be able learn</p> <ol style="list-style-type: none"> 1. Energy sources like solar energy, wind energy, energy from biomass, geothermal energy, energy from the ocean. 2. Recent advancements in energy generations like magneto hydrodynamic power generation, fuel cell technology, hydrogen energy and management of energy in the industries. 	2	100	0
IV	21UFSDE406	DSE-2 : Material physics and spectroscopic technique	<ol style="list-style-type: none"> 1. Students can understand apply and analyze different concepts of solid mechanics 2. Students can understand apply and analyze different concepts of crystallography 3. Students can understand apply and analyze different concepts of thermodynamics 4. Students can understand apply and analyze different concepts of Kinetic theory of gases 5. Students can understand apply and analyze different concepts of spectroscopy 	3	40	60
IV	21BPYCC403	Core Practical 4: Combined Practical	<ol style="list-style-type: none"> 1. Students can design different setup to understand heat transfer 2. Students can design different setup to Latent heat and specific heat 3. Students can design different setup to Thermal conductivity of different materials. 4. Students can design different setup to various mathematical 	2	40	60



			<p>methods as an important tool to understand the physics</p> <p>5. Students can design different setup to application of mathematical computational techniques</p>			
IV	21BPYCL403	Core elective practical 1: Amplifier and oscillator circuit Practical	<p>1. Students can design different setup to study transistor characteristics</p> <p>2. Students can design different setup to study Transistor Load line and Q – Point analysis</p> <p>3. Students can design different setup to study Characteristics of FET and UJT</p> <p>4. Students can design different setup to study Frequency response of amplifier circuits</p> <p>5. Students can design different functional circuits</p>	1	40	60
IV	21BPYCL404	Core elective practical 2: Linear Integrated Circuit Practical	<p>1. Students can design different setup to study Instrumentation of amplifier circuits</p> <p>2. Students can design different setup to study setup Circuit analysis of inverting circuits</p> <p>3. Students can design different setup to study setup for Circuit analysis of non-inverting circuits</p> <p>4. Students can design different setup to study setup Circuit analysis of differentiator circuits</p> <p>5. Students can design different setup to study setup Circuit analysis of integrator circuits</p>	1	40	60
V	21BPYCC501	Core 10: Geometrical Optics and Wave Optics	<p>1. Student can understand , apply and analyze different concepts of the Geometrical Optics</p> <p>2. Student can understand , apply and analyze different concepts of the Wave Optics: Interference</p> <p>3. Student can understand , apply and analyze different concepts of the Multiple Beam Interferometry</p> <p>4. Student can understand , apply and analyze different concepts of the Diffraction</p> <p>5. Student can understand , apply and analyze different concepts of the Polarization</p>	30	70	4
V	21BPYCC502	Core 11: Atomic and Molecular Spectroscopy	<p>1. Student can understand , apply and analyze different concepts of the Atomic spectroscopy</p> <p>2. Student can understand , apply and analyze different concepts of the Vector atom model</p>	30	70	4



			<ol style="list-style-type: none"> 3. Student can understand , apply and analyze different concepts of the Raman spectra 4. Student can understand , apply and analyze different concepts of the Molecular Spectroscopy 5. Student can understand , apply and analyze different concepts of the Rotational and vibrational spectra 			
V	21BPYCC503	Core 12:(Self-Study) (Ap) Instrumentations	<ol style="list-style-type: none"> 1. Student can understand , apply and analyze different concepts of Multimeter 2. Student can understand , apply and analyze different concepts of Electronic Voltmeter 3. Student can understand , apply and analyze different concepts of Cathode Ray Oscilloscope 4. Student can understand , apply and analyze different concepts of Working Principle and Application of: Q-meter 5. Student can understand , apply and analyze different concepts of Signal Generation 	30	70	3
V	21BPYCC504	Core 13: Concept Recapitulation Test	<p>Upon completion of this course, the learner will be able learn Recall basic knowledge of all the subjects of previous semesters.</p>	50	-	2
V	21BPYCL501	Core Elective 2: (Ap) Solid State and material physics	<ol style="list-style-type: none"> 1. Student can understand , apply and analyze different concepts of Free electron theory of metals which focus on electron transport mechanism in conductors 2. Student can understand , apply and analyze different concepts of Semiconductor physics which focus on band theory and electron transport mechanism in semi conductor devices 3. Student can understand , apply and analyze different concepts of Superconductivity which reveals crucial role of temperature and magnetic field on superconducting behavior of materials 4. Student can understand , apply and analyze different concepts of Crystal Binding which explain inter atomic interaction and various types of inter atomic bonds in crystalline solids 5. Student can understand , apply and analyze different 	30	70	4



			concepts of Thermal Conductivity of Solids which reveals thermal conductivity mechanism in solids			
V	21BPYCL502	Core Elective 2: Sensor technology	Upon completion of this course, the learner will be able learn about sensors.	30	70	4
V		TDE 2: Applied Nanotechnology	<ol style="list-style-type: none"> 1. Students can understand , apply and analyze concepts of Nano-materials and Nanotechnology 2. Students can understand , apply and analyze concepts of Materials in Nanotechnology 3. Students can understand , apply and analyze concepts of Nanofabrication 4. Students can understand , apply and analyze concepts of Nanomaterial Characterization Techniques 5. Students can understand , apply and analyze concepts of Applications of Nanomaterials 	100	-	2
V	21BPYCC505	Core Practical 5: Combined Practical	<ol style="list-style-type: none"> 1. Student can design different basic optical measurement methods 2. Student can design and analyze different Optics and Spectroscopic instrumentation Techniques 3. Student can design and analyze different of optics to evaluate different optical parameters 4. Student can design and analyze different concepts of study of different optical phenomena such as Interference, Diffraction, polarization etc 5. Student can understand , apply and analyze different concepts of Optical and Spectroscopic Data analysis 	40	60	4
V	21BPYCL503	Core Elective Practical 2: Solid state physics Practicals	<ol style="list-style-type: none"> 1. Basic measurement methods 2. Basic solid state materials 3. Device applications of solid state materials 4. Material properties of solid state devices such as resistivity, hall co efficient etc. 5. Circuit fabrication of solid state electronic devices 	40	60	2
VI	21BPYCC601	Core 14: Nuclear and particle Physics (Ap)	<ol style="list-style-type: none"> 1. Students can understand , apply and analyze General Properties of Nuclei & Nuclear Models 2. Students can understand , apply and analyze concepts of Radioactivity 3. Students can understand , apply and analyze Interaction of 	30	70	4



			<p>Nuclear Radiation with matter And Detector</p> <ol style="list-style-type: none"> Students can understand , apply and analyze concepts of Accelerator and their types Students can understand , apply and analyze concepts Nuclear fusion and their applications 			
VI	21BPYCC602	Core 15: Electrodynamics (Ad)	<ol style="list-style-type: none"> Students can understand , apply and analyze concepts of Electrodynamics Students can understand , apply and analyze concepts of Electromagnetic Waves Students can understand , apply and analyze concepts of Students can understand , apply and analyze concepts of Students can understand , apply and analyze concepts of Electromagnetic Radiations Students can understand , apply and analyze concepts of Electrodynamics and relativity 	30	70	4
VI	21BPYCC603	Core 16: Applied Nanotechnology (Ap)	<ol style="list-style-type: none"> Students can understand , apply and analyze concepts of Nano-materials and Nanotechnology Students can understand , apply and analyze concepts of Materials in Nanotechnology Students can understand , apply and analyze concepts of Nanofabrication Students can understand , apply and analyze concepts of Nanomaterial Characterization Techniques Students can understand , apply and analyze concepts of Applications of Nanomaterials 	30	70	4
VI	21BPYCC604	Core Practical 6: Skill Training / start up / Practical	<ol style="list-style-type: none"> Students can design fabrication techniques of Nano material Student can analyze different characterization techniques Students can understand , apply and analyze concepts of Nanofabrication Students can hypothesize different applications of nano technology 	40	60	4
VI	21BPYCR602	Core Enrichment Course / Component 5: Project / Skill training / Start-up	<ol style="list-style-type: none"> Students can design various working model of electronic circuit Student can hypothesize different material characterization Students can hypothesize different material preparation techniques 	120	180	8



			<ol style="list-style-type: none"> 4. Can hypothesize different theoretical modeling techniques 5. Can hypothesize different computing modeling techniques 			
I	23UGPY101	Physics-1	<ol style="list-style-type: none"> 1. Students will understand the concepts of Work, Energy And Power/ Conservation Laws. 2. Student will able to apply and evaluate concepts D.C. Circuits & A.C. Circuits 3. Students will understand the concepts of Elastic behavior of solids 4. Students will understand the concepts of Oscillations 5. Students will understand the concepts of Rotational Mechanics 	30	70	
I	23UGPY102	Physics Practical- I	<ol style="list-style-type: none"> 1. Identifies different electrical components 2. Analysis functions of different D.C. and A.C. circuits 3. Design different D.C. circuits 4. Understand different connection rules of electrical circuits 	50	50	2
II	23UGPY201	Physics-II	<ol style="list-style-type: none"> 1. Understand the General Properties X- ray 2. Understand Radioactivity 3. Understand the concept of waves and sound 4. Understand Different atomic models 5. Understand Different transistors and their types 6. Understanding Number systems and logic gates 	30	70	
II	23UGPY202	Physics Practical- II	<ol style="list-style-type: none"> 5. Student can design different electrical circuit 6. Student can evaluate performance of different electrical circuit 7. Student can design and test combination of electrical circuit 8. Students can hypothesize performance of combination of different electrical circuit 	50	50	2



Faculty of Business & Commerce
Department of Commerce
Program: M.Com.

Program Objective:

Courses offered in this program are designed towards providing students a world-class curriculum with an advance and in-depth understanding of Commerce discipline. It helps them in attaining conceptual knowledge, proficiency and desired analytical skills to deal with prevailing business framework. It helps in developing skills necessary to deal with real time situations and to find solutions under complex conditions. It will enable students to gain familiarity with the current trade/mercantile affairs.

- To make students understand the importance of nature of business and trade activities in Trade, Business and Commerce
- To develop skills to do a thorough analysis to use them as basis for business decision making.
- To enable the students in practical application of the concepts taught during the course.
- To provide opportunity to the students with such learning motives to become intelligent participant of community and understand interdependence of people in their social relationship.
- To inculcate entrepreneurial and employability skills among students

Graduate Attributes:

- **Core Competence:** Possess discipline-relevant knowledge and competencies and able to link them to local, national and global issues to seek positive and sustainable solutions
- **Transferable Global & Impactful Societal Skills:** Ability to create knowledge through research and innovations by social immersions and transferring them to impact through problem solving at local and global levels.



- **Adaptability and Resilience:** Demonstrate resilience, perseverance and positivity in unfamiliar situations and adapt their skills and knowledge to excel in new environment
- **Sense of Purpose &Curiosity:** Possess intellectual curiosity to apply the knowledge to generate, develop and realize new ideas
- **Ethics &Lifelong Immersive Learning:** Adhered to highest standards of ethics and always amenable to new ideas and actively seek out new ways of learning.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Depth and breadth of knowledge: will be capable to creatively apply the knowledge of commerce as well as other related discipline for his professional and research career.
PEO2	:	Practice, Operation and usage of modern tools and technology: will contribute in the field of accounting,taxation and finance in designing, developing and providing solutions for complex environments of industries.
PEO3	:	Professional capacity and passion of learning: are flexible and adaptable in different work environments, prepared to acquire, develop, employ and integrate new technologies and exhibit leadership and team work quality.
PEO4	:	Research, numeracy, scholarship and data literacy: will exhibit ethical behaviour consistent with academic honesty and use of appropriate guidelines and procedures with responsible conduct of research.
PEO5	:	Global, moral and aesthetic sustainability: will have love for learning in pursuance of excellence in all domains of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain Knowledge: Acquire in-depth, systematic and rigorous learning, exposure and competence in commerce discipline.
PO2	:	Problem analysis: Able to identify problems related to accountancy, finance, and taxation and to analyse and derive



		valid conclusions with fundamental knowledge in commerce.
PO3	:	Conduct Investigations of Complex Problems: Demonstrate the ability to plan, execute and engage holistically through an all-encompassing knowledge impartation related to commerce and allied discipline in a scientific way, required for further research at a higher level.
PO4	:	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern tools for research or production purpose with an understanding of the limitations.
PO5	:	Environment and Sustainability: Analyse global environmental problems and critically evaluate evidence to formulate and organize sustainable strategies.
PO6	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the commerce..
PO7	:	Individual and Team Work: Exhibit leadership qualities with ability to function effectively as an individual and in a team.
PO8	:	Communication: Present research results to a technically literate audience by means of presentation, poster, report or any other form for dissemination of information.
PO9	:	Life-long Learning: Able to integrate and appraise information/knowledge from a variety of sources throughout the life

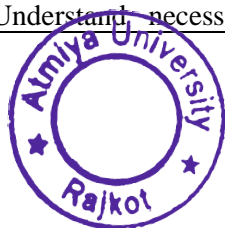
Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Be able to inculcate the knowledge of business and the techniques of managing the business with special focus on accounting, finance, taxation etc.
PSO2	:	Be able to apply the acquired knowledge to provide cost-effective and sustainable solutions in commerce.
PSO3	:	Be able to translate commerce know-how to address environmental, ethical, intellectual property rights, societal issues and good governance practices.
PSO4	:	Be able to develop skills in application of research, its analysis and capabilities in application oriented research for business decisions.



Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21MCMCC101	Core-1: Supply Chain Management (F)	<ol style="list-style-type: none"> 1. Develop a sound understanding of functions and importance of supply chains in today's business environment. 2. Understand the how to design supply chain network 3. Understand and apply conceptual decision-support to supply chain related demand and supply decisions. 4. Develop and utilize critical management skills for planning and managing inventories 5. Understand the foundational role of sourcing and logistics as it relates to transportation and warehousing 	4	30	70
I	21MCMCC102	Core-2: International Business Environment (Ad)	<ol style="list-style-type: none"> 1. Understand the overall international business environment 2. Understanding of International Economic Environment 3. Understanding of International Trade and Investment Theory 4. Demonstrate the knowledge of international investment opportunities. 5. Will have detail knowledge of Multinational corporations and their global development. 	4	30	70
I	21MCMCC103	Core-3: Accounting for Managerial Decisions (Ap)	<ol style="list-style-type: none"> 1. Make decision based on financial information 2. Develop the understanding of transfer pricing 3. Impart relevant knowledge regarding Working Capital Management 4. Understand cash and inventory as one of the important element of working capital 5. Awareness about Budget as Decision Making Tool 	4	40	60
I	21MCMCL101	Accounting & Taxation Group Indirect Tax (GST) (Ap)	<ol style="list-style-type: none"> 1. Understand the basic concept of GST and important terminologies associated with Goods and Service Tax. 2. Familiarize with the framework of GST in India. 3. Understand necessary basic and their impact on 			



			<p>business decision-making and clear idea about the supply as per GST.</p> <ol style="list-style-type: none"> 4. Develop the knowledge about the provisions regarding registration and documentation required under GST. 5. Develop the understanding of filing of returns and necessary provisions for tax credits under the Act. 			
I	21MCMCL102	Finance Group Financial Decision Tactics (Ap)	<ol style="list-style-type: none"> 1. Develop the understanding of designing capital structure 2. Understand various theories and examine various factors affecting capital structure decisions. 3. Develop the understanding of how to analyze the effect of leverage 4. Understand various techniques of Capital Budgeting decision techniques 5. Understand various theories of Dividend decision 			
I		#Value Education for Consciousness Development	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature 			
II	21MCMCC201	Core-4: Corporate Law (Ad)	<ol style="list-style-type: none"> 5. Understand as how a company can be formed under the Companies Act 6. Demonstrate about various types and importance of meetings specified in the Companies Act 7. Discover composition of board of directors and various types of directors appointed in the companies 8. Understand necessary preparation and documentations of physical and virtual meetings 9. Discover about the services of MCA and filing of XBLR 	4	30	70
II	21MCMCC202	Core-5: Corporate Financial	<ol style="list-style-type: none"> 1. Understand about corporate financial accounting 2. Demonstrate the importance of corporate reporting 	5	40	60



		Accounting (Ap)	<p>and its necessity</p> <ol style="list-style-type: none"> Evaluate the conditions under which companies liquidate and its accounting Impart relevant knowledge regarding internal reconstruction of companies Develop the understanding of how companies amalgamate 			
II	21MCMCC203	Core-6: Quantitative Techniques (Ap)	<ol style="list-style-type: none"> Understand various quantitative & statistical methods Demonstrate their competence and confidence in using descriptive statistics Demonstrate their competence and confidence in using inferential statistics in general and to the use of significance testing in particular Demonstrate an ability to apply various statistical tool to solve business problem by calculating and interpreting statistical values using statistical tool Have a better understanding about the quantitative aspects regarding research and economic analysis 	5	40	60
II	21MCMCL201	Accounting & Taxation Group Advanced Cost Accounting (Ad)	<ol style="list-style-type: none"> Discover various latest recent development in the field of cost accounting Learn about the system of costing under activity based method and the process of cost audit Gain knowledge of analysis of standard costs and variance statements Learn skill for controlling cost and decision making Develop an understanding cost system which may be integrated and non-integrated 			
II	21MCMCL202	Core-Elective 2: Funds Management in Commercial Banks	<ol style="list-style-type: none"> Justify the effective management of funds in commercial banks Evaluate various types of reserves and its management in commercial banks Develop the understanding mobilisation and strategies of bank deposits Evaluate management of various types of lending and its policies Propose methods of effective performance evaluation 			



			and monitoring of commercial banks			
II		*CEC-1 : STC/Online Courses/ Professional Certification Courses	Not Applicable			
II	21CEWE201	Value Education for Consciousness Development	1. Differentiate the career success, academic success and life success 2. Identify the correct priority order in life and illustrate the human goal 3. Understand that the relationships are definite 4. Understand the Interconnectedness between all the orders in existence.			
III	21MCMCC301	Core-7: Business Research (Ap)	1. Understand the basics of conceptual framework of research 2. Understand research problems and its applications 3. Earn knowledge of various types of data and usefulness 4. Develop understanding of instrument development, its validation and various scales 5. Understand the process of research reporting	4	30	70
III	21MCMCC302	Core-8: Income Tax Law & Practice (Ad)	1. Acquire knowledge of basic concepts and definition of Income Tax 2. Understand the provisions and be able to compute income from various head of income 3. Familiarize the provisions regarding clubbing of income, transfer income and set-off, carry forward of losses 4. Compute taxable income and taxability of individual and partnership firms 5. Gain knowledge about the Income Tax administration and rules for assessment	5	40	60
III	21MCMCC303	Core-9: Management Accounting (Ap)	1. Acquaint with the accounting concepts, tools and techniques for managerial decisions 2. Aware about the latest technological development necessary for management and emerging issues in the global management environment 3. Develop financial analysis skills among learners	4	40	60



			<p>4. Develop an understanding of responsibility accounting and decision making process</p> <p>5. Understand and evaluate capital budgeting decisions using advanced techniques</p>			
III	21MCMCC304	<p>Core-10: Self-Study Course (Marketing Management) (F)</p>	<p>1. Familiarize with the fundamentals of marketing to enable them to take better marketing decisions</p> <p>2. Discuss and understand the nuances and complexities involved in various products and pricing decisions.</p> <p>3. Equip to take effective distribution decisions for products and services.</p> <p>4. Develop the skills to enable them to design the Promotion-Mix strategies advertising campaigns.</p> <p>5. Aware about the current trends in marketing to enable them to take proactive measures while taking marketing decisions.</p>	4	30	70
	21MCMCL301	<p>Taxation Group Ethics & Corporate Governance (Ap)</p>	<p>1. Understand the basics, theories and principles of ethics and corporate Governance</p> <p>2. Examine ethics in relation to human values, decision making and its codes</p> <p>3. Learn and practice ethical practices</p> <p>4. Acquire knowledge of corporate citizenship and practices of corporate governance</p> <p>5. Understand the roles of ethics and corporate governance in India</p>			
	21MCMCL302	<p>Core-Elective 3: Investment Management</p>	<p>1. Understand the basics and processes of investment management</p> <p>2. Detail out the relevant assets for investment and measurement of its performance</p> <p>3. Analyse and examine various investment options in terms of risk and return</p> <p>4. Evaluate and apply different valuation models to evaluate various investment options.</p> <p>5. Develop skills and knowledge of portfolio strategies for individuals investors</p>			
IV	21MCMCC401	<p>Core-11: Managerial Economics</p>	<p>1. Draw on economics to explain the nature of the firm and its problems</p>	4	30	70



		(Ad)	<ol style="list-style-type: none"> Analyze the problems faced by firms in their interaction with consumers and the market Evaluate strategies for successful selling of a product in a specific market situation Prepare a response to a specified business problem Communicate applications of economics to managerial issues and articulate possible solutions 			
	21MCMCC402	Core-12: Specialized Accounting (Ad)	<ol style="list-style-type: none"> Understand knowledge of accounting concepts of Royalty Understand accounting treatment in case of voyages Familiarize with the accounting aspects of investments Understand the provisions and accounting procedure of Insurance Companies Acquire and learn the provisions and accounting procedure of Banking Companies 	5	40	60
	21MCMCC403	Core-13: Dissertation (Ap)	<ol style="list-style-type: none"> Design and justify research methodology for data collection Demonstrate understanding of research code of conduct and ethical approval process Utilize appropriate research methodology to collect data Critically analyse the collected data and draw conclusions accordingly Present research findings and conclusions in an academically appropriate manner 	12	100	100
	21MCMCL401	Accounting & Taxation Group Core-Elective 4: Corporate Tax Structure and Planning	<ol style="list-style-type: none"> Impart deep knowledge about the latest provisions of Income Tax Act related with corporate Develop application and analytical skill of the provisions of Income Tax Law for Tax planning and Management Understand the fundamental concepts and computation of tax and Assessment procedure Knowledge regarding the legitimate way of Tax Planning and Management under different Financial and managerial decisions Bridge the gap between and theory and practice 			
	21MCMCL402	Finance Group Core-Elective 4: Security	<ol style="list-style-type: none"> Learn the nature, scope and approaches of Investment Analysis and basic mathematical measurement of security 			



		Analysis and Portfolio Management (Ad)	<p>risk and returns.</p> <p>2. Learn the conceptual knowledge about analysis of bonds and market efficacy</p> <p>3. Understand how to evaluate various instruments and measure the portfolio performances</p> <p>4. Learn the valuation of securities using fundamental analysis, and technical analysis</p> <p>5. Develop skills and knowledge of portfolio strategies for individuals investors</p>			
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Department of Commerce
Program: M.Com.

Program Objective:

Courses offered in this program are designed towards providing students a world-class curriculum with an advance and in-depth understanding of Commerce discipline. It helps them in attaining conceptual knowledge, proficiency and desired analytical skills to deal with prevailing business framework. It helps in developing skills necessary to deal with real time situations and to find solutions under complex conditions. It will enable students to gain familiarity with the current trade/mercantile affairs.

- To make students understand the importance of nature of business and trade activities in Trade, Business and Commerce
- To develop skills to do a thorough analysis to use them as basis for business decision making.
- To enable the students in practical application of the concepts taught during the course.
- To provide opportunity to the students with such learning motives to become intelligent participant of community and understand interdependence of people in their social relationship.
- To inculcate entrepreneurial and employability skills among students

Graduate Attributes:

- **Core Competence:** Possess discipline-relevant knowledge and competencies and able to link them to local, national and global issues to seek positive and sustainable solutions
- **Transferable Global & Impactful Societal Skills:** Ability to create knowledge through research and innovations by social immersions and transferring them to impact through problem solving at local and global levels.
- **Adaptability and Resilience:** Demonstrate resilience, perseverance and positivity in unfamiliar situations and adapt their skills and knowledge to excel in new environment



- **Sense of Purpose &Curiosity:** Possess intellectual curiosity to apply the knowledge to generate, develop and realize new ideas
- **Ethics &Lifelong Immersive Learning:**Adhered to highest standards of ethics and always amenable to new ideas and actively seek out new ways of learning.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Depth and breadth of knowledge: will be capable to creatively apply the knowledge of commerce as well as other related discipline for his professional and research career.
PEO2	:	Practice, Operation and usage of modern tools and technology: will contribute in the field of accounting,taxation and finance in designing, developing and providing solutions for complex environments of industries.
PEO3	:	Professional capacity and passion of learning: are flexible and adaptable in different work environments, prepared to acquire, develop, employ and integrate new technologies and exhibit leadership and team work quality.
PEO4	:	Research, numeracy, scholarship and data literacy: will exhibit ethical behaviour consistent with academic honesty and use of appropriate guidelines and procedures with responsible conduct of research.
PEO5	:	Global, moral and aesthetic sustainability: will have love for learning in pursuance of excellence in all domains of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain Knowledge: Acquire in-depth, systematic and rigorous learning, exposure and competence in commerce discipline.
PO2	:	Problem analysis: Able to identify problems related to accountancy, finance, and taxation and to analyse and derive valid conclusions with fundamental knowledge in commerce.
PO3	:	Conduct Investigations of Complex Problems: Demonstrate the ability to plan, execute and engage holistically through an all-encompassing knowledge impartation related to commerce and allied discipline in a scientific way,



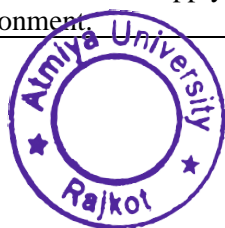
		required for further research at a higher level.
PO4	:	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern tools for research or production purpose with an understanding of the limitations.
PO5	:	Environment and Sustainability: Analyse global environmental problems and critically evaluate evidence to formulate and organize sustainable strategies.
PO6	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the commerce..
PO7	:	Individual and Team Work: Exhibit leadership qualities with ability to function effectively as an individual and in a team.
PO8	:	Communication: Present research results to a technically literate audience by means of presentation, poster, report or any other form for dissemination of information.
PO9	:	Life-long Learning: Able to integrate and appraise information/knowledge from a variety of sources throughout the life

Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Be able to inculcate the knowledge of business and the techniques of managing the business with special focus on accounting, finance, taxation etc.
PSO2	:	Be able to apply the acquired knowledge to provide cost-effective and sustainable solutions in commerce.
PSO3	:	Be able to translate commerce know-how to address environmental, ethical, intellectual property rights, societal issues and good governance practices.
PSO4	:	Be able to develop skills in application of research, its analysis and capabilities in application oriented research for business decisions.

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	22MCMCC101	Core-1: Supply Chain Management (F)	1. Develop a sound understanding of functions and importance of supply chains in today's business environment	4	30	70



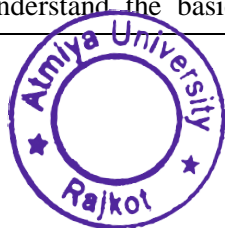
			<ul style="list-style-type: none"> 2. Understand the how to design supply chain network 3. Understand and apply conceptual decision-support to supply chain related demand and supply decisions. 4. Develop and utilize critical management skills for planning and managing inventories 5. Understand the foundational role of sourcing and logistics as it relates to transportation and warehousing 			
I	22MCMCC102	Core-2: International Business Environment (Ad)	<ul style="list-style-type: none"> 1. Understand the overall international business environment 2. Understanding of International Economic Environment 3. Understanding of International Trade and Investment Theory 4. Demonstrate the knowledge of international investment opportunities. 5. Will have detail knowledge of Multinational corporations and their global development. 	4	30	70
I	22MCMCC103	Core-3: Accounting for Managerial Decisions (Ap)	<ul style="list-style-type: none"> 1. Make decision based on financial information 2. Develop the understanding of transfer pricing 3. Impart relevant knowledge regarding Working Capital Management 4. Understand cash and inventory as one of the important element of working capital 5. Awareness about Budget as Decision Making Tool 	4	40	60
I	22MCMCL101	Accounting & Taxation Group Indirect Tax (GST) (Ap)	<ul style="list-style-type: none"> 1. Understand the basic concept of GST and important terminologies associated with Goods and Service Tax. 2. Familiarize with the framework of GST in India. 3. Understand necessary basic and their impact on business decision-making and clear idea about the supply as per GST. 4. Develop the knowledge about the provisions regarding registration and documentation required under GST. 5. Develop the understanding of filing of returns and necessary provisions for tax credits under the Act. 			
I	22MCMCL102	Finance Group Financial Decision Tactics (Ap)	<ul style="list-style-type: none"> 1. Develop the understanding of designing capital structure 2. Understand various theories and examine various 			



			<p>factors affecting capital structure decisions.</p> <p>3. Develop the understanding of how to analyze the effect of leverage</p> <p>4. Understand various techniques of Capital Budgeting decision techniques</p> <p>5. Understand various theories of Dividend decision</p>			
I & II		#Value Education for Consciousness Development	<p>1. Recall basic guidelines of value education and understand the basic aspirations.</p> <p>2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration</p> <p>3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations.</p> <p>4. Understand required skills to understand the laws of nature</p>			
II	22MCMCC201	Core-4: Corporate Law (Ad)	<p>1. Understand as how a company can be formed under the Companies Act</p> <p>2. Demonstrate about various types and importance of meetings specified in the Companies Act</p> <p>3. Discover composition of board of directors and various types of directors appointed in the companies</p> <p>4. Understand necessary preparation and documentations of physical and virtual meetings</p> <p>5. Discover about the services of MCA and filing of XBLR</p>	4	30	70
II	22MCMCC202	Core-5: Corporate Financial Accounting (Ap)	<p>1. Understand about corporate financial accounting</p> <p>2. Demonstrate the importance of corporate reporting and its necessity</p> <p>3. Evaluate the conditions under which companies liquidate and its accounting</p> <p>4. Impart relevant knowledge regarding internal reconstruction of companies</p> <p>5. Develop the understanding of how companies amalgamate</p>	5	40	60
II	22MCMCC203	Core-6: Quantitative Techniques	<p>1. Understand various quantitative & statistical methods</p> <p>2. Demonstrate their competence and confidence in using</p>	5	40	60



		(Ap)	<p>descriptive statistics</p> <p>3. Demonstrate their competence and confidence in using inferential statistics in general and to the use of significance testing in particular</p> <p>4. Demonstrate an ability to apply various statistical tool to solve business problem by calculating and interpreting statistical values using statistical tool</p> <p>5. Have a better understanding about the quantitative aspects regarding research and economic analysis</p>			
II	22MCMCL201	<p>Accounting & Taxation Group</p> <p>Core-Elective 2:Advanced Cost Accounting (Ad)</p>	<p>1. Discover various latest recent development in the field of cost accounting</p> <p>2. Learn about the system of costing under activity based method and the process of cost audit</p> <p>3. Gain knowledge of analysis of standard costs and variance statements</p> <p>4. Learn skill for controlling cost and decision making</p> <p>5. Develop an understanding cost system which may be integrated and non-integrated</p>			
II	22MCMCL202	<p>Core-Elective 2:Funds Management in Commercial Banks (Ad)</p>	<p>1. Justify the effective management of funds in commercial banks</p> <p>2. Evaluate various types of reserves and its management in commercial banks</p> <p>3. Develop the understanding mobilisation and strategies of bank deposits</p> <p>4. Evaluate management of various types of lending and its policies</p> <p>5. Propose methods of effective performance evaluation and monitoring of commercial banks</p>			
II	21CEWE201	<p>Value Education for Consciousness Development</p>	<p>1. Differentiate the career success, academic success and life success</p> <p>2. Identify the correct priority order in life and illustrate the human goal</p> <p>3. Understand that the relationships are definite</p> <p>4. Understand the Interconnectedness between all the orders in existence.</p>			
III	22MCMCC301	Core-7:	<p>1. Understand the basics of conceptual framework of</p>	4	30	70



		Business Research (Ap)	<p>research</p> <ol style="list-style-type: none"> 2. Understand research problems and its applications 3. Earn knowledge of various types of data and usefulness 4. Develop understanding of instrument development, its validation and various scales 5. Understand the process of research reporting 			
III	22MCMCC302	Core-8: Income Tax Law & Practice (Ad)	<ol style="list-style-type: none"> 1. Acquire knowledge of basic concepts and definition of Income Tax 2. Understand the provisions and be able to compute income from various head of income 3. Familiarize the provisions regarding clubbing of income, transfer income and set-off, carry forward of losses 4. Compute taxable income and taxability of individual and partnership firms 5. Gain knowledge about the Income Tax administration and rules for assessment 	5	40	60
III	22MCMCC303	Core-9: Management Accounting (Ap)	<ol style="list-style-type: none"> 1. Acquaint with the accounting concepts, tools and techniques for managerial decisions 2. Aware about the latest technological development necessary for management and emerging issues in the global management environment 3. Develop financial analysis skills among learners 4. Develop an understanding of responsibility accounting and decision making process 5. Understand and evaluate capital budgeting decisions using advanced techniques 	4	40	60
III	22MCMCC304	Core-10: Self-Study Course (Marketing Management) (F)	<ol style="list-style-type: none"> 1. Familiarize with the fundamentals of marketing to enable them to take better marketing decisions 2. Discuss and understand the nuances and complexities involved in various products and pricing decisions. 3. Equip to take effective distribution decisions for products and services. 4. Develop the skills to enable them to design the Promotion-Mix strategies advertising campaigns. 	4	30	70



			5. Aware about the current trends in marketing to enable them to take proactive measures while taking marketing decisions.			
III	22MCMCL301	Taxation Group Ethics & Corporate Governance (Ap)	1. Understand the basics, theories and principles of ethics and corporate Governance 2. Examine ethics in relation to human values, decision making and its codes 3. Learn and practice ethical practices 4. Acquire knowledge of corporate citizenship and practices of corporate governance 5. Understand the roles of ethics and corporate governance in India			
III	22MCMCL302	Core-Elective 3:Investment Management (Ap)	1. Understand the basics and processes of investment management 2. Detail out the relevant assets for investment and measurement of its performance 3. Analyse and examine various investment options in terms of risk and return 4. Evaluate and apply different valuation models to evaluate various investment options. 5. Develop skills and knowledge of portfolio strategies for individuals investors			
IV	22MCMCC401	Core-11: Managerial Economics (Ad)	1. Draw on economics to explain the nature of the firm and its problems 2. Analyze the problems faced by firms in their interaction with consumers and the market 3. Evaluate strategies for successful selling of a product in a specific market situation 4. Prepare a response to a specified business problem 5. Communicate applications of economics to managerial issues and articulate possible solutions	4	30	70
IV	22MCMCC402	Core-12: Specialized Accounting (Ad)	1. Understand knowledge of accounting concepts of Royalty 2. Understand accounting treatment in case of voyages 3. Familiarize with the accounting aspects of investments 4. Understand the provisions and accounting procedure	5	40	60



			of Insurance Companies 5. Acquire and learn the provisions and accounting procedure of Banking Companies			
IV	22MCMCC403	Core-13: Dissertation (Ap)	1. Design and justify research methodology for data collection 2. Demonstrate understanding of research code of conduct and ethical approval process 3. Utilize appropriate research methodology to collect data 4. Critically analyse the collected data and draw conclusions accordingly 5. Present research findings and conclusions in an academically appropriate manner	12	100	100
IV	22MCMCL401	Accounting & Taxation Group Core-Elective 4: Corporate Tax Structure and Planning (Ap)	1. Impart deep knowledge about the latest provisions of Income Tax Act related with corporate 2. Develop application and analytical skill of the provisions of Income Tax Law for Tax planning and Management 3. Understand the fundamental concepts and computation of tax and Assessment procedure 4. Knowledge regarding the legitimate way of Tax Planning and Management under different Financial and managerial decisions 5. Bridge the gap between and theory and practice			
IV	22MCMCL402	Finance Group Core-Elective 4: Security Analysis and Portfolio Management (Ad)	1. Learn the nature, scope and approaches of Investment Analysis and basic mathematical measurement of security risk and returns. 2. Learn the conceptual knowledge about analysis of bonds and market efficacy 3. Understand how to evaluate various instruments and measure the portfolio performances 4. Learn the valuation of securities using fundamental analysis, and technical analysis 5. Develop skills and knowledge of portfolio strategies for individuals investors			



Department of Commerce
Program: B.Com.

Program Objective:

The objectives of the department is to provide competency-driven education along with a core component for growth and success. The department focuses to equip students with knowledge of accounting, taxation and finance to enhance their skills like entrepreneurial, managerial and analytical thinking. One of the important objectives is to leverage knowledge and resources to provide experiential learning, immersion and other collaborative opportunities to the learners for their best professional and career development.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments with broad understanding of other disciplines
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgment about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate and consider new knowledge and ways of thinking and conscious of the impact of one's actions on the environment.

Program Educational Objectives (PEOs):

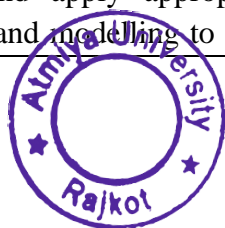
Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core Competency: To develop the competency to pursue higher education or successful professional career with synergistic combination of the knowledge and skills of commerce and business.
PEO2	:	Breadth of Knowledge To make students explore complex problems and take up research and development work in



		the related fields
PEO3	:	Preparedness To show preparedness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities
PEO4	:	Professionalism To show professionalism, ethical attitude, communication skills, team work in their profession and modify to current trends in technology by engaging in continuous professional development.
PEO5	:	Learning Environment To create and help a community of learning in which students gain knowledge and learn to apply it professionally with due consideration for ethical, ecological and economic issues.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain Knowledge: Apply the comprehensive knowledge, skills and exposure of commerce and business which includes accounts, finance, taxation, economics, commercial laws, etc
PO2	:	Problem analysis: Identify, formulate, research literature and analyse complex commerce and business problems reaching substantiated conclusions using principles of accounts, finance, taxation, economics, commercial laws, etc.
PO3	:	Design/development of Solutions: Design solutions for complex commercial and business problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	:	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	:	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern information technological tools including prediction and modelling to complex business activities with an understanding of the



		limitations
PO6	:	Professionalism and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practice.
PO7	:	Environment and Sustainability: Understand the impact of the professional business solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the moral dimensions and accept responsibility.
PO9	:	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO10	:	Communication: Communicate effectively on complex commerce and business activities with the community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	:	Project Management and Finance Demonstrate knowledge understanding of the accounting, taxation and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO12	:	Life-long Learning Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

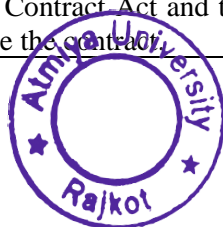


Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply the knowledge and concepts of business, accounting, and finance, and management, taxation in starting and managing business and realize the social responsibilities, social realities and inculcate an essential value system.
PSO2	:	Identify, formulate, research and analyse complex business problems to reach substantiated solution and conclusions.
PSO3	:	Develop necessary professional knowledge and skills in accounting, finance and taxation
PSO4	:	Implement traditional and modern strategies and practices of accounts, costing, banking, economics, auditing, law and taxation
PSO5	:	Get awareness and prepare and pursue higher education and research in reputed institutes at national and international level

Course Outcomes (COs):

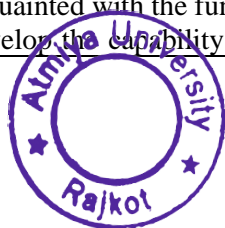
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGCO101	Major 1: Foundational Financial Accounting (F)	<ol style="list-style-type: none"> 1. Understand the theoretical and conceptual basic of financial accounting 2. Identify business transactions to record in suitable books of accounts 3. Display an understanding of posting and trial balance along with the rectification of errors 4. Demonstrate knowledge of preparation of financial statements of a sole proprietorship 5. Articulate how to calculate depreciation by various methods and its application in business 	4	40	60
I	23UGCO102	Major 2: Business Regulatory Framework (F)	<ol style="list-style-type: none"> 1. Understand the basic concepts and terminologies in Indian Contract Act and to identify essential elements to validate the contract 	4	30	70



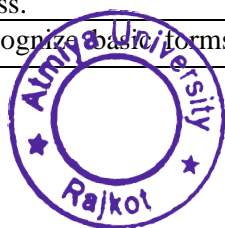
			<ol style="list-style-type: none"> 2. Identify the fundamental legal principles behind agreements and contracts 3. Understand the fundamental aspects of Special contracts like Indemnity, Guarantee, Bailment and Pledge 4. Understand the sale of goods act 5. Paraphrase the understanding of Negotiable Instruments 			
I	23UGCO103	Minor 1: Principles of Micro Economics (F)	<ol style="list-style-type: none"> 1. Memorize the fundamental concepts of microeconomics 2. Understand the concepts of demand, elasticity of demand and supply to explain the equilibrium of a market 3. Demonstrates knowledge of theory of production and cost 4. Examine the behaviour of consumers in terms of the demand for products 5. Understand the dynamics and performance of firms under different market structures 	4	30	70
I	23UGMT120	MDC 1: Business Mathematics	<ol style="list-style-type: none"> 1. Understand permutations of different things and similar things and combinations. 2. Define arithmetic and geometric progression and utilize it to find the sum of first nth terms. 3. Define determinants and understand their properties. 4. Define and utilize the concept of matrix. Understand types of matrices and different operations of matrices. 5. Calculate simple interest, compound interest and amount of annuity. 	4	40	60
I	23UGEN141	AEC 1: Development of Functional English	<ol style="list-style-type: none"> 1. Identify the essential aspects of reading skills. 2. Interpreted human values and ethics through literature. 3. Develop the ability to comprehend a text related to the domain area, leading to the cultivation of the reading habit. 4. Recognize and apply fundamental grammar usage. 5. Identify the the important features of writing skills. 	3	40	60
I	23UGCO150	SEC-1- Principles of Management	<ol style="list-style-type: none"> 1. Recognize nature and functions of management and role of a manager in business organization. 	4	30	70



			<ol style="list-style-type: none"> 2. Understand effective planning and decision making requirements. 3. Memorize the fundamentals of organizing and to understand its working and chain of authority. 4. Apprehend the procedure of recruitment and selection and directing function in organization. 5. Apply controlling techniques in business management. 			
I	23UGCI070	VAC1: Environmental Conservation and Sustainable Development / New Name Environment Studies	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources 2. Understand importance of natural resources and biological diversity 3. Understand the sectoral effects on the local, regional, and global environmental issues 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources 5. Learn about the major international treaties and our country's stand on and responses to the major international agreements. 			
I	23UGLI070	VAC2: Introduction to SDG (online)	<ol style="list-style-type: none"> 1. Define and relate to concepts of sustainability and development 2. Identify and interpret the SDGs 3. Recognize and Classify the SDGs into 5 Ps 4. Infer the importance of SDGs as Development Index 5. Summarize the interdependence and interconnectedness of SDGs in three dimensions – Social, Economical and Environmental 			
II	23UGCO201	Major-3: Accounting For Partnership Firms	<ol style="list-style-type: none"> 1. Understand the theoretical and conceptual basic of partnership firm accounting 2. Demonstrate knowledge of preparation of financial statements of a partnership firm 3. Display an understanding of dissolution of a partnership firm 4. Articulate how a partnership firm will be amalgamated 5. Articulate conversion of a firm into limited liability company 	4	40	60
II	23UGCO202	Major-4: Fundamentals of Banking	<ol style="list-style-type: none"> 1. Acquainted with the fundamentals of banking 2. Develop the capability for knowing banking concepts 	4	30	70



			and operations 3. Understand banking business and practices 4. Acquire thorough knowledge of banking operations 5. Enlighten the new concepts introduced in the banking system			
II	23UGCO203	Minor-2: Principles of Macro Economics	1. Memorize the fundamental concepts of macroeconomics 2. Understands national income and issues concerned with it 3. Helps in understanding economic fluctuations and inflation and its connection with economics 4. Helps in understanding economic fluctuations and inflation and its connection with economics 5. Make students aware various sectors and economic planning of government	4	30	70
II	23UGMT220	MDC-2: Statistics for Business	1. Understand the purposes, calculation and to interpret the measures of central tendency (mean, medium and mode) for a set of data 2. Demonstrate the concepts about probability, factorial and counting 3. Define concepts of sampling and stages of sampling process 4. Apply the concepts of statistical quality control to business 5. Understand time series to get knowledge about observation and identify the variation	4	40	60
II	23UGEN241	AEC-2: Effective communicative English	1. To understand listening skills and fluent speaking skills 2. To infer morals through literature and enhance comprehension skills. 3. To make student capable of evaluating the literature of their domain. 4. Recognize and apply fundamental grammar usage and fluency in vocabulary 5. Apply the writing skills in the field of office and business.	3	40	60
II	23UGCO250	SEC-2:	1. Recognize basic forms of business organization like	2	50	-



		Business Organization	<p>sole proprietorship, partnership, cooperative society and company form.</p> <p>2. Summarize various forms of organization</p> <p>3. Memorize indicators and process of formation of every form of business organization</p> <p>4. Interpret the basic requirement of business management</p> <p>5. Memorize the core concepts of business organization</p>			
II	23UGUVE070	VAC-3: Human Values for Higher Living	<p>1. Recall basic guidelines of value education and understand the basic aspirations.</p> <p>2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration</p> <p>3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations</p> <p>4. Understand required skills to understand the laws of nature</p>			



Department of Commerce
Program: B.Com.

Program Objective:

The objectives of the department is to provide competency-driven education along with a core component for growth and success. The department focuses to equip students with knowledge of accounting, taxation and finance to enhance their skills like entrepreneurial, managerial and analytical thinking. One of the important objectives is to leverage knowledge and resources to provide experiential learning, immersion and other collaborative opportunities to the learners for their best professional and career development.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments with broad understanding of other disciplines
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgment about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate and consider new knowledge and ways of thinking and conscious of the impact of one's actions on the environment.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core Competency: To develop the competency to pursue higher education or successful professional career with synergistic combination of the knowledge and skills of commerce and business.
PEO2	:	Breadth of Knowledge To make students explore complex problems and take up research and development work in



		the related fields
PEO3	:	Preparedness To show preparedness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities
PEO4	:	Professionalism To show professionalism, ethical attitude, communication skills, team work in their profession and modify to current trends in technology by engaging in continuous professional development.
PEO5	:	Learning Environment To create and help a community of learning in which students gain knowledge and learn to apply it professionally with due consideration for ethical, ecological and economic issues.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain Knowledge: Apply the comprehensive knowledge, skills and exposure of commerce and business which includes accounts, finance, taxation, economics, commercial laws, etc
PO2	:	Problem analysis: Identify, formulate, research literature and analyse complex commerce and business problems reaching substantiated conclusions using principles of accounts, finance, taxation, economics, commercial laws, etc.
PO3	:	Design/development of Solutions: Design solutions for complex commercial and business problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	:	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	:	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern information



		technological tools including prediction and modelling to complex business activities with an understanding of the limitations
PO6	:	Professionalism and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practice.
PO7	:	Environment and Sustainability: Understand the impact of the professional business solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the moral dimensions and accept responsibility.
PO9	:	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO10	:	Communication: Communicate effectively on complex commerce and business activities with the community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	:	Project Management and Finance Demonstrate knowledge understanding of the accounting, taxation and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO12	:	Life-long Learning Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

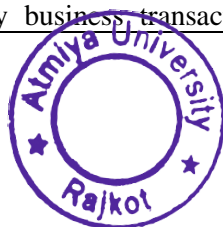


Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply the knowledge and concepts of business, accounting, and finance, and management, taxation in starting and managing business and realize the social responsibilities, social realities and inculcate an essential value system.
PSO2	:	Identify, formulate, research and analyse complex business problems to reach substantiated solution and conclusions.
PSO3	:	Develop necessary professional knowledge and skills in accounting, finance and taxation
PSO4	:	Implement traditional and modern strategies and practices of accounts, costing, banking, economics, auditing, law and taxation
PSO5	:	Get awareness and prepare and pursue higher education and research in reputed institutes at national and international level

Course Outcomes (COs):

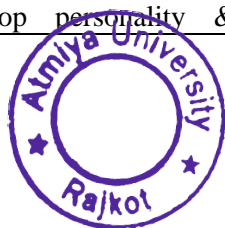
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21ULCEN102	Development of Functional English	<ol style="list-style-type: none"> 1. Identify the characteristics of reading skill. 2. Interpret human values and ethics through literature. 3. Develop the ability to comprehend a text related to the domain area, leading to the cultivation of the reading habit. 4. Recognize and apply fundamental grammar usage. 5. Identify the characteristics of listening skill 	3	40	60
I	22BCMCC101	Core-1: Foundational Financial Accounting (F)	<ol style="list-style-type: none"> 1. Understand the theoretical and conceptual basic of financial accounting 2. Identify business transactions to record in suitable 	4	40	60



			<p>books of accounts</p> <p>3. Display an understanding of posting and trial balance along with the rectification of errors</p> <p>4. Demonstrate knowledge of preparation of financial statements of a sole proprietorship</p> <p>5. Articulate how to calculate depreciation by various methods and its application in business</p>			
I	22BCMCC102	Core-2: Principles of Micro Economics (F)	<p>1. Memorize the fundamental concepts of microeconomics</p> <p>2. Understand the concepts of demand and supply to explain the equilibrium of a market</p> <p>3. Demonstrates knowledge of elasticity and its application</p> <p>4. Examine the behaviour of consumers in terms of the demand for products</p> <p>5. Understand the dynamics and performance of firms under different market structures</p>	4	30	70
I	22BCMCC103	Core-3: Business Regulatory Framework (F)	<p>1. Understand the basic concepts and terminologies in Indian Contract Act and to identify essential elements to validate the contract.</p> <p>2. Identify the fundamental legal principles behind agreements and contracts</p> <p>3. Understand the fundamental aspects of Special contracts like Indemnity, Guarantee, Bailment and Pledge</p> <p>4. Understand the fundamentals of LLP Act</p> <p>5. Paraphrase the understanding of Negotiable Instruments</p>	4	30	70
I	22BCMCC104	Core-4: Principles of Management (F)	<p>1. Recognize nature and functions of management and role of a manager in business organization.</p> <p>2. Understand effective planning and decision making requirements.</p> <p>3. Memorize the fundamentals of organizing and to understand its working and chain of authority.</p> <p>4. Apprehend the procedure of recruitment and selection and directing function in organization.</p>	4	30	70



			5. Apply controlling techniques in business management.			
I	22BCM101	IDC-1: Mathematics for Business	1. Understand permutations of different things and similar things and combinations. 2. Define arithmetic and geometric progression and utilize it to find the sum of first nth terms. 3. Define determinants and understand their properties. 4. Define and utilize the concept of matrix. Understand types of matrices and different operations of matrices. 5. Calculate simple interest, compound interest and amount of annuity.	4	40	60
I		Course Enrichment-1: Concept to Practice	1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written and oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. 5. Demonstrate the knowledge, skills, values and attitudes of professional graduates.			
I		AECC-1 : Introduction to SDG (online course)	1. Define and relate to concepts of sustainability and development 2. Identify and interpret the SDGs 3. Recognize and Classify the SDGs into 5 Ps 4. Infer the importance of SDGs as Development Index 5. Summarize the interdependence and interconnectedness of SDGs in three dimensions – Social, Economical and Environmental			
I		FS 3: Career Acceleration Program	1. Remember the message coming through different communication channels 2. Understand the message coming through different communication channels to think critically, logically and creatively 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Develop personality & right attitude through			



			communication skills.			
II	21ULCEN202	Functional English	<ol style="list-style-type: none"> 1. Understand the importance of possessing good writing skills 2. Interpret human values and ethics through literature. 3. Develop the ability to comprehend a text related to the domain area, leading to the cultivation of the reading habit 4. Recognize and apply fundamental grammar usage. 5. Identify the characteristics of listening skill 	3	40	60
II	22BCMCC201	Core-5: Accounting for Partnership Firms (Ad)	<ol style="list-style-type: none"> 1. Understand the theoretical and conceptual basic of partnership firm accounting 2. Demonstrate knowledge of preparation of financial statements of a partnership firm 3. Display an understanding of dissolution of a partnership firm 4. Articulate how a partnership firm will be amalgamated 5. Articulate conversion of a firm into limited liability company 	4	40	60
II	22BCMCC202	Core-6: Principles of Macro Economics (F)	<ol style="list-style-type: none"> 1. Memorize the fundamental concepts of macroeconomics 2. Understands national income and issues concerned with it 3. Helps in understanding economic fluctuations and inflation and its connection with economics 4. Helps in understanding economic fluctuations and inflation and its connection with economics 5. Make students aware various sectors and economic planning of government 	4	30	70
II	22BCMCC203	Core-7: Fundamentals of Banking (F)	<ol style="list-style-type: none"> 1. Acquainted with the fundamentals of banking 2. Develop the capability for knowing banking concepts and operations 3. Understand banking business and practices 4. Acquire thorough knowledge of banking operations 5. Enlighten the new concepts introduced in the banking system 	4	30	70



II	22BCMCC204	Core-8: Statistics for Business (F)	<ol style="list-style-type: none"> 1. Understand the purposes, calculation and to interpret the measures of central tendency (mean, medium and mode) for a set of data 2. Demonstrate the concepts about probability, factorial and counting 3. Define concepts of sampling and stages of sampling process 4. Apply the concepts of statistical quality control to business 5. Understand time series to get knowledge about observation and identify the variation 	4	40	60
II	22BCMCC201	IDC-2: Business Organization (F)	<ol style="list-style-type: none"> 1. Recognize basic forms of business organization like sole proprietorship, partnership, cooperative society and company form. 2. Summarize various forms of organization 3. Memorize indicators and process of formation of every form of business organization 4. Interpret the basic requirement of business management 5. Memorize the core concepts of business organization 	3	30	70
II		Course Enrichment-1: Concept to Practice	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written and oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. 5. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 			
II		AECC 2: Environmental Conservation and Sustainable Development	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources 2. Understand importance of natural resources and biological diversity 3. Understand the sectoral effects on the local, regional, and global environmental issues 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources 			



			5. Learn about the major international treaties and our country's stand on and responses to the major international agreements.			
II		AECC 3: Human Values for Holistic Living	1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature			
II		FS 3: Career Acceleration Program	1. Recognize the message coming through different channels 2. Understand the given situation to think critically, logically and creatively and deal accordingly based on that. 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others. 4. Reframe personality & right attitude through traditional Soft skills.			
III	21ULCEN303	Effective Communicative English	1. To Explain the students with language skills for business and commerce. 2. To develop the interest in the literature and to hone the comprehensive skill, by introducing poems. 3. To enhance the ability to speak, present and negotiate in business and commerce. 4. Apply the essential grammatical aspects of the language 5. To discover the ability to express ideas regarding the fields of business and commerce in written forms.	3	40	60
III	22BCMCC301	Core-9: Accounting of Special Institutions (Ad)	1. Understanding the concept and practical implication of Joint Venture Transactions 2. Demonstrate knowledge of preparation of accounts of Consignment	4	40	60



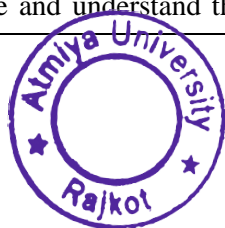
			<ol style="list-style-type: none"> 3. Display an understanding and conversion of Single Entry System 4. Articulate the preparation of accounts of Non-Trading Institutions 5. Present the accounts maintained by branch and head office 			
III	22BCMCC302	Core-10: Fundamentals of Cost Accounting (F)	<ol style="list-style-type: none"> 1. Develop and understanding of basic concepts of cost accounting 2. Acquaint the students with the treatment of different cost components 3. Acquire knowledge of various methods of remuneration and incentive system in calculation of wages. 4. Facilitate allocation and apportionment of overheads to different departments or cost centres. 5. Recording and presentation of cost data to management for measuring the efficiency. 	4	40	60
III	22BCMCC303	Core-11: Entrepreneurship Development (Ad)	<ol style="list-style-type: none"> 1. Recognize the concept of entrepreneurship and recent trends in entrepreneurship 2. Analyze business opportunities and apply theoretical knowledge to establish the business 3. Memorize and describe the concepts of family business, franchising and MSME 4. Memorize the work of Entrepreneurship Development Programme and initiatives taken by government 5. Memorize the role of various financial institutions 	4	30	70
III	22BCMCC304	Core-12: Fundamentals of Indian Securities Market (F)	<ol style="list-style-type: none"> 1. To introduce students to the basics of the Indian Securities market 2. To familiarize students with the various types of securities and their features 3. To develop a basic understanding of the Primary market 4. To develop a basic understanding of the Secondary market 5. To familiarize students with the basics concept of Mutual funds 	4	30	70



III	22BCMCC305	Core 13: Modern Banking Operations & Services	<ol style="list-style-type: none"> 1. Understand Concepts of Modern Banking 2. Understand history role, types and functions of banking 3. Know various functions of financial markets and functions of RBI 4. Acquire the knowledge of the International Monetary Fund and Basel Committee and their rules and regulation 5. Analyse the credit control impact on the market with help of financial policies framed by RBI and Central Government. 	4	30	70
III	22UFBDE301	DSE 1: Behavioral Concepts in Organization	<ol style="list-style-type: none"> 1. Develop and understanding of basic concepts of organizational behaviour 2. Acquaint the students with the dynamics of individual behaviour 3. Acquaint the students with the dynamics of group behaviour 4. Evaluate the importance of organizational change organizational development 5. Demonstrate the important trends of organization behaviour 			
III	22UFBDE302	DSE 1: Business Environment and Sustainability	<ol style="list-style-type: none"> 1. Understand the basic concepts and terminologies of Business Environment 2. Identify various business environments and their applications in a business entity 3. Awareness about the requirements of Business Environment and the effects of their sub components on a business concern 4. Understand the needs and importance of different business environments in business activities 5. Understand the concepts of sustainability for a business 			
III	22UFBDE303	DSE 1: Financial Technology	<ol style="list-style-type: none"> 1. To explore the needs of transforming business by launching new digital products with the help of FinTech. 2. To understand the key technologies, business models, and companies of the startup fintech landscape. 3. To have the knowledge of various instruments of 			



			<p>financial technology and the use of those instruments.</p> <p>4. To impart managerial skills and knowledge required to manage modern digital business enterprises involved in providing various business domains.</p> <p>5. To develop skills in the technologies uses in digital business, digital business transformation, information security, digital commerce, block chain, crypto currencies & virtual currency.</p>			
III		FS 3: Career Acceleration Program	<p>1. Understand the need of 21st century skills, Understand and Analyze the skills through Learning : Critical Thinking, Creativity & Innovation</p> <p>2. Understand the leading skills through edge of : Communication, Collaboration and Networking</p> <p>3. Understand the skills through digital literacy : Information, Media and Technology Literacy</p> <p>4. Recall, Understand and Analyze Life Skills : Flexibility and Adaptability, Leadership and Responsibility</p> <p>5. Recall, Understand and Analyze Life Skills : Productivity and Accountability, Social and Cross-Cultural Interaction</p>			
IV	21ULCEN403	Business Communicative English	<p>1. To illustrate communication process</p> <p>2. To connect business communication from literature.</p> <p>3. To design advertisement and Press release</p> <p>4. To develop formal communication skills.</p> <p>5. To assess modes of oral communication.</p>	3	40	60
IV	22BCMCC401	Core-14: Company Law (Ad)	<p>1. Understand the basics of Company and Companies Act, 2013</p> <p>2. Understand about prospectus, share and debentures</p> <p>3. Understand how a company is formed under the Companies Act, 2013</p> <p>4. Demonstrate about various types and importance of meetings specified in the Companies Act</p> <p>5. Discover about the directors of a company and their composition in board of directors</p>			
IV	22BCMCC402	Core-15:	1. To state and understand the reasons for difference in			



		Cost Accounting Competency (Ad)	<p>profit shown by two sets of books, cost and financial accounts and reconcile it.</p> <ol style="list-style-type: none"> To impart relevant knowledge regarding how the cost gets finalized under different methods of costing. To get the knowledge about allocation of cost under Joint and By-Products methods of costing. To enable the students to acquaint themselves with the various methods of ascertainment of cost. To understand the various costs that may be incurred for a contract and accounting for the contract costs. 			
IV	22BCMCC403	Core-16: Aspects of Corporate Accounting (F)	<ol style="list-style-type: none"> Understand the concept and practical implication of Transactions related to securities Articulate the preparation of accounts as per Companies Act, 2013 Calculation of the transactions for managerial remuneration as per Companies Act, 2013 Impart knowledge regarding different methods of valuation of shares Present knowledge of valuation of Goodwill 			
		Core-Elective-1		4	40	60
IV	22BCMCL401	Accounting Group: Core-Elective 1: Accounting Intellect-I (Ad)	<ol style="list-style-type: none"> Understanding the concepts of computerized accounting Present knowledge of Hire Purchase System for Buyers Impart knowledge regarding Insurance Claim for Loss of Stock Understand the concept and practical implication of Investment Account Articulate the knowledge of transactions for Wholesale and Foreign Branch 			
IV	22BCMCL402	Finance Group: Core-Elective 1: Financial Management-I (Ad)	<ol style="list-style-type: none"> Understanding the concepts of computerized accounting Present knowledge of Hire Purchase System for Buyers Impart knowledge regarding Insurance Claim for Loss of Stock 			



			<p>4. Understand the concept and practical implication of Investment Account</p> <p>5. Articulate the knowledge of transactions for Wholesale and Foreign Branch</p>			
IV	22UFBDE402	DSE-2: Indian Economy	<p>1. Demonstrate an understanding of the overall role and importance of the finance function</p> <p>2. Understand and apply time value of money</p> <p>3. Understand fundamentals of working capital management and sources of finance</p> <p>4. Understand basics of Capital Structure</p> <p>5. Understand and apply capital budgeting methods</p>	4	50	50
IV		Core Enrichment-1: Concept to Practice	<p>1. Understand problem identification, formulation and solution.</p> <p>2. Design an engineering solution to complex problems.</p> <p>3. Communicate with the community at large in written and oral forms.</p> <p>4. Demonstrate a sound technical knowledge of their societal problems.</p> <p>5. Demonstrate the knowledge, skills, values and attitudes of professional graduates.</p>			
IV		FS 3: Career Acceleration Program	<p>1. Understand the basic concepts of quantitative ability</p> <p>2. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions</p> <p>3. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.</p>			



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		the related fields
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PEO4	:	Professionalism To show professionalism, ethical attitude, communication skills, team work in their profession and modify to current trends in technology by engaging in continuous professional development.
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After completion of the programme the Graduate will be able to:		
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PO2	:	Problem analysis: Identify, formulate, research literature and analyse complex commerce and business problems reaching substantiated conclusions using principles of accounts, finance, taxation, economics, commercial laws, etc.
PO3	:	Design/development of Solutions: Design solutions for complex commercial and business problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	:	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	:	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern information



		technological tools including prediction and modelling to complex business activities with an understanding of the limitations
PO6	:	Professionalism and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practice.
PO7	:	Environment and Sustainability: Understand the impact of the professional business solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the moral dimensions and accept responsibility.
PO9	:	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO10	:	Communication: Communicate effectively on complex commerce and business activities with the community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	:	Project Management and Finance Demonstrate knowledge understanding of the accounting, taxation and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO12	:	Life-long Learning Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

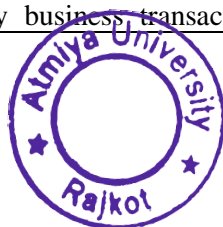


Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply the knowledge and concepts of business, accounting, and finance, and management, taxation in starting and managing business and realize the social responsibilities, social realities and inculcate an essential value system.
PSO2	:	Identify, formulate, research and analyse complex business problems to reach substantiated solution and conclusions.
PSO3	:	Develop necessary professional knowledge and skills in accounting, finance and taxation
PSO4	:	Implement traditional and modern strategies and practices of accounts, costing, banking, economics, auditing, law and taxation
PSO5	:	Get awareness and prepare and pursue higher education and research in reputed institutes at national and international level

Course Outcomes (COs):

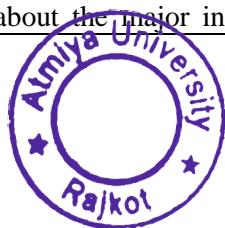
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21ULCEN102	Development of Functional English	<ol style="list-style-type: none"> 1. Identify the characteristics of reading skill. 2. Interpret human values and ethics through literature. 3. Develop the ability to comprehend a text related to the domain area, leading to the cultivation of the reading habit. 4. Recognize and apply fundamental grammar usage. 5. Identify the characteristics of listening skill 	3	40	60
I	21BCMCC101	Core-1: Foundational Financial Accounting (F)	<ol style="list-style-type: none"> 1. Understand the theoretical and conceptual basic of financial accounting 2. Identify business transactions to record in suitable 	4	40	60



			<p>books of accounts</p> <p>3. Display an understanding of posting and trial balance along with the rectification of errors</p> <p>4. Demonstrate knowledge of preparation of financial statements of a sole proprietorship</p> <p>5. Articulate how to calculate depreciation by various methods and its application in business</p>			
I	21BCMCC102	Core-2: Principles of Micro Economics (F)	<p>1. Memorize the fundamental concepts of microeconomics</p> <p>2. Understand the concepts of demand and supply to explain the equilibrium of a market</p> <p>3. Demonstrates knowledge of elasticity and its application</p> <p>4. Examine the behaviour of consumers in terms of the demand for products</p> <p>5. Understand the dynamics and performance of firms under different market structures</p>	4	30	70
I	21BCMCC103	Core-3: Business Regulatory Framework (F)	<p>1. Understand the basic concepts and terminologies in Indian Contract Act and to identify essential elements to validate the contract.</p> <p>2. Identify the fundamental legal principles behind agreements and contracts</p> <p>3. Understand the fundamental aspects of Special contracts like Indemnity, Guarantee, Bailment and Pledge</p> <p>4. Understand the fundamentals of LLP Act</p> <p>5. Paraphrase the understanding of Negotiable Instruments</p>	4	30	70
I	21BCMCC104	Core-4: Business Organization and of Management (F)	<p>1. Recognize basic forms of business organization like sole proprietorship, partnership, cooperative society and company form.</p> <p>2. Summarize various forms of organization.</p> <p>3. Memorize indicators and process of formation of every form of business organization.</p> <p>4. Interpret the basic requirement of business management.</p>	4	30	70



			5. Memorize the core concepts of business organization.			
I	21BCMIC101	IDC-1: Mathematics for Business	<ol style="list-style-type: none"> 1. Understand permutations of different things and similar things and combinations. 2. Define arithmetic and geometric progression and utilize it to find the sum of first nth terms. 3. Define determinants and understand their properties. 4. Define and utilize the concept of matrix. Understand types of matrices and different operations of matrices. 5. Calculate simple interest, compound interest and amount of annuity. 	4	40	60
I		Course Enrichment-1: Concept to Practice	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written an oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. 5. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 			
I		AECC-1 : Introduction to SDG (online course)	<ol style="list-style-type: none"> 1. Define and relate to concepts of sustainability and development 2. Identify and interpret the SDGs 3. Recognize and Classify the SDGs into 5 Ps 4. Infer the importance of SDGs as Development Index 5. Summarize the interdependence and interconnectedness of SDGs in three dimensions – Social, Economical and Environmental 			
I		AECC-2: Environmental Conservation and Sustainable Development	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources 2. Understand importance of natural resources and biological diversity 3. Understand the sectoral effects on the local, regional, and global environmental issues 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources 5. Learn about the major international treaties and our 			



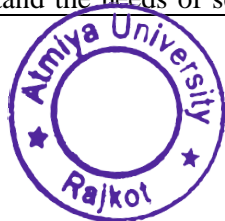
			country's stand on and responses to the major international agreements.			
I		AECC-3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature 			
I		FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Remember the message coming through different communication channels 2. Understand the message coming through different communication channels to think critically, logically and creatively 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Develop personality & right attitude through communication skills. 			
II	21ULCEN202	Functional English	<ol style="list-style-type: none"> 1. Understand the importance of possessing good writing skills 2. Interpret human values and ethics through literature. 3. Develop the ability to comprehend a text related to the domain area, leading to the cultivation of the reading habit 4. Recognize and apply fundamental grammar usage. 5. Identify the characteristics of listening skill 	3	40	60
II	21BCMCC201	Core-5: Accounting for Partnership Firms (Ad)	<ol style="list-style-type: none"> 1. Understand the theoretical and conceptual basic of partnership firm accounting 2. Demonstrate knowledge of preparation of financial statements of a partnership firm 3. Display an understanding of dissolution of a partnership firm 4. Articulate how a partnership firm will be amalgamated 	4	40	60



			5. Articulate conversion of a firm into limited liability company			
II	21BCMCC202	Core-6: Principles of Macro Economics (F)	<ol style="list-style-type: none"> 1. Memorize the fundamental concepts of macroeconomics 2. Understands national income and issues concerned with it 3. Helps in understanding economic fluctuations and inflation and its connection with economics 4. Helps in understanding economic fluctuations and inflation and its connection with economics 5. Make students aware various sectors and economic planning of government 	4	30	70
II	21BCMCC203	Core-7: Fundamentals of Banking (F)	<ol style="list-style-type: none"> 1. Acquainted with the fundamentals of banking 2. Develop the capability for knowing banking concepts and operations 3. Understand banking business and practices 4. Acquire thorough knowledge of banking operations 5. Enlighten the new concepts introduced in the banking system 	4	30	70
II	21BCMCC204	Core-8:	<ol style="list-style-type: none"> 1. Recognize the basic concepts and terminologies of E-Commerce EDI 2. Identify various business models and types of network and its application in business undertakings. 3. Understand the requirements of E-Payment system, its tools and payment gateway 4. Understand the basic concept of E-Security and its need in recent business transactions 5. Identify recent trends and opportunities in E-Commerce. 	4	30	70
II	21BCMCC205	Core-9: Statistics for Business (F)	<ol style="list-style-type: none"> 1. Understand the purposes, calculation and to interpret the measures of central tendency (mean, medium and mode) for a set of data 2. Demonstrate the concepts about probability, factorial and counting 3. Define concepts of sampling and stages of sampling process 	4	40	60



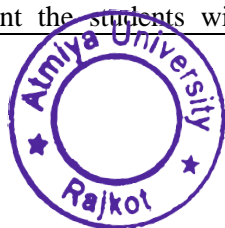
			<p>4. Apply the concepts of statistical quality control to business</p> <p>5. Understand time series to get knowledge about observation and identify the variation</p>			
II	21BCMIC201	IDC-2: Fundamentals of Marketing and HR Management	<p>1. Recognize the basic concept of HR and marketing philosophies</p> <p>2. Understand effective product decision requirements and its application in marketing and HR management</p> <p>3. Understand the fundamentals of pricing and understand its application in marketing & HR management</p> <p>4. Describe the basic functions of distribution and related decisions</p> <p>5. Classify and apply the methods of market promotion</p>	3	30	70
II		Course Enrichment-1: Concept to Practice	<p>1. Understand problem identification, formulation and solution.</p> <p>2. Design an engineering solution to complex problems.</p> <p>3. Communicate with the community at large in written and oral forms.</p> <p>4. Demonstrate a sound technical knowledge of their societal problems.</p> <p>5. Demonstrate the knowledge, skills, values and attitudes of professional graduates.</p>			
II		AECC 2: Environmental Conservation and Sustainable Development	<p>1. Gain insights into the international efforts to safeguard the Earth's environment and resources</p> <p>2. Understand importance of natural resources and biological diversity</p> <p>3. Understand the sectoral effects on the local, regional, and global environmental issues</p> <p>4. Correlate the exploitation and utilization of conventional and non-conventional energy resources</p> <p>5. Learn about the major international treaties and our country's stand on and responses to the major international agreements.</p>			
II		AECC 3: Human Values for Holistic Living	<p>1. Recall basic guidelines of value education and understand the basic aspirations.</p> <p>2. Understand the needs of self and body based on their</p>			



			natural acceptance and solves their conflict using self exploration 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature			
II		FS 3: Career Acceleration Program	1. Recognize the message coming through different channels 2. Understand the given situation to think critically, logically and creatively and deal accordingly based on that. 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others. 4. Reframe personality & right attitude through traditional Soft skills.			
III	21ULCEN303	Effective Communicative English	1. To Explain the students with language skills for business and commerce. 2. To develop the interest in the literature and to hone the comprehensive skill, by introducing poems. 3. To enhance the ability to speak, present and negotiate in business and commerce. 4. Apply the essential grammatical aspects of the language 5. To discover the ability to express ideas regarding the fields of business and commerce in written forms.	3	40	60
III	21BCMCC301	Core-10: Accounting of Special Institutions (Ad)	1. Understanding the concept and practical implication of Joint Venture Transactions 2. Demonstrate knowledge of preparation of accounts of Consignment 3. Display an understanding and conversion of Single Entry System 4. Articulate the preparation of accounts of Non-Trading Institutions 5. Present the accounts maintained by branch and head office	4	40	60



III	21BCMCC302	Core-11: Fundamentals of Cost Accounting (F)	<ol style="list-style-type: none"> 1. Develop and understanding of basic concepts of cost accounting 2. Acquaint the students with the treatment of different cost components 3. Acquire knowledge of various methods of remuneration and incentive system in calculation of wages. 4. Facilitate allocation and apportionment of overheads to different departments or cost centres. 5. Recording and presentation of cost data to management for measuring the efficiency. 	4	40	60
III	21BCMCC303	Core-12: Entrepreneurship Development (Ad)	<ol style="list-style-type: none"> 1. Recognize the concept of entrepreneurship and recent trends in entrepreneurship 2. Analyze business opportunities and apply theoretical knowledge to establish the business 3. Memorize and describe the concepts of family business, franchising and MSME 4. Memorize the work of Entrepreneurship Development Programme and initiatives taken by government 5. Memorize the role of various financial institutions 	4	30	70
III	21BCMCC304	Core-13: Fundamentals of Indian Securities Market (F)	<ol style="list-style-type: none"> 1. To introduce students to the basics of the Indian Securities market 2. To familiarize students with the various types of securities and their features 3. To develop a basic understanding of the Primary market 4. To develop a basic understanding of the Secondary market 5. To familiarize students with the basics concept of Mutual funds 	4	30	70
III	21BCMCC305	DSE-1:		4	50	50
III	21UFBDE301	DSE-1: Behavioral Concepts in Organization	<ol style="list-style-type: none"> 1. Develop and understanding of basic concepts of organizational behaviour 2. Acquaint the students with the dynamics of individual behaviour 3. Acquaint the students with the dynamics of group 			



			behaviour 4. Evaluate the importance of organizational change organizational development 5. Demonstrate the important trends of organization behaviour			
III	21UFBDE302	DSE-1:Business Environment and Sustainability	1. Understand the basic concepts and terminologies of Business Environment 2. Identify various business environments and their applications in a business entity 3. Awareness about the requirements of Business Environment and the effects of their sub components on a business concern 4. Understand the needs and importance of different business environments in business activities 5. Understand the concepts of sustainability for a business			
III	21UFBDE303	DSE-1:Financial Technology	1. To explore the needs of transforming business by launching new digital products with the help of FinTech. 2. To understand the key technologies, business models, and companies of the startup fintech landscape. 3. To have the knowledge of various instruments of financial technology and the use of those instruments. 4. To impart managerial skills and knowledge required to manage modern digital business enterprises involved in providing various business domains. 5. To develop skills in the technologies uses in digital business, digital business transformation, information security, digital commerce, block chain, crypto currencies & virtual currency.			
III		FS 3:Career Acceleration Program	1. Understand the need of 21st century skills, Understand and Analyze the skills through Learning : Critical Thinking, Creativity & Innovation 2. Understand the leading skills through edge of : Communication, Collaboration and Networking 3. Understand the skills through digital literacy : Information, Media and Technology Literacy			



			<p>4. Recall, Understand and Analyze Life Skills : Flexibility and Adaptability, Leadership and Responsibility</p> <p>5. Recall, Understand and Analyze Life Skills : Productivity and Accountability, Social and Cross-Cultural Interaction</p>			
IV	21ULCEN403	Business Communicative English	<p>1. To illustrate communication process</p> <p>2. To connect business communication from literature.</p> <p>3. To design advertisement and Press release</p> <p>4. To develop formal communication skills.</p> <p>5. To assess modes of oral communication.</p>	3	40	60
IV	21BCMCC401	Core-16: Company Law (Ad)	<p>1. Understand the basics of Company and Companies Act, 2013</p> <p>2. Understand about prospectus, share and debentures</p> <p>3. Understand how a company is formed under the Companies Act, 2013</p> <p>4. Demonstrate about various types and importance of meetings specified in the Companies Act</p> <p>5. Discover about the directors of a company and their composition in board of directors</p>			
IV	21BCMCC402	Core-17: Cost Accounting Competency (Ad)	<p>1. To state and understand the reasons for difference in profit shown by two sets of books, cost and financial accounts and reconcile it.</p> <p>2. To impart relevant knowledge regarding how the cost gets finalized under different methods of costing.</p> <p>3. To get the knowledge about allocation of cost under Joint and By-Products methods of costing.</p> <p>4. To enable the students to acquaint themselves with the various methods of ascertainment of cost.</p> <p>5. To understand the various costs that may be incurred for a contract and accounting for the contract costs.</p>			
IV	21BCMCC403	Core-18: Aspects of Corporate Accounting (F)	<p>1. Understand the concept and practical implication of Transactions related to securities</p> <p>2. Articulate the preparation of accounts as per Companies Act, 2013</p> <p>3. Calculation of the transactions for managerial</p>			



			remuneration as per Companies Act, 2013 4. Impart knowledge regarding different methods of valuation of shares 5. Present knowledge of valuation of Goodwill			
IV	21BCMCL401	Accounting Group: Core-Selective-1 Accounting Intellect-I (Ad	1. Understanding the concepts of computerized accounting 2. Present knowledge of Hire Purchase System for Buyers 3. Impart knowledge regarding Insurance Claim for Loss of Stock 4. Understand the concept and practical implication of Investment Account 5. Articulate the knowledge of transactions for Wholesale and Foreign Branch			
IV	21BCMCL402	Finance Group: Core-Selective-1 Financial Management-I (Ad)	1. Understanding the concepts of computerized accounting 2. Present knowledge of Hire Purchase System for Buyers 3. Impart knowledge regarding Insurance Claim for Loss of Stock 4. Understand the concept and practical implication of Investment Account 5. Articulate the knowledge of transactions for Wholesale and Foreign Branch			
IV	21UFBDE402	DSE-2: Indian Economy	1. Demonstrate an understanding of the overall role and importance of the finance function 2. Understand and apply time value of money 3. Understand fundamentals of working capital management and sources of finance 4. Understand basics of Capital Structure 5. Understand and apply capital budgeting methods	4	50	50
IV		Core Enrichment-1: Concept to Practice	1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written an oral forms.			



			<p>4. Demonstrate a sound technical knowledge of their societal problems.</p> <p>5. Demonstrate the knowledge, skills, values and attitudes of professional graduates.</p>			
IV		FS 3: Career Acceleration Program	<p>1. Understand the basic concepts of quantitative ability</p> <p>2. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions</p> <p>3. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.</p>			
V	21BCMCC501	Core-20: Audit Essentials (Ap)	<p>1. Understand the functional classification and qualities of Audit</p> <p>2. Impart relevant knowledge regarding types of audit and audit program</p> <p>3. Learn about audit paperwork and audit evidence</p> <p>4. Allow students to become acquainted with the various audit reports</p> <p>5. Gain awareness of upcoming auditing challenges</p>	4	30	70
V	21BCMCC502	Core -21: Advanced Corporate Accounting (Ad)	<p>1. Impart the knowledge of accounting of Employees Stock Option Plan</p> <p>2. Present knowledge of Amalgamation, Absorption and Reconstruction and accounting of the same in the books of both vendor company and purchasing company</p> <p>3. Understand the concept of Internal Reconstruction of the Company and the accounting of the same.</p> <p>4. Articulate the knowledge of Accounting and procedure of Liquidation of the Company</p> <p>5. Differentiate of Profit and Loss of Pre Incorporation and Post Incorporation of company</p>	4	40	60
V	21BCMCC503	Core-22: Management Accounting (Ap)	<p>1. To develop fundamental understanding of Management Accounting</p> <p>2. Preparing, Analyzing and examining various types of Budgets</p> <p>3. To develop understanding of the students regarding analysis of financial statements of the companies</p> <p>4. To develop the ability of how to apply the accounting principles in decision making</p>	4	40	60



			5. To develop the understanding regarding how to control the costs by setting standards for each type of cost incurred- material and labour			
V	21BCMCC504	Core-23: Income Tax Law and Practice- I (F)	<ol style="list-style-type: none"> 1. Develop an understanding of basics of Taxation including relevance to Direct Tax 2. Understand conceptual clarity of calculating Taxable Income and Income Tax Payable 3. Understand the concept and calculation of Taxable Income Under the head ‘Salary’ 4. Understand the concept and calculation of Taxable Income Under the head ‘Salary’ with reference to retirement benefit 5. Understand the concept and calculation of Taxable Income Under the head ‘House Property’ 	4	40	60
V	21BCMCC505	Core-24: Self-Study Course (Ap)	<ol style="list-style-type: none"> 1. Understanding the journey of entrepreneurs 2. Apply the lessons learned in real life decision making 3. Analyze the different challenges and obstacles entrepreneurs have faced 4. Evaluate the strategies used by entrepreneurs 5. Create the inspiration and insights gained for choosing career path 	4	40	60
V	21BCMCC507	Core-25: Introduction to GST	<ol style="list-style-type: none"> 1. Understand the basic concept of GST and important terminologies associated with Goods and Service Tax. 2. Familiarize with the Composition of Tax & Reverse charge in GST in India. 3. Understand necessary basics and their impact on business decision-making and clear ideas about the Input Tax Credits per GST. 4. Develop the knowledge about the provisions regarding registration and documentation required under GST. 5. Develop the understanding of filing of returns under the Act. 	4	30	70
V	21BCMCL501	Accounting Group: Core Elective -2 Accounting Intellect-II (Ad)	<ol style="list-style-type: none"> 1. Understanding different emerging concepts of Ind AS, IFRS and E-Commerce Businesses. 2. Present knowledge of treatment of Underwriting Commission. 			



			<p>3. Impart knowledge regarding Insurance Claim for Loss of Profit.</p> <p>4. Understand the concept and various issues of departmental accounts.</p> <p>5. Articulate the knowledge of Cash flow Statement</p>			
V	21BCMCL502	Finance Group: Core Elective -2 Advanced Financial Management (Ad)	<p>1. Apply the concept of cost of capital</p> <p>2. Apply the concept of dividend decision</p> <p>3. Analyze capitalization, under capitalization and over capitalization</p> <p>4. Understand latest concepts of corporate finance</p> <p>5. Apply the concept finance in various case studies</p>			
V	21AEFS501	FS 3:Career Acceleration Program	<p>1. Understand the basic concepts of quantitative ability</p> <p>2. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions</p> <p>3. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.</p>			
VI	21BCMCC601	Core-27: Office Management and Secretarial Practice	<p>1. Understand the various administrative systems required in an Office.</p> <p>2. Apply competency in managing banking transactions.</p> <p>3. Develop effective filing system.</p> <p>4. Manage office equipment efficiently.</p> <p>5. Discuss the roles and responsibilities of secretary.</p>	4	30	70
VI	21BCMCC602	Core -28: Consumer Protection Act	<p>1. To understand the basics of the consumer protection act and its importance in the society.</p> <p>2. To impart relevant knowledge regarding consumer education and awareness and to give knowledge regarding the working of the different organizations for providing the education regarding the consumer awareness.</p> <p>3. To learn about the basics of consumer protection Act-2019</p> <p>4. To inculcate the learning in the students regarding Grievance Redress Mechanism under the Consumer Protection Act - 2019</p> <p>5. To give the idea about the Product Liability under the Consumer Protection Act – 2019</p>	4	30	70



VI	21BCMCC603	Core-29: Strategic Cost Management	<ol style="list-style-type: none"> 1. Understanding the variance analysis for overheads. 2. Understanding the variance analysis for Sales 3. Impart knowledge regarding strategic decision making with learning curve insights 4. Understand the contemporary challenges in cost accounting. 5. To Provide the in depth knowledge regarding integrated system of cost accounting. 	2	40	60
VI	21BCMCC604	Core-30: Income Tax Law and Practice- II(Ad)	<ol style="list-style-type: none"> 1. Understand the concept and calculation of Taxable Income Under the head 'Profit and Gains from Business and Profession'. 2. Develop an understanding of basics of Taxation set off and carry forward provision 3. Provide conceptual clarity in calculating Taxable Income by considering Deductions. 4. Develop an understanding of Important concepts relevant to Direct Tax. 5. Understand the concept and calculation of Taxable Income Under the head 'Capital Gain and Other Sources'. 	4	40	60
VI	21BCMCR601	Core-Enrichment-4: Business Plan Project Report	<ol style="list-style-type: none"> 1. To develop a strategic business mindset, enabling them to analyze market trends, identify competitive advantages, and formulate innovative strategies for sustainable growth. 2. Exhibit a high level of financial literacy, proficient in crafting realistic financial projections, understanding budgetary considerations, and assessing the financial viability of business plans. 3. Students will enhance their ability to communicate complex business concepts persuasively, both in written form within the business plan and through engaging oral presentations 4. To lead and inspire teams, navigate uncertainties, and make informed decisions in the dynamic landscape of entrepreneurship. 5. To apply critical thinking and problem-solving skills in 	4	50	-



			real-world business challenges, showcasing their ability to adapt and innovate within the competitive business environment.			
VI	21BCMCR602	Core-Enrichment-5: Corporate Training Project Report	<ol style="list-style-type: none"> 1. To work & gain knowledge of real time business environment. 2. To explore various areas of the company. 3. To analyze how theoretical concepts taught are applied in real life situations. 4. To analyze best practices, system, processes, procedures and policies of a company/industry in finance/accounting department and bring forward the deviations. 5. To develop skills in report writing through data collection, data analysis, data extraction, and presentation and draw lessons vis-à-vis firm or company. 	4	-	100



Department of Commerce
Program: B.Com. (Logistics)

Program Objective:

Logistics Sector Skill Council offers apprenticeship-based UG Degree Programme in collaboration with select institutions across India from the Academic Year 2019-20. Logistics Sector Skill Council (LSC), established by the Ministry of Skill Development and Entrepreneurship (MSDE) through National Skill Development Corporation of India (NSDC), has taken up a number of initiatives with the objective of creating adequate skills for gainful employment at various levels in Logistics Industry. Courses offered in this program are designed towards providing students with an overall understanding of logistics discipline. It helps them in attaining proficiency and desired skills to deal with prevailing logistics frameworks. It will enable students to gain familiarity with the current logistics affairs.

The objectives are to:

- To make students understand the importance and nature of trade, commerce and allied activities in business related with logistics.
- To provide opportunity to the students with such learning motives in understanding the logistics sector of the world and become intelligent participant of community.
- To make them understand the increasing interdependence of people in their social inter relationship.
- In order to make the programme effective and efficient LSC actively assists all collaborating institutions in the following ways.
- Curriculum Development and Continuous Improvement Securing Apprenticeship Training (On-the-job Training) in Logistics Companies for all students of this Degree programme under the provisions of Apprenticeship Act, 1961
- Providing a list of resource persons for teaching critical courses for which the Collaborating Institutions (CI) do not have full time faculty.
- Assessing the performance & learning of students while in Apprenticeship.
- Securing final placements for all students on successful completion of the Degree Programme.



- Annual Assessment of Academic Process in the Collaborating Institution (CI) to ensure churning out skilled graduates in Logistics

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments with broad understanding of other disciplines.
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate and consider new knowledge and ways of thinking and conscious of the impact of one’s actions on the environment

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core Competency: To develop the competency to pursue higher education or successful professional career with synergistic combination of the knowledge and skills of logistics.
PEO2	:	Breadth of Knowledge: To make students explore complex problems and take up research and development work in the related field.
PEO3	:	Preparedness: To show preparedness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities.
PEO4	:	Professionalism: To show professionalism, ethical attitude, communication skills, team work in their profession and modify to current trends in technology by engaging in continuous professional development.
PEO5	:	Learning Environment: To create and help a community of learning in which students gain knowledge and learn to apply it professionally with due consideration for ethical, ecological and economic issues.



Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain Knowledge: Apply the knowledge of logistics to the solution of complex engineering problems.
PO2	:	Problem Analysis: Identify, formulate, research literature and analyse complex logistics problems reaching substantiated conclusions using principles of logistics, warehousing, Cargo, etc.
PO3	:	Design/development of Solutions: Design solutions for complex logistics problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	:	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	:	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern information technological tools including prediction and modelling to complex logistics activities with an understanding of the limitations.
PO6	:	Professionalism and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practice.
PO7	:	Environment and Sustainability: Understand the impact of the professional business solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the moral dimensions and accept responsibility.
PO9	:	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	:	Communication: Communicate effectively on complex commerce and business activities with the community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	:	Project Management and Finance: Demonstrate knowledge and understanding of the supply chain management, warehousing, Cargo and management principles to apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	:	Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply the knowledge and concepts of logistics and management in starting and managing logistics business and realize the social responsibilities, social realities and inculcate an essential value system.
PSO2	:	Identify, formulate, research and analyse complex logistics problems to reach substantiated solution and conclusions.
PSO3	:	Develop necessary professional knowledge and skills in warehousing, logistics, supply chain, cargo, etc.
PSO4	:	Implement traditional and modern strategies and practices of warehousing, logistics, supply chain, cargo, etc.
PSO5	:	Get awareness and prepare and pursue higher education and research in reputed institutes at national and international level.

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21ULCEN105	English for Logistics	<ol style="list-style-type: none"> 1. Recognize reading as a skill along with its techniques and classify viewpoints and opinions of texts 2. Analyze and understand literary works and congregate values from them. Understand and interpret literary works, having background of the field. 3. Apply grammatical aspects and techniques for enhancement 4. Analyze and apply the concepts of business communication 5. Understand listening as a skill accompanied with its characteristics, types and improvisation 	3	40	60
I	21BCLCC101	Core-1: Principles & Practices of Accounting (F)	<ol style="list-style-type: none"> 1. To develop an understanding of basic concepts of Accounting 2. To provide conceptual clarity in basic Accounting process 3. Discuss the accounting framework and role of accounting in business 	4	40	60



			<p>4. To enhance the ability of students in solving practical of ledger posting</p> <p>5. Apply accounting principles, concepts and conventions to record business transactions culminating into final accounts.</p>			
I	21BCLCC102	Core-2: Fundamentals of Logistics (F)	<p>1. Developing understandings of Introduction to Logistics and to develop competencies and knowledge of students in logistics</p> <p>2. Develop the orientation and evaluation in the field of Logistics services like customer retention, customers' services, procurements and outsourcing.</p> <p>3. Evaluate and the understanding of the Global Supply Chain for determining the appropriate supply chain in globalization and integration of logistics</p> <p>4. Understand Fundamentals of Logistics with reference to Transportation ,Courier and E-commerce</p> <p>5. Analyzing the Logistics in Multi- modal transportation, customs clearance, bulk load handling and trans-shipment supply chain andEXIM.</p>	4	40	60
I	21BCLCC103	Core-3: Principles of Management (F)	<p>1. Recognize nature and functions of management and role of a manager in business organization.</p> <p>2. Understand effective planning and decision making requirements.</p> <p>3. Apprehend the procedure of recruitment and selection and directing function in organization.</p> <p>4. Remember the fundamentals of organizing and to understand its working and chain of authority.</p> <p>5. Understand Contemporary issues in management and to apply SWOT analysis and 7s models in business management.</p>	4	40	60
I	21BCLCC104	Core-4: Materials Management (F)	<p>1. Identifying the scope for integrating materials management function over the logistics and supply chain operations</p> <p>2. Ensure that the purchasing decisions meet the basic requirements to the right quality, right quantity, right</p>	4	40	60



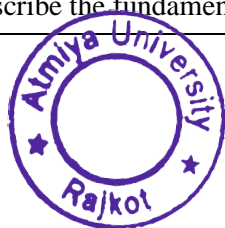
			<p>time, right price, and right source. Identify, study, compare, and evaluate alternatives, select and relate with a good supplier.</p> <p>3. Determine the appropriate inventory control models to use, organizational policies and procedures.</p> <p>4. Develop an in-depth understanding of the students of the basic concepts of Quality control of material and materials management</p> <p>5. Analyzing the materials in storage, handling, packaging, shipping, distributing and standardizing</p>			
I	21BCLCC105	<p>Core-5: Warehousing & Distribution Centre Operations (F)</p>	<p>1. Develop an understanding to apply the basic knowledge of Warehousing and distribution centre operations like Warehouse (Storage and Packaging), Background, Need for Warehouse in the real-life situation</p> <p>2. Develop an understanding of the importance of the warehouse operational performance of an organization like Receiving and Dispatch of Goods in warehouse</p> <p>3. Evaluate multiple methods and tools used by today's Supply Chain managers in Warehouse Activities: receiving, sorting, loading, unloading, Picking Packing and dispatch activities and their relevance in a warehouse</p> <p>4. Enable them to enhance their ability and professional skills in Warehouse Utilization Management</p> <p>5. Evaluating and describing proper and safe warehouse operations and techniques and understand the major operational processes and safety procedures used in warehouse operations</p>	4	40	60
I	21AESD101	<p>AECC-1: Introduction to SDG (online course)</p>	<p>1. Define and relate to concepts of sustainability and development</p> <p>2. Identify and interpret the SDGs</p> <p>3. Recognize and Classify the SDGs into 5 Ps</p> <p>4. Infer the importance of SDGs as Development Index</p> <p>5. Summarize the interdependence and interconnectedness of SDGs in three dimensions – Social, Economical and Environmental</p>			



I		AECC-2: Environmental Conservation and Sustainable Development	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources 2. Understand importance of natural resources and biological diversity 3. Understand the sectoral effects on the local, regional, and global environmental issues 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources 5. Learn about the major international treaties and our country's stand on and responses to the major international agreements. 			
I		AECC-3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature 			
I		FS-3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Remember the message coming through different communication channels 2. Understand the message coming through different communication channels to think critically, logically and creatively 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Develop personality & right attitude through communication skills. 			
II	21ULCEN205	Communicative English for Logistics	<ol style="list-style-type: none"> 1. Able to understand business communication basics. 2. Interpret human values and ethics through literature. 3. Develop the ability to comprehend a text related to the domain area, leading to the cultivation of the reading habit. 4. Recognize and apply fundamental grammar usage and 	3	40	60



			learn domain specific vocabulary. 5. Identify the characteristics of speaking skill			
II	21BCLCC201	Core-6: Principles of Economics (F)	1. Understand the fundamentals of economics and its application 2. Understand the concept of utility analysis and its importance in day to day life 3. Describe the market competition and in dealing with the issue of different markets 4. Explain the theories of demand and supply and its analysis 5. Analyze the concept of elasticity and the dynamics of demand elasticity works and price fixing	3	40	60
II	21BCLCC202	Core-7: Freight Forwarding (Ocean & Air Cargo) (F)	1. Describe the fundamentals of Exim trade, freight forwarding and custom clearances 2. Understand the fundamentals of functions of Multimodal Transportation 3. Understand the procedures for Pre-Operating Checks to be performed for every shipment / consignment in Freight Forwarding 4. Analyze various techniques of cargo handling process and their practical situations 5. Evaluate the concepts of Documentation of Freight Forwarding Process	3	40	60
II	21BCLCC203	Core-8: Forecasting and Inventory Management (F)	1. Describe the fundamentals, objectives and functions of forecasting and its application in logistics 2. Understand elements and functions of sales and operations planning for forecasting & inventory management 3. Apply various techniques of inventory management and their practical situations 4. Understand codification in inventory management for the order management in inventory level maintenance 5. Evaluate the concepts of Inventory Management System, Ratio Analysis on Inventory & economic order quantity model	4	40	60
II	21BCLCC204	Core-9:	1. Describe the fundamentals of Surface Transportation	3	40	60



		Surface Transportation (F)	<ol style="list-style-type: none"> 2. Understand the fundamentals and functions of Tracking of Transport 3. Demonstrate the procedures for Trucks Management 4. Explain the Transportation System 5. Appraise the concepts of Rail Logistics 			
II	21BCLCC205	Core-10: Business Statistics (F)	<ol style="list-style-type: none"> 1. Understand the purposes, calculation and to interpret the measures of central tendency (mean, medium and mode) for a set of data 2. Understand the concepts of correlation and regression 3. Understand time series to get knowledge about observation and identify the variation 4. Analyse the problems of transportation and assignments 5. Demonstrate the concepts of probability and sampling. 	4	40	60
II	21BCLCL201	Core-Elective-1: Management and Cost Accounting (F) /	<ol style="list-style-type: none"> 1. Identify the basic and conceptual knowledge of cost & management accounting 2. Understand appropriate methods and judgment in selecting and presenting information of cost accounting 3. Discuss various skills related with budget and budgetary control 4. Understand the Financial statements & explain their impact on profitability & strategic positioning 5. Understand and interpret various concepts of standard costing and variance analysis 	3	40	60
II	21BCLCL202	Core-Elective-1: Banking & Finance (F)	<ol style="list-style-type: none"> 1. Describe the fundamentals of banking, unique features, definitions of Banks under Indian Law 2. Understanding the customers and their accounts on banking business models application 3. Understand the system of Negotiable Instruments and related matters in banking and its applications 4. Identify industry factors of financial sources 5. Understand various components of Indian Financial System 			
II	21AEES201	AECC-2: Environmental Conservation and Sustainable Development	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources 2. Understand importance of natural resources and 			



			<p>biological diversity</p> <p>3. Understand the sectoral effects on the local, regional, and global environmental issues</p> <p>4. Correlate the exploitation and utilization of conventional and non-conventional energy resources</p> <p>5. Learn about the major international treaties and our country's stand on and responses to the major international agreements.</p>			
II	21AEHV202	AECC-3: Human Values for Holistic Living	<p>1. Recall basic guidelines of value education and understand the basic aspirations</p> <p>2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration</p> <p>3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations.</p> <p>4. Understand required skills to understand the laws of nature</p>			
II		FS-3: Career Acceleration Program	<p>1. Remember the message coming through different communication channels</p> <p>2. Understand the message coming through different communication channels to think critically, logically and creatively</p> <p>3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others</p> <p>4. Develop personality & right attitude through communication skills.</p>			
III	21BCLCC301	Core-11: Marketing Management (F)	<p>1. Understand the basic concepts of marketing</p> <p>2. Understand about the behavior of consumers along with market segment</p> <p>3. Earn knowledge of various stages of development of a products</p> <p>4. Develop understanding how the products reaching to the end users</p> <p>5. Understand the impact advertisement and promotional activities on marketing of a product</p>	40	60	3



III	21BCLCC302	Core-12: Human Resource Management (F)	<ol style="list-style-type: none"> 1. Understand the concepts of human resource management 2. Understand about the various aspects of manpower selection 3. Earn knowledge of about career planning and appraisal 4. Analyse the impact of training and development of human resources 5. Develop understanding how the resolves conflicts of human resources 	40	60	3
III	21BCLCC303	Core-13: Retail Logistics and E-Commerce (F)	<ol style="list-style-type: none"> 1. Remember basic concepts of retail logistics 2. Examine the usefulness of logistics for the retail marketing 3. Remember basic concepts of e-commerce 4. Identify the situations giving rise to reverse logistics 5. Distinguish different types of e-commerce 	40	60	3
III	21BCLCC304	Core-14: International Logistics Management (Ad)	<ol style="list-style-type: none"> 1. Recognise the basic concepts of international logistics 2. Compare the marketing concepts based on customer centric and at international level 3. Examine various models of transportation and basic of freight 4. Memorise the usefulness of containers in logistics 5. Learn the documentation for international logistics 	40	60	3
III	21BCLCC305	Core-15: Logistics Network Design (Ap)	<ol style="list-style-type: none"> 1. Remember basic concepts of components of logistics network 2. Examine the issues occurring in network designing 3. Evaluate the importance of data in the designing logistics network 4. Identify the situations required for strategic decisions 5. Identify the various sources of data collection and use of information collected 	40	60	3
III	21BCLCC306	Core-16: MIS for Logistics (Ap)	<ol style="list-style-type: none"> 1. Understand the basic concepts of management information system in logistics 2. Learn about the technology used for database 3. Identify the diffusion of information and use of various acts for the same 4. Identify various areas and compliance of management 	40	60	3



			information system 5. Understand basics of business process and project management			
III	21BCLCC307	Core-17: Port Terminal Logistics (Ad)	1. Examine about the basics of ports 2. Learn about functionalities of the terminal for containers 3. Discover the efficient management of terminals 4. Memorise the regulations of the Port Trust Act 5. Describe about various aspects of the port terminals	40	60	3
III	21BCLCC308	Core-18: Liner Logistics (Ap)	1. Understand the basics of linear logistics 2. Identify equipment necessary for the handling of cargoes 3. Know about the container utilization in terms of loads 4. Discuss about the law related to bill of lading 5. Discover the rules regarding transfer of goods nationally and internationally	40	60	3
III		FS 3: Career Acceleration Program	1. Remember the message coming through different communication channels 2. Understand the message coming through different communication channels to think critically, logically and creatively 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Develop personality & right attitude through communication skills.			
IV	21BCLCC401	Core-19: Word & Presentation Tools (F)	1. Familiarize Students with windows 2000 2. Develop an understanding about basics of MS Word 3. Develop an understanding about basics of Power Point 4. Providing help to Students to apply the Word & Presentation tools in real-life application. 5. Enable students to enhance their ability and professional skills in the Computer Application in MS-Word & Presentation	40	60	3
IV	21BCLCC402	Core-20: Data Analysis using Spread	1. To provide fundamental understanding of MS-Excel. 2. To inculcate the skills of displaying data using MS-	40	60	3



		Sheet (F)	Excel 3. To perform data analysis using spreadsheet (MS Excel) 4. To impart the knowledge of presenting data with charts and the drawing tools 5. To conduct advanced analysis using pivot tables from a range with rows and columns in Excel.			
IV	21BCLCC403	Core-21: Commercial Geography (F)	1. Acquiring Knowledge of Geography 2. Ability of Problem Analysis of physical factors 3. Knowing the bases of commercial and marketing activities Related to the earth and transport systems 4. To Understand world time zone 5. Understanding airport codes and world geography	40	60	3
IV	21BCLCC404	Core-22: Logistics 4.0 (Ad)	1. Acquaint students with the logistics industry revolution 2. Develop understanding about digitalization of logistics 3. Familiarize students with digital challenges in logistics 4. Helps to understand uses of technology in logistics 5. Examine future trends and opportunities	40	60	3
IV	21BCLCC405	Core-23: Introduction to Aviation Industry & Airport Operations (F)	1. Understand fundamentals of aviation industry and airport operations 2. Remember basic concepts of aviation industry and airport operations 3. Develop competencies and knowledge of aviation industry 4. Enhance ability and professional skills in the aviation industry and airport operations 5. Apply the basic knowledge of aviation and airport operations in the real-life situation	40	60	3
IV	21BCLCC406	Core-24: Introduction to Air Cargo Industry (F)	1. Understand, learn and apply the fundamental knowledge of Air Cargo Industry in the real-life situation 2. Understand about the organizations offering the air cargo facilities 3. Learn about various models of air cargo 4. Enable them to improve their ability and professional	40	60	3



			skills in the logistics of Air Cargo Industry 5. Identify key stakeholders, understand key terminologies and other organization areas for air cargo			
IV	21BCLCC407	Core-25: Multimodal Transportation (F)	1. Enable to learn basics involved in the multi modal transportation and its importance and role played by Multi-modal transport in the efficient and cost-effective movement of cargo 2. Develop knowledge on types of multi-modal movement and the role of containerization for security and speed in movement of cargo 3. Understand the provisions and procedures for Exim trade and INCOTERMS 4. Learn about the Indian Government's policies and vision R for development of seamless multi-modal transport 5. Understand the role and practice of multimodal transportation in today's world	40	60	3
IV	21BCLCC408	Core-26: Commercial Aspects of Transportation (F)	1. Develop a clear perspective of various commercial aspects in transportation 2. Develop knowledge about commercial aspects as well as to distinguish between the Operational feasibility of a work and its commercial viability 3. Understand the problems and know the issues involved in booking and reservation of passengers and pricing considerations 4. Learn about the various types of costs involved and understand the concept of cost-of-service 5. Learn about marketing concept and strategies related to transportation	40	60	3
V	21BCLCC501	Core-27: Apprenticeship – I	Not Applicable	150	250	22
V	21BCLCL501/	Core-Elective-1 (Any two out of three MOOC Course): Warehouse Automation /	1. Remember basic concepts of warehouse automation and recognize common and latest automation solutions for ware-housing 2. Remember and examine the basics as well as usefulness of warehouse automation in logistics	100 (50 + 50)	100 (50 + 50)	4 (2 + 2)



			<p>3. Understand the importance of automation solution in warehouse Recognize the costs and pre-requisites for each automation solution and the expected benefits of the different solutions</p> <p>4. Identify the different aspects giving elaboration of topics related to warehouse automation</p> <p>5. Details about the concepts and able to complete the analysis and to select the most appropriate solution for ware- house automation</p>			
V	21BCLCL502/	Core-Elective-1 Best Practices in Transportation /	<p>1. Remember basic concepts of transportation operations.</p> <p>2. Remember and examine the basics as well as usefulness of import export documentations requirements in logistics.</p> <p>3. Understand the importance of Air freight as well as ocean freight shipment handling for logistics efficiency.</p> <p>4. Identify the aspects with elaboration of topics related to Road transportations, Rail transportations as well as all relevant considerations.</p> <p>5. Details about the concepts of Inland waterways in practices and distinguish of different aspects concerning to it as well as recognize the importance and future development of Indian water ways.</p>			
V	21BCLCL503	Core-Elective-1 Inland Waterways & Coastal Shipping	<p>1. Remember basic concepts of coastal shipping in logistics and recognize the impact of Inland water ways and coastal shipping.</p> <p>2. Remember and examine the basics as well as usefulness of Inland waterways in logistics</p> <p>3. Understand the roll and importance of Inland waterways</p> <p>4. Identify the aspects giving elaboration of topics related to inland waterways</p> <p>5. Acquire the concepts of Inland waterways in practices and distinguish future development of Indian water ways.</p>			



Department of Commerce
Program: B.Com. – Professional Accounting

Program Objective:

The objectives of the department is to provide competency-driven education along with a core component for growth and success. The department focuses to equip students with knowledge of accounting, taxation and finance to enhance their skills like entrepreneurial, managerial and analytical thinking. One of the important objectives is to leverage knowledge and resources to provide experiential learning, immersion and other collaborative opportunities to the learners for their best professional and career development.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments with broad understanding of other disciplines
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgment about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate and consider new knowledge and ways of thinking and conscious of the impact of one's actions on the environment.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core Competency: To develop the competency to pursue higher education or successful professional career with synergistic combination of the knowledge and skills of commerce and business.
PEO2	:	Breadth of Knowledge To make students explore complex problems and take up research and development work in



		the related fields
PEO3	:	Preparedness To show preparedness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities
PEO4	:	Professionalism To show professionalism, ethical attitude, communication skills, team work in their profession and modify to current trends in technology by engaging in continuous professional development.
PEO5	:	Learning Environment To create and help a community of learning in which students gain knowledge and learn to apply it professionally with due consideration for ethical, ecological and economic issues.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain Knowledge: Apply the comprehensive knowledge, skills and exposure of commerce and business which includes accounts, finance, taxation, economics, commercial laws, etc
PO2	:	Problem analysis: Identify, formulate, research literature and analyse complex commerce and business problems reaching substantiated conclusions using principles of accounts, finance, taxation, economics, commercial laws, etc.
PO3	:	Design/development of Solutions: Design solutions for complex commercial and business problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	:	Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	:	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern information



		technological tools including prediction and modelling to complex business activities with an understanding of the limitations
PO6	:	Professionalism and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practice.
PO7	:	Environment and Sustainability: Understand the impact of the professional business solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the moral dimensions and accept responsibility.
PO9	:	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO10	:	Communication: Communicate effectively on complex commerce and business activities with the community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	:	Project Management and Finance Demonstrate knowledge understanding of the accounting, taxation and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO12	:	Life-long Learning Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply the knowledge and concepts of business, accounting, and finance, and management, taxation in starting and managing business and realize the social responsibilities, social realities and inculcate an essential value system.
PSO2	:	Identify, formulate, research and analyse complex business problems to reach substantiated solution and conclusions.
PSO3	:	Develop necessary professional knowledge and skills in accounting, finance and taxation
PSO4	:	Implement traditional and modern strategies and practices of accounts, costing, banking, economics, auditing, law and taxation
PSO5	:	Get awareness and prepare and pursue higher education and research in reputed institutes at national and international level

Course Outcomes (COs):

Seme ster	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGCO111	Major 1: Fundamentals of Accounting	<ol style="list-style-type: none"> 1. Understand basic terminologies of Accounting 2. theoretical concepts including generally accepted accounting principles, accounting standards, the accounting cycle and differentiate capital and revenue expenditure 3. Analyze and record business transactions in the initial books of along with the rectification of errors. 4. Explain the purpose of depreciation and its application in accounting 	4	50	50



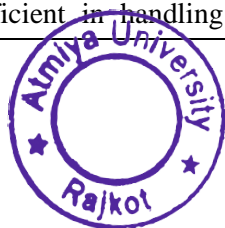
			5. Explain Inventories and its' Accounting Treatment.			
I	23UGCO112	Major 2: Business Accounting	<p>1. Able to understand, apply, and effectively manage these financial instruments in business accounting, complying with legal requirements and assessing their financial implications.</p> <p>2. Demonstrate the ability to reconcile financial records, identify discrepancies, and ensure the accuracy of financial transactions in business accounting.</p> <p>3. Prepare financial statement analysis to evaluate the financial performance of a sole proprietorship</p> <p>4. Prepare financial statement analysis to evaluate the financial performance of a Non-Profit Organization</p> <p>5. Prepare financial statement analysis to evaluate the financial performance of a Partnership</p>	4	50	50
I	23UGCO113	Minor-1: Business Economics	<p>1. A comprehensive understanding of the fundamental principles and the practical application of economics in the business context.</p> <p>2. Able to analyse and predict market dynamics, pricing, and resource allocation in various economic scenarios.</p> <p>3. equipped to analyse and optimize production processes, cost structures, and resource allocation in economic decision-making</p> <p>4. Able to assess and explain how prices are determined in various market structures and their impact on economic outcomes.</p> <p>5. Understand the dynamics of economic fluctuations, their causes, and their consequences for business and policy decisions.</p>	4	50	50
I	23UGCO114	MDC-1: Mathematics for Commerce	1. Understand permutations of different things and similar things and combinations.	4	50	50



			<ol style="list-style-type: none"> 2. Define arithmetic and geometric progression and utilize it to find sum of first nth terms 3. Define determinants and understand their properties. 4. Define and utilize the concept of matrix. Understand types of matrix and different operations of matrices. 5. Calculate simple interest, compound interest and amount of annuity. 			
I	23UGEN144	AEC -1 : Functional English and grammar	<ol style="list-style-type: none"> 1. To be able to remember basics about communication 2. To enable students to recognize the type of sentences. 3. To be able to use effective vocabulary to describe the surrounding phenomena. 4. To be able to interpret language correctly. 5. To be proficient at identifying proper ways of note-making. 	3	50	50
I	23UGCO160	SEC -1 : Presentation Skills	<ol style="list-style-type: none"> 1. To develop the ability to organize and structure presentations effectively, ensuring clarity and coherence. 2. To enhance their verbal and nonverbal communication skills, enabling them to engage and captivate their audience. 3. To learn to create compelling visual aids and use technology to enhance the impact of their presentations. 4. To gain confidence in handling questions, feedback, and unexpected challenges during presentations. 5. To refine their overall presentation delivery, improving their ability to inform, persuade, and inspire their audience in diverse professional and academic contexts. 	2	25	25
I	23UGCI070	VAC1: Environmental Conservation and Sustainable Development	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources 2. Understand importance of natural resources and biological diversity 3. Understand the sectoral effects on the local, 	2		



			regional, and global environmental issues 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources 5. Learn about the major international treaties and our country's stand on and responses to the major international agreements.			
I	23UGLI070	VAC2: Introduction to SDG (online)	1. Define and relate to concepts of sustainability and development 2. Identify and interpret the SDGs 3. Recognize and Classify the SDGs into 5 Ps 4. Infer the importance of SDGs as Development Index 5. Summarize the interdependence and interconnectedness of SDGs in three dimensions – Social, Economical and Environmental	1		
II	23UGCO211	Major-3: Accounting Standards – I	1. Equipped to structure and prepare financial statements in compliance with established accounting standards, enhancing their ability to communicate financial information accurately and transparently.. 2. theoretical concepts including generally accepted accounting principles, accounting standards, the accounting cycle and differentiate capital and revenue expenditure 3. Proficient in applying accounting standards to different types of entities, ensuring uniformity and accuracy in financial reporting. 4. A comprehensive understanding of these specific standards, enabling them to accurately apply them in financial reporting for various entities. 5. Possess a deep understanding of these specific standards, facilitating their precise application in the financial reporting of diverse entities.	4	50	50
II	23UGCO212	Major-4: Corporate	1. Proficient in handling the issuance, valuation, and	4	50	50



		Accounting - I	<p>accounting for shares and debentures in various corporate financial transactions.</p> <p>2. Well-versed in the processes, accounting, and financial implications associated with the redemption of these financial instruments in corporate finance.</p> <p>3. Capable of accurately accounting for and analyzing the impact of bonus and rights issues on a company's financial statements and shareholder equity.</p> <p>4. Proficient in understanding, recording, and evaluating the financial implications and regulatory compliance related to the buyback of shares and other securities by corporations</p> <p>5. Able to prepare comprehensive final accounts for companies, including balance sheets, profit and loss accounts, and cash flow statements, ensuring compliance with relevant accounting standards.</p>			
II	23UGCO213	Minor-2: Business Law	<p>1. Understand the fundamental concepts and terminologies of Indian Contract Act</p> <p>2. Understanding the legal provisions sale of goods act</p> <p>3. Paraphrase the understanding of Partnership Act</p> <p>4. Attain the knowledge of Limited Liability Partnership Act</p> <p>5. Apply a systematic approach to the acquisition of knowledge of negotiable Instrument Act.</p>	4	50	50
II	23UGCO214	MDC-2: Application of Statistics in Economics	<p>1. Equipped with the skills to effectively collect, organize, and analyse data, enabling them to make informed economic decisions and draw meaningful conclusions.</p> <p>2. Summarize and interpret economic data, understand its distribution, and make informed decisions based on statistical analysis.</p>	4	50	50



			<p>3. Proficient in applying probability theory to analyze and predict uncertain economic events and outcomes.</p> <p>4. Understand and apply various probability distributions, enabling them to model and analyse economic phenomena accurately.</p> <p>5. Possess the skills to quantitatively measure and interpret relationships between economic variables, facilitating informed decision-making and economic analysis.</p>			
II	23UGEN244	AEC -2:English and communication	<p>1. To Explain the students with language skills for business and commerce.</p> <p>2. To develop the interest in the literature and to hone the comprehensive skill, by introducing poems.</p> <p>3. Identify the important features of speaking skill.</p> <p>4. Identify the essential aspects of reading and writing skills.</p> <p>5. Identify the important features of listening and writing skill</p>	3	50	50
II	23UGCO260	SEC -2 : Tally Accounting	<p>1. To demonstrate proficiency in using Tally software for financial data entry, processing, and reporting.</p> <p>2. To be able to create and maintain various accounts, ledgers, and financial statements accurately in Tally.</p> <p>3. To acquire the skills to perform data reconciliation and troubleshoot common issues in Tally.</p> <p>4. To understand the principles of GST and learn to use Tally for GST compliance and reporting.</p> <p>5. To apply Tally accounting knowledge to real-world scenarios, enhancing their employability and efficiency in financial record-keeping and reporting.</p>	2	25	25



Faculty of Business & Commerce
Department of Management
Program: M. B. A. (2023)

Program Objective:

MBA programme aims at exploring management skills in the students. The curriculum is designed to understand general & need/skill based subjects in 1st year & takes students forward to become specialized in Finance, Marketing, Human Resource, International Business & Entrepreneurship genres, in 2nd year with plethora of other credit components like Short Term Courses (STC) & General Elective (GE), Summer Internship Project (SIP), Community Engagement Projects & Capstone Projects to produce industry ready graduates having highest regard for Personal & Institutional Integrity, Social Responsibility, Teamwork and Continuous Learning.

Graduate Attributes:

- **Core Competence:** Possess discipline-relevant knowledge and competencies and able to link them to local, national and global issues to seek positive and sustainable solutions.
- **Transferable Global & Impactful Societal Skills:** Ability to create knowledge through research and innovations by social immersions and transferring them to impact through problem solving at local and global levels.
- **Adaptability and Resilience:** Demonstrate resilience, perseverance and positivity in unfamiliar situations and adapt their skills and knowledge to excel in new environment.
- **Sense of Purpose & Curiosity:** Possess intellectual curiosity to apply the knowledge to generate, develop and realize new ideas.
- **Ethics & Lifelong Immersive Learning:** Adhered to highest standards of ethics and always amenable to new ideas and actively seek out new ways of learning.



Program Educational Objectives (PEOs):

Our programme will produce Post Graduates who:		
PEO1	:	Depth and Breadth of Knowledge: will be capable to creatively apply the knowledge of the strategic management tactics, leadership traits, entrepreneurial process and inculcation of creativity and innovation as well as other related discipline for his professional and research career along with High Noble Values.
PEO2	:	Practice, Operation and Usage of Modern Tools and Technology: will contribute in the field of business & management providing solutions for product/processes/technology development.
PEO3	:	Professional Capacity and Passion of Learning: are flexible and adaptable in different work environments, prepared to acquire, develop, employ and integrate business models, new management tactics, technologies and exhibit leadership and team work quality.
PEO4	:	Research, Numeracy, Scholarship and Data Literacy: will exhibit ethical behaviour consistent with academic honesty and use of appropriate guidelines and procedures with responsible conduct of research for continuous professional development.
PEO5	:	Global, Moral and Aesthetic Sustainability: will have love for learning in pursuance of excellence in all domains of life.

Program Outcomes (POs):

After completion of the programme the Post graduate will:		
PO1	:	Domain Knowledge: Nurture talent, stimulate thinking, impart skills to create & adapt competent & professional work dynamics for the industries.
PO2	:	Problem Analysis: Able to identify problems related to management functions of an organization and to analyse and derive valid conclusions with fundamental & applied knowledge of management domain.
PO3	:	Conduct Investigations of Complex Problems: Gain information literacy, proficiency with technology, and analytical techniques for decision-making.
PO4	:	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern tools for research or



		production purpose with an understanding of the limitations.
PO5	:	Environment and Sustainability: Analyse global environmental problems and critically evaluate evidence to formulate and organize sustainable strategies.
PO6	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Biotechnological practice.
PO7	:	Individual and Team Work: Exhibit leadership qualities with ability to function effectively as an individual and in a team by building professional relationship.
PO8	:	Communication: Communicate ideas clearly and concisely in oral and written structures, and in formal and informal settings.
PO9	:	Life-Long Learning: Able to integrate and appraise information/knowledge from a variety of sources throughout the life.

Programme Specific Outcome (PSOs):

After completion of the programme the Post graduate will:		
PSO1	:	Be able to cultivate integrated perspective of several disciplines to reinforce their understanding, capabilities and calibre & to tackle business problems in different sectors.
PSO2	:	Be able to evaluate business decisions with regard to their impacts on environmental sustainability. Structure a set of cognitive, affective, behavioural skills and characteristics that facilitate effective and appropriate interaction in diversified contexts.
PSO3	:	Transform abilities to understand the importance of an organizational perspective of different functional areas like Finance, Marketing, HR, IB & Entrepreneurship through integrative courses.
PSO4	:	Be able to build and demonstrate leadership, teamwork, and social skills to contribute in the economy effectively as an individual to the society, nation & globe.



Course Outcomes (COs): MBA (2023 SLE)

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23MBACC101	Core 1: Managerial Communication (F)	<ol style="list-style-type: none"> 1. Let students become aware of their communication skills and get sensitized towards the demand of market & his/her capacity of expression in various communication forms i.e. W/S/L/R. 2. Introduce them to some of the practices in managerial communication that are in vogue 3. Make historical views of managerial practices which are approximately 80 years old & focusing on the role of communication in it. 4. Establish the lens of students in a way to look at business & managerial communication as correlated aspects. 5. Study the challenges before corporate & cross functional communication & finding out its solution. 6. Understand the application of managerial communication in real time situations. 7. Consider the validity of a possessed skill set with the required one to perform the role of an effective manager. 	4	40	60
I	23MBACC102	Core 2: Economic Analysis for Business Decisions (Ap)	<ol style="list-style-type: none"> 1. Summarize the factors affecting demand and 2. Supply of commodity. 3. Calculate price elasticity of demand. 4. Classify cost into various categories. 5. Decide break-even point for a given data. 6. Differentiate various types of markets. 	4	40	60
I	23MBACC103		<ol style="list-style-type: none"> 1. Apply the fundamental knowledge and exposure to concepts theories and practices of business structures & processes. 2. Understand the importance of business structure 	4	40	60



		Core 3: Business Structure & Entrepreneurship Skills (F)	<p>in building a strong and competitive Business Organization.</p> <ol style="list-style-type: none"> Understand various functions & processes of management with their relevance and applications. The Identification of new ideas for creating industries, infrastructures, and ways of doing business worldwide. The ability to identify entrepreneurial opportunities that exist, those that represent untapped markets and underserved markets, and those that can be created by applying existing technologies to new fields and new markets. 			
I	23MBACC104	Core 4: Modern Marketing Management (F)	<ol style="list-style-type: none"> Describe and relate basic concepts of market and marketing management. Discover regarding marketing information system, consumer behavior and market segmentation of marketing. Learn the application based marketing strategies to identify product and pricing decisions of marketing. Analyze marketing channels and marketing communication decisions. Appraise holistic marketing concepts and evaluate case studies with the application of marketing management in real time situations. 	4	40	60
I	23MBACC105	Core 5: Quantitative Techniques for Management (Ap)	<ol style="list-style-type: none"> Identify basics of quantitative statistics and different diagrams and charts used for presentation of data. Describe and interpret statistical analysis tools commonly used in business decision making. Use and calculate various quantitative tools and techniques relevant to business analysis for two variables. 	4	40	60



			4. Evaluate business information including the graphics and probability statements.			
I	23MBAID101	DSE-ID 1: Principles & Practices of Accounting (Ap)	<ol style="list-style-type: none"> 1. Identify relevant principles in connection with accounting transactions. 2. Understand the role of financial accounting in business firms and the essentials of financial accounting. 3. Identify the conceptual foundation of Book keeping. 4. Describe and illustrate the method of preparing Journal, Ledger, Subsidiary books, Cash Book & trial balance. 5. Describe the form and content of statement of profit and loss and balance sheet of a company as per (revised) schedule VI. 	4	40	60
I	23CEWE101	SEC-1 Wisdom & Ethics for Success in Life	<ol style="list-style-type: none"> 1. Differentiate the career success, academic success and life success 2. Identify the correct priority order in life and illustrate the human goal 3. Understand that the relationships are definite. 4. Understand the Interconnectedness between all the orders in existence. 	2		
II	23MBACC201	Core 6: International Business (F)	<ol style="list-style-type: none"> 1. Demonstrate knowledge of the basic vocabulary and concepts of International Business. 2. Students are expected to enhance & apply their cognitive knowledge of global issues & interpersonal skills to develop a framework to support successful decision making in all relevant functions & activities of an international business or international operations. 3. Students will demonstrate an awareness of their role in the global environment which possess a sense of responsibility & a capacity for services. 4. Students will be able to analyze the relationships between international business and the political, 	4	40	60



			<p>economic, legal and social policies of countries, regions and international institutions. They will be able to recognize challenges and opportunities in foreign markets by utilizing and understanding of the characteristics of high-performing organizations.</p> <p>5. Students will be able to Identify the risks and opportunities for businesses in developing emerging markets to operate business in the global arena and develop financial models.</p>			
II	23MBACC202	Core 7: Human Resource Management (F)	<p>1. Demonstrate knowledge about fundamental principles, generalizations, and/or theories and concepts in advanced human resources management.</p> <p>2. Apply course material to improve thinking, problem solving, and decision making in the advanced human resources management arena.</p> <p>3. Assess potential and to prepare an employee through appropriate feedback and guidance for higher responsibilities which connects with monetary rewards and to act as a tool for Human Resource Development.</p> <p>4. Create a productive, engaged workforce and to eliminate the perception that organized labor and management have a perpetually adversarial relationship</p> <p>5. Secure industrial peace and harmony by providing machinery and procedure for the investigation and settlement of Industrial Disputes</p>	4	40	60
II	23MBACC203	Core 8: Financial Framework for Decision Making (F)	<p>1. Identify relevant concept in connection with Financial Management</p> <p>2. Understand the role of financial accounting in business firms and the essentials of finance manager and financial markets so as to enable the students to gain an understanding of market mechanisms.</p> <p>3. Aware with necessary pros and cons of financial instruments available in the market.</p>	4	40	60



			<p>4. Understand the fundamental concepts of Finance.</p> <p>5. Acquaint students with the concept of working capital and its requirements in business operations.</p>			
II	23MBACC204	<p>Core 9: Production & Operations Management (Ad)</p>	<ol style="list-style-type: none"> 1. Demonstrate an understanding of production as a process of converting or transforming resources for the effective production of goods & services. 2. Demonstrate an understanding of the manager's concern in planning, organizing, directing, and controlling productive operations to meet organizational objectives. 3. Develop an understanding of how the operations have strategic importance and can provide a competitive advantage in the workplace. 4. Demonstrate an understanding of capacity planning, productivity measures, scheduling, critical path identification, total quality management, etc. 5. Understand how to manage resources to achieve superior quality through statistical process control through effective analysis. 	4	40	60



II	23MBACC205	Core 10: Business Research Methods (Ad)	<ol style="list-style-type: none"> 1. To develop understanding of the basic framework of research process. 2. To identify various sources of information for literature review and develop an understanding of various research designs. 3. To understand some basic concepts of research methodologies & sampling design. 4. To prepare students for conducting an independent study including formulating research questions and selecting a research approach, applying research methodology – designing a study and selecting specific methods and techniques appropriate for answering the questions; 5. To develop research report writing skills in a professional manner. 	4	40	60
II	23MBACC206	Core 11: Strategic Cost Management	<ol style="list-style-type: none"> 1. Impart a conceptual knowledge in Strategic Management 2. Impart a conceptual knowledge in Some Emerging Concepts of Cost Accounting 3. Understand the fundamental concepts of Material Costing 4. Understand and determine Stock Levels, EOQ, Stock Ledger & Inventory Turnover 5. Understand the fundamental concepts of Labor cost & Overhead 6. Understand and determine various wage Payment Systems, labor Turnover and various methods of reapportionment of serv1. Impart a conceptual knowledge in Strategic Cost Management 2. Impart a conceptual knowledge in Some Emerging Concepts of Cost Accounting 3. Understand the fundamental concepts of Material Costing 4. Understand and determine Stock Levels, EOQ, Stock Ledger & Inventory Turnover 5. Understand the fundamental concepts of Labor 	4	40	60



			<p>cost & Overhead</p> <p>6. Understand and determine various wage Payment Systems, labor Turnover and various methods of reapportionment of service department overheads to production department</p> <p>7. Inculcate deeper knowledge in standard costing methods to analyze the costs which impact the profitability of a firm.</p> <p>8. Inculcate deeper knowledge in Marginal costing methods to analyze the costs which impact the profitability of a firm.</p> <p>9. Enable the students to prepare cost sheet and pricing the materials</p>			
II	23MBAID201	DSE-ID 2: Business Analytics for Managers	<p>1. Understand the role of business analytics and Business Intelligence within an organization.</p> <p>2. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.</p> <p>3. Apply advanced analytical tools to analyse complex problems under uncertainty.</p> <p>4. Understand and critically apply the concepts and methods of business analytics</p> <p>5. Foster an ability to critically analyze, synthesize and solve complex unstructured business problems</p>	4	40	60
II	21CEWE201	SEC-1 Wisdom & Ethics for Success in Life	<p>1. Differentiate the career success, academic success and life success</p> <p>2. Identify the correct priority order in life and illustrate the human goal</p> <p>3. Understand that the relationships are definite.</p> <p>4. Understand the Interconnectedness between all the orders in existence.</p>	2		



Department of Management
Program: M. B. A. (2021)

Program Objective:

MBA programme aims at exploring management skills in the students. The curriculum is designed to understand general & need/skill based subjects in 1st year & takes students forward to become specialized in Finance, Marketing, Human Resource, International Business & Entrepreneurship genres, in 2nd year with plethora of other credit components like Short Term Courses (STC) & General Elective (GE), Summer Internship Project (SIP), Community Engagement Projects & Capstone Projects to produce industry ready graduates having highest regard for Personal & Institutional Integrity, Social Responsibility, Teamwork and Continuous Learning.

Graduate Attributes:

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PEO2	:	Practice, Operation and Usage of Modern Tools and Technology: will contribute in the field of business & management providing solutions for product/processes/technology development.
PEO3	:	Professional Capacity and Passion of Learning: are flexible and adaptable in different work environments, prepared to acquire, develop, employ and integrate business models, new management tactics, technologies and exhibit leadership and team work quality.
PEO4	:	Research, Numeracy, Scholarship and Data Literacy: will exhibit ethical behaviour consistent with academic honesty and use of appropriate guidelines and procedures with responsible conduct of research for continuous professional development.
PEO5	:	Global, Moral and Aesthetic Sustainability: will have love for learning in pursuance of excellence in all domains of life.

Program Outcomes (POs):

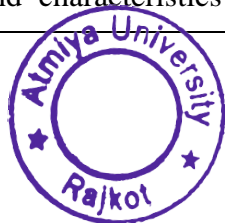
After completion of the programme the Post graduate will:		
PO1	:	Domain Knowledge: Nurture talent, stimulate thinking, impart skills to create & adapt competent & professional work dynamics for the industries.
PO2	:	Problem Analysis: Able to identify problems related to management functions of an organization and to analyse and



		derive valid conclusions with fundamental & applied knowledge of management domain.
PO3	:	Conduct Investigations of Complex Problems: Gain information literacy, proficiency with technology, and analytical techniques for decision-making.
PO4	:	Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern tools for research or production purpose with an understanding of the limitations.
PO5	:	Environment and Sustainability: Analyse global environmental problems and critically evaluate evidence to formulate and organize sustainable strategies.
PO6	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Biotechnological practice.
PO7	:	Individual and Team Work: Exhibit leadership qualities with ability to function effectively as an individual and in a team by building professional relationship.
PO8	:	Communication: Communicate ideas clearly and concisely in oral and written structures, and in formal and informal settings.
PO9	:	Life-Long Learning: Able to integrate and appraise information/knowledge from a variety of sources throughout the life.

Programme Specific Outcome (PSOs):

After completion of the programme the Post graduate will:		
PSO1	:	Be able to cultivate integrated perspective of several disciplines to reinforce their understanding, capabilities and calibre & to tackle business problems in different sectors.
PSO2	:	Be able to evaluate business decisions with regard to their impacts on environmental sustainability. Structure a set of cognitive, affective, behavioural skills and characteristics that facilitate effective and appropriate interaction in



		diversified contexts.
PSO3	:	Transform abilities to understand the importance of an organizational perspective of different functional areas like Finance, Marketing, HR, IB & Entrepreneurship through integrative courses.
PSO4		Be able to build and demonstrate leadership, teamwork, and social skills to contribute in the economy effectively as an individual to the society, nation & globe.

Course Outcomes (COs): MBA (2021 SLE)

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21MBACC 101	Core 2: (F) Managerial Communication	<ol style="list-style-type: none"> Let students become aware of their communication skills and get sensitized towards the demand of market & his/her capacity of expression in various communication forms i.e. W/S/L/R. Introduce them to some of the practices in managerial communication that are in vogue Make historical views of managerial practices which are approximately 80 years old & focusing on the role of communication in it. Establish the lens of students in a way to look at business & managerial communication as correlated aspects. Study the challenges before corporate & cross functional communication & finding out its solution. Understand the application of managerial communication in real time situations. Consider the validity of a possessed skill set with the required one to perform the role of an effective manager. Learn the application based listening strategies to improve upon the same. Learn the application based speaking strategies to improve upon the same. 	4	40	60
	21MBACC 102		<ol style="list-style-type: none"> Summarize the factors affecting demand and supply of commodity. 	4	40	60



I		Core 2: (Ap) Economic Analysis for Business Decisions	<ol style="list-style-type: none"> 2. Calculate price elasticity of demand. 3. Classify cost into various categories. 4. Decide break-even point for a given data. 5. Differentiate various types of markets. 			
I	21MBACC 103	Core 3: (F) Business Structure & Process	<ol style="list-style-type: none"> 1. Understand Business structures & processes to create sustainability in business practices. 2. Familiarize the students with traditional & contemporary management schools, theories & practices with reference to Indian constitution. 3. Make available, detailed understanding regarding various functions & processes of management with their relevance and applications. 4. Let students visualize & understand about Successful organizations & their business structures & processes. 5. Study the challenges before modern businesses and familiarize students about special fields in management with their applications. 6. Understand various structures & models prevailing in various industries. 7. Understand organizational designs & challenges associated with it. 8. Learn with reference to modern day business requirements- the necessary strategies & tactics. 9. See the practicability of theoretical frames through case studies. 10. Visualize real time scenarios of the learned concepts. 	4	40	60
I	21MBACC 104	Core 4: (F) Modern Marketing Management	<ol style="list-style-type: none"> 1. Enhance the knowledge frame with the conceptual & case study based learning. 1. Get familiarized with the marketing concepts and practices and develop their analytical skills, conceptual abilities and knowledge in the aforesaid field. 2. Learn contemporary practices in marketing management that are in vogue. 3. Make historical views of managerial practices which are approximately 80 years old & focusing on the role of marketing in it. 4. Establish the lens of students in a way to look at marketing management as one of the most important functional areas. 5. Study the challenges before the functional aspects of the business organization to find out its solutions. 6. Understand the application of marketing management in real 	4	40	60



			<p>time situations.</p> <p>7. Consider the validity of a possessed skill set with the required one to perform the role of an effective manager.</p> <p>8. Learn the application based marketing strategies to improve upon the managerial performance.</p> <p>9. Establish the outlook of understanding</p>			
I	21MBACC 105	Core 5: (F) Entrepreneurship & Family Business	<p>1. Demonstrate knowledge of the basic vocabulary and concepts of Entrepreneurial study.</p> <p>2. Apply effective strategies for designing innovative projects in collaboration with team members to develop an effective creative project, product, or practice.</p> <p>3. The ability to identify entrepreneurial opportunities that exist, those that represent untapped markets and underserved markets, and those that can be created by applying existing technologies to new fields and new markets; and</p> <p>4. The ability to analyze the entrepreneurial opportunities through the invention, development and exploitation of entirely new ideas, products and services.</p> <p>5. The Identification of new ideas for creating industries, infrastructures, and ways of doing business worldwide.</p>	4	40	60
I	21MBACC 106	Core 6: (Ap) Principles & Practices of Accounting	<p>1. Identify relevant principles in connection with accounting transactions.</p> <p>2. Understand the role of financial accounting in business firms and the essentials of financial accounting.</p> <p>3. Identify the conceptual foundation of Book keeping.</p> <p>4. Describe and illustrate the method of preparing Journal, Ledger, Subsidiary books, Cash Book & trial balance.</p> <p>5. Describe the form and content of statement of profit and loss and balance sheet of a company as per (revised) schedule VI.</p> <p>6. Prepare necessary accounts in Company Final Account.</p> <p>7. Have knowledge about various tools of analysis of financial statement.</p> <p>8. Enable to preparing statements of analysis of financial statements.</p>	4	40	60



			<p>9. Have knowledge about all types of ratios.</p> <p>10. Enable the students to evaluate the Financial Performance through various ratios.</p>			
I	21MBAID1 01	IDC 1: Quantitative Techniques in Management	<p>1. Identify basics of quantitative statistics and different diagrams and charts used for presentation of data.</p> <p>2. Describe and interpret statistical analysis tools commonly used in business decision making.</p> <p>3. Use and calculate various quantitative tools and techniques relevant to business analysis for two variables.</p> <p>4. Evaluate business information including the graphics and probability statements.</p>	4	40	60
II	21MBACC2 01	Core 7: International Business (F)	<p>1. Demonstrate knowledge of the basic vocabulary and concepts of International Business.</p> <p>2. Students are expected to enhance & apply their cognitive knowledge of global issues & interpersonal skills to develop a framework to support successful decision making in all relevant functions & activities of an international business or international operations.</p> <p>3. Students will demonstrate an awareness of their role in the global environment which possess a sense of responsibility & a capacity for services.</p> <p>4. Students will be able to analyze the relationships between international business and the political, economic, legal and social policies of countries, regions and international institutions. They will be able to recognize challenges and opportunities in foreign markets by utilizing and understanding of the characteristics of high-performing organizations.</p> <p>5. Students will be able to Identify the risks and opportunities for businesses in developing emerging markets to operate business in the global arena and develop financial models.</p>	4	40	60
II	21MBACC 202	Core 8: Human Resource Management (F)	<p>1. Demonstrate knowledge about fundamental principles, generalizations, and/or theories and concepts in advanced human resources management.</p> <p>2. Apply course material to improve thinking, problem solving, and</p>	4	40	60



			<p>decision making in the advanced human resources management arena.</p> <ol style="list-style-type: none"> 3. Assess potential and to prepare an employee through appropriate feedback and guidance for higher responsibilities which connects with monetary rewards and to act as a tool for Human Resource Development. 4. Create a productive, engaged workforce and to eliminate the perception that organized labor and management have a perpetually adversarial relationship 5. Secure industrial peace and harmony by providing machinery and procedure for the investigation and settlement of Industrial Disputes 			
II	21MBACC 203	Core 9: Financial Framework for Decision Making (F)	<ol style="list-style-type: none"> 1. Identify relevant concept in connection with Financial Management. 2. Understand the role of financial accounting in business firms and the essentials of finance manager and financial markets so as to enable the students to gain an understanding of market mechanisms. 3. Be aware of the necessary pros and cons of financial instruments available in the market. 4. Understand the fundamental concepts of Finance. 5. □ Acquaint students with the concept of working capital and its requirements in business operations. 	4	40	60
II	21MBACC 204	Core 10: Production & Operations Management (Ad)	<ol style="list-style-type: none"> 1. Demonstrate an understanding of production as a process of converting or transforming resources for the effective production of goods & services. 2. Demonstrate an understanding of the manager's concern in planning, organizing, directing, and controlling productive operations to meet organizational objectives. 3. Develop an understanding of how the operations have strategic importance and can provide a competitive advantage in the workplace. 4. Demonstrate an understanding of capacity planning, productivity 	4	40	60



			measures, scheduling, critical path identification, total quality management, etc. 5. Understand how to manage resources to achieve superior quality through statistical process control through effective analysis.			
II	21MBACC 205	Core 11: Business Research Methods (Ad)	1. Describe types of research based on utility. 2. Identify types of scale of measurement. 3. Design questionnaire for primary research. 4. Evaluate the type of hypothesis test to be applied. 5. Differentiate types of report.	4	40	60
II	21MBACC 206	Core 12: Strategic Cost Management	1. Impart a conceptual knowledge in Strategic Cost Management 2. Impart a conceptual knowledge in Some Emerging Concepts of Cost Accounting 3. Understand the fundamental concepts of Material Costing 4. Understand and determine Stock Levels, EOQ, Stock Ledger & Inventory Turnover 5. Understand the fundamental concepts of Labor cost & Overhead 6. Understand and determine various wage Payment Systems, labor Turnover and various methods of reapportionment of service department overheads to production department 7. Inculcate deeper knowledge in standard costing methods to analyze the costs which impact the profitability of a firm. 8. Inculcate deeper knowledge in Marginal costing methods to analyze the costs which impact the profitability of a firm.	4	40	60
II	21MBAID2 01	DSE-ID 2: Quantitative & Business Analytics	1. Impart a conceptual knowledge in Quantitative Analysis 2. Impart a conceptual knowledge in hypothesis testing 3. Understand the fundamental concepts of Business Research Testing 4. Understand and determine appropriate test, level of significance, etc 5. Understand the fundamental concepts of type of decision rule and type of error. 6. Understand and determine various types of tests, t-test, z-test, ANOVA, Chi Square, Non-parametric tests. 7. Inculcate deeper knowledge in Parametric Test and using	4	40	60



			<p>appropriate test and obtaining quantitative output.</p> <p>8. Inculcate deeper knowledge in Non - Parametric Test and using appropriate test and obtaining quantitative output.</p> <p>9. Enable the students to identify and use of appropriate test in various cases under correct assumptions.</p> <p>10. Enable the students to understand, prepare & analysis of summary of business cases and use correct research tools to get correct business decision.</p>			
II	21CEWE20 1	SEC-1 Wisdom & Ethics for Success in Life	<p>1. Differentiate the career success, academic success and life success</p> <p>2. Identify the correct priority order in life and illustrate the human goal</p> <p>3. Understand that the relationships are definite.</p> <p>4. Understand the Interconnectedness between all the orders in existence.</p>	2		
III	21MBACC 301	Core 13: (F) Business Law	<p>1. To demonstrate the relationship between law and economic activity by developing in the student an awareness of legal principles involved in economic relationships and business transactions.</p> <p>2. To develop in the student habits of analytical thinking and logical reasoning as a technique for decision-making.</p> <p>3. To develop in the student acceptable attitudes and viewpoints with respect to Business documentation and Income tax perspective of organization.</p> <p>4. To make students aware about legal aspects of business within which business activities are needed to carry out with different forms of business for sustainable growth & development of economy.</p> <p>5. To inculcate awareness regarding jurisdiction of India affecting managerial decisions, Environment protection, Public policy, IT and IPR.</p>	4	40	60
III	21MBACC 302	Core 14: (Ap) Dynamic Skills at	1. Understand the meaning of the word dynamic & understanding the	4	40	60



		Work	<p>importance of knowledge, skill & ability through conceptual frames & activity based learning.</p> <ol style="list-style-type: none"> 2. Provide students the importance of standard & specific skill set, required to perform different roles of an individual- effectively. 3. Make available the vision & mission of an individual to head in the correct direction towards achieving professional & personal goals. 4. Establish the lens of students in a way to look at habit as the micro & most important element of character building. 5. Study the challenges before identifying & cultivating correct habits which ultimately carves their personalities. 6. Understand the importance of rectifying the habits through trial & error & observation study. 7. Consider the validity of a possessed skill set with the required one to perform the role of an effective manager. 8. See the implication of the earlier habits/skill set & match it with the improved one to be a successful manager. 9. See the practicability of theoretical frames through case studies & activities at every unit. 10. Visualize real time scenarios of the learned concepts in the specialized area of interest. 			
III	21MBACC 303	Core Practical 1: Summer Internship Project	<ol style="list-style-type: none"> 1. To involve students in identifying and understanding the Industry oriented problem(s) & encourage them to contribute the real time solutions. 2. To give participants an insight to learn practical aspects of professional work life and gaining deeper understanding of specific functional areas. 3. To explore career opportunities in the area of student's interest while gaining hands-on experience in a corporate environment. 4. To assist the student's development of employer-valued skills such as teamwork, learning ability & workplace behavior. 5. To provide students an industrial exposure and encourage them to create a professional network resulting future employment opportunities. 6. To help participants develop an appreciation for the linkages among different functions and developing a realistic managerial 	8	-	100



			perspective about organizations in their totality.			
III	22MBADC 301/21MB ADC304 / 21MBADC 307 / 21MBADC 310 / 21MBADC 313	DSE Core – 01: (Ad) International Trade Environment / Management of Financial Services / Consumer Insights & Trends / Change Management and Organizational Development / Business Strategies & Policies for Corporate Entrepreneurship	<p>International Trade Environment/22MBADC301</p> <ol style="list-style-type: none"> 1. Detailed assessment of the institutional infrastructure available for promoting foreign trade in India and the World. 2. Comprehension of the role of international trade blocs, agreements and institutions in facilitating foreign trade. 3. Judge global opportunities in trade through the prism of social accountability and ethics. 4. Combine multifaceted association or institution on global trade opportunities. 5. To understand and analyze the applicability of foreign trade for international Business. <p>Management of Financial Services/21MBADC304</p> <ol style="list-style-type: none"> 1. Identify relevance with the concept, scope and functions of Management of Financial Services 2. Understand about various factors that are having impact on the functioning of Indian Financial System. 3. Aware about the nature and suitability of various Financial Services offered in the international financial market. 4. Understand & develop insights regarding concept & mechanism of financial market & its impact on Indian economy. 5. Analyze the broader knowledge about asset based & advisory financial services. <p>Consumer Insights & Trends /21MBADC307</p> <ol style="list-style-type: none"> 1. Identify relevance with the concept, scope and functions of Consumer's behavioral components. 2. Understand the role of Motivation, Personality, Attitude, Perception and other behavioral essentials to enable students to gain an understanding of consumer mechanism. 3. Bring the awareness with necessary pros and cons of understanding the impact of these components. 4. Understand the fundamental concepts of Consumer insights. 5. To familiarize students with this concept to make him/her a smart 	4	40	60



		<p>consumer first.</p> <p>6. Understand different factors influencing consumer behavior & then observing its impact in the internal & external groups.</p> <p>7. To understand different attitudes of consumer with the help of communication.</p> <p>8. Understand very vital aspects of consumer decision making in every situation</p> <p>9. Understand the internal forces, external influences and processes that go on to affect consumer behavior, the challenges generated for the marketers and the strategies which could be implemented</p> <p>10. Understanding this mechanism of how consumer's get motivated by colleagues/friends/self. What personality of consumers buy what products more etc..</p> <p>Change Management and Organizational Development/21MBADC310</p> <p>1. To synthesis the understanding of occurrence of change in organization and also to drive change to stay a step ahead.</p> <p>2. To develop behavioural science skill and attributes of a students as a future OD Practitioner and Change Agent.</p> <p>3. To understand and apply concepts, theories, models and latest researches that forms a core of organizational development.</p> <p>4. To promote effective implementation of team and interterm and Personal and Interpersonal OD Concepts</p> <p>5. To explore the need to build an OD background and Developing and Increased knowledge of OD through importance of Planned Change.</p> <p>Business Strategies & Policies for Corporate Entrepreneurship/21MBADC313</p> <p>1. Identify & appraise the resources and capabilities of the firm in terms of their ability to confer sustainable competitive advantage and formulate strategies that leverage a firm's core competencies.</p> <p>2. Understand the strategic decisions that organizations make and have an ability to engage in strategic planning</p> <p>3. Analyze about the nature and suitability of various Financial Services offered in the international financial market.</p>			
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			<p>4. Recognize the different stages of industry evolution and recommend strategies appropriate to each stage.</p> <p>5. Demonstrate understanding of the concept of competitive advantage and its sources and the ability to recognize it in real-world scenarios.</p>			
III	<p>22MBADC 302 /</p> <p>21MBADC 305 /</p> <p>21MBADC 308 /</p> <p>21MBADC 311 /</p> <p>21MBADC 314</p>	<p>DSE Core – 02: (Ad) Finance of International Trade / Investment Analysis and Portfolio Management / Integrated Marketing Communication / Employee Relations & Labor Law / Entrepreneurial Skills & Competencies for Business Management</p>	<p>Finance of International Trade/22MBADC302</p> <p>1. Identify relevance with the concept, scope and functions of financial management in international Market</p> <p>2. Understand the role of finance in business firms and the essentials of finance manager and financial markets so as to enable the students to gain an understanding of market mechanisms Internationally.</p> <p>3. Aware of the necessary pros and cons of financial instruments available in the International market.</p> <p>4. Understand the fundamental concepts of Finance with respect to International Trade.</p> <p>5. To acquaint students with the concepts of Foreign Exchange and its requirements.</p> <p>Investment Analysis and Portfolio Management/21MBADC305</p> <p>1. Understand the principles of portfolio theory and the effect of diversification on investment portfolios.</p> <p>2. Learn to compute historical and expected returns as well as risk measures and comprehend the importance of the risk-return relationship.</p> <p>3. Learn how the financial markets operate, how we can invest in different security types matching investor’s portfolio objectives and constraint.</p> <p>4. Define the objectives in constructing and managing a portfolio and learn to create an investment policy statement.</p> <p>5. Measure and evaluate portfolio performance and understand the key features of futures and options and how they can be used to manage the risk of the portfolio.</p> <p>Integrated Marketing Communication/ 21MBADC308</p>	4	40	60



		<ol style="list-style-type: none"> 1. Identify relevance with the concept, scope and functions of Integrated Marketing Communication. 2. Understand the role of In house advertising department & outsourcing marketing/advertising agencies so as to enable students to gain an understanding of market mechanisms. 3. Aware with necessary pros and cons of sales promotion instruments available in the market. 4. Understand the fundamental concepts of Marketing communication. 5. To acquaint students with the concepts of Advertising/Promotion/Communication amongst the business organization, employees & customers. 6. Understanding Indian Media process, specifically with focus on Advertising. 7. Understanding consumers & organizing promotion accordingly cost effectively. 8. Understanding strategic planning & execution in Advertising campaigns. 9. Understanding media selection, Evaluation & the role of Internet in communication. 10. Understanding Social marketing communication with Legal & Ethical issues in Advertising, Publicity, Public relations with respect to Marketing Communication. <p>Employee Relations & Labor Law/21MBADC311</p> <ol style="list-style-type: none"> 1. To understand concepts & practical implication of Industrial Relations in an Organization. 2. To analyse the measures to strengthen trade unions and its provisions for workers. 3. To understand the ways to deal with labour laws at workplace. 4. To understand process preventive machinery of industrial relations in organizational setting. 5. To understand & learn applicability of employment Legislations at Work place. 			
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		<p>Entrepreneurial Skills & Competencies for Business Management/21MBADC314</p> <ol style="list-style-type: none"> 1. Impart a conceptual knowledge related to various entrepreneurial skills 2. Impart a conceptual knowledge in requirement of strategic skills required for business management 3. Understand the fundamental concepts of marketing skills for entrepreneurs. 4. Understand and determine appropriate needs of market in short and long term systematically. 5. Understand the fundamental concepts of leadership skills for entrepreneurs. 6. Understand and determine various types' leaders and their leadership skills during various stages of entrepreneurship journey. 7. Inculcate deeper knowledge in organizational skills including delegation and getting work done. 8. Enable the students to identify skill and competencies gap among various leaders around world and him for making corrective actions. 9. Inculcate deeper knowledge in Problem-solving Skills and Self-management Skills. 10. Enable the students to understand, prepare & analysis of various skill sets required for entrepreneurs. <ol style="list-style-type: none"> 1. Impart a conceptual knowledge related to various entrepreneurial skills 2. Impart a conceptual knowledge in requirement of strategic skills required for business management 3. Understand the fundamental concepts of marketing skills for entrepreneurs. 4. Understand and determine appropriate needs of market in short and long term systematically. 5. Understand the fundamental concepts of leadership skills for entrepreneurs. 6. Understand and determine various types' leaders and their leadership skills during various stages of entrepreneurship journey. 7. Inculcate deeper knowledge in organizational skills including delegation and getting work done. 			
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			<p>8. Enable the students to identify skill and competencies gap among various leaders around world and him for making corrective actions.</p> <p>9. Inculcate deeper knowledge in Problem-solving Skills and Self-management Skills.</p> <p>10. Enable the students to understand, prepare & analysis of various skill sets required for entrepreneurs.</p>			
III	<p>22MBADC 303 / 21MBADC 306 / 21MBADC 309 / 21MBADC 312 / 21MBADC 315</p>	<p>DSE Core – 03: (Ad) Export - Import Management / Mergers & Acquisitions / Service and Relationship Marketing / Strategic Human Resource Management / Intellectual Property for Entrepreneurs</p>	<p>Export - Import Management/22MBADC303</p> <p>1. Evaluate and justify the various documents for processing export and import orders.</p> <p>2. Developing analytical skills for identifying export opportunities and undertaking export marketing in countries offering export potential for wide ranging products of Indian origin.</p> <p>3. Understand the implications of foreign trade policy.</p> <p>4. Evaluate the legal implications in the area of exports and imports.</p> <p>5. Clarity in understanding the various export-import documents, and ability to clearly communicate specific details in written and oral communication.</p> <p>Mergers & Acquisitions/21MBADC306</p> <p>1. Impart a conceptual knowledge related to various aspects of mergers and acquisitions.</p> <p>2. Impart a conceptual knowledge in requirement of strategic aspects required for business management</p> <p>3. Understand the fundamental concepts of takeover techniques and handling during expansion phase.</p> <p>4. Understand and determine appropriate needs of takeover defense tactics in short and long term systematically.</p> <p>5. Understand the fundamental concepts of leadership skills during various phases of merger.</p> <p>6. Understand and various types cases studies and their various aspects during various stages of merger and acquisition journey.</p> <p>7. Inculcate deeper knowledge in other forms like LBO and Strategic Alliances.</p> <p>8. Enable the students to identify skill and competencies required to understand various forms of mergers and acquisitions.</p> <p>9. Inculcate deeper knowledge in Problem-solving Skill related to</p>	4	40	60



		<p>evaluation and assessment of valuations.</p> <p>10. Enable the students to understand cases of merger and acquisition along with different forms of corporate restructuring.</p> <p>Service and Relationship Marketing/21MBADC309</p> <ol style="list-style-type: none"> 1. Understanding the challenges of the journey from product to services, delivery of service quality & measuring customer satisfaction with the development of sustainable service models. 2. Explain and demonstrate how service products differ from tangible goods, and how this impacts on marketing strategy design and execution. 3. Apply the extended services marketing mix to develop a product or marketing strategy for an organization. 4. Recognize service quality and productivity issues and key success factors in the creation of service based competitive advantage. 5. Evaluate the implications of establishing long-term relationships with a variety of audiences. <p>Strategic Human Resource Management/21MBADC312</p> <ol style="list-style-type: none"> 1. Understand strategic HRM issues and its application 2. Develop strategic thinking and ability to integrate HR activity with organizational goal 3. Understand strategic approach to HR acquisition, recruitment and selection. 4. Understand the benefit of strategic compensation and employee retention strategies 5. Application of Strategic Management in Other HR scenarios <p>Intellectual Property for Entrepreneurs/21MBADC315</p> <ol style="list-style-type: none"> 1. Basic understanding of Intellectual Property right and Legal framework applicable for entrepreneurs to register their start up 2. To introduce fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries. 			
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			<p>3. To disseminate knowledge on patents, patent regime in India and abroad and registration aspects.</p> <p>4. To disseminate knowledge on Trademark, registration aspects, related laws and importance of trademark in business and corporate</p> <p>5. Student will get overview design and geographical indication and practical implication of IPR</p>			
III	21MBACE 301/21MB ACE302	<p>Core Elective 1: (Ap) Event Management or Financial Planning</p>	<p>Event Management /</p> <p>1. To analyze the role of creativity in event management process and study about the various types of event management structure</p> <p>2. Know about the roles and responsibilities of people involved in planning and delivering of events and be able to plan and develop timeline for event management</p> <p>3. To identify the role of branding in event management and understand the various leadership skills required in event management</p> <p>4. Highlight the importance of interpersonal relations and understand the role of management skills in event management</p> <p>5. Analyze the reasons for popularity of festivals as events and highlight the various activities associated with special event</p> <p>Financial Planning</p> <p>1. To understand the importance of financial planning, the financial planning process, investment avenues and ethical considerations in financial planning.</p> <p>2. To develop analytical skills with the aim to facilitate effective financial decision making for handling finance efficiently in their real life.</p> <p>3. To develop insights regarding the nature & suitability of various investment schemes as per the life style & individual's objective.</p> <p>4. To develop the skills for developing the diversified portfolio, its revision & management resulting maximization of wealth.</p> <p>5. To financially responsible adults who will save regularly and use credit wisely.</p>	3	40	60
III	21MBAGE 01		<p>1. To manage tour and travel related procedures and activities enabling students to become effective managers.</p>	2	30	70



		Generic Elective:	<ol style="list-style-type: none"> 2. To inculcate knowledge and skills essential in the administration and management of tour operations as a business. 3. To understand the functions & duties of Travel agents & operators. 4. To make students aware about the background elements of tourism resources. 5. To understand resource attractions of visit places and disseminate information to visitors. 			
III	21MBACC 401	Core – 15: Management Paradigms from Bhagavad Gita	<ol style="list-style-type: none"> 1. To identify some of the commonly felt problems that individuals, organizations, societies, nations & the planet are facing. 2. To illustrate the usefulness of Bhagavad Gita in addressing some of the management practices. 3. To demonstrate how alternative worldviews and paradigms of management could be developed with knowledge of Ancient Indian wisdom such as Bhagavad Gita. 4. To provide real time learning to students from ancient Indian wisdom using Bhagavad Gita as a medium. 5. To develop reflective and intuitive minds of students who don't only work upon the logics but also on the conscientiousness and To increase the motivation & morale of future managers to be able to hold the managerial positions confidently. 	4	40	60
III	22MBACC 402	Core Practical 2: Comprehensive	<ul style="list-style-type: none"> • CP should involve the application of management and scientific techniques to a unique problem or task with the potential of contributing to the solution of the problem and producing change. However, the comprehensive project is not expected to be an original solution to the problem. • Selection of an appropriate topic is done in consultation with the students' academic advisor / internal guide. Typically, this occurs at a time of the commencement of the 4th semester. • Provide students with the opportunity to learn about problems faced by businesses and ways of finding remedies for them, to refine research skills and demonstrate their proficiency in written and/or oral communication. • Allow students to apply the knowledge and extend their 	8	50	50



		Project	<p>academic experience into areas of personal interest, working with new ideas and solving specific issues.</p> <ul style="list-style-type: none"> Students can undertake a study pertaining to an entire industry and develop a holistic and macro view of the environment or students can undertake independently researched business plan for a new business venture which might justify investment against a predicted return. 			
IV	<p>22MBADC 401 / 21MBADC 404 / 21MBADC 407 / 21MBADC 410 / 21MBADC 413</p>	<p>DSE Core – 04: International Trade & Policy Framework / International Finance / International Marketing / Talent Management / Startups, Innovation & Funding</p>	<p>International Trade & Policy Framework</p> <ol style="list-style-type: none"> Identify relevance with the foundation knowledge of International Trade & Policy Framework. Understand the basic Concepts and how to manage the family business worldwide. Aware about the concepts of international business and they are able to start their own start-ups & can cover the international market. Understand the fundamental concepts & necessary to provide hands on experience with appropriate concepts & Cases. To acquaint with the concepts of international Currency and its requirements & provides an active learning platform regarding in-depth knowledge on how to execute the International Trade & Policy Framework. <p>International Finance</p> <ol style="list-style-type: none"> Identify relevance with the concept, scope and functions of International financial management. Understand the role of International finance in business firms and the essentials of finance manager and financial markets so as to enable the students to gain an understanding of market mechanisms. Aware of the necessary pros and cons of financial instruments available in the market. Understand the fundamental concepts of International Finance. To acquaint myself with the concepts of international Currency and its requirements. <p>International Marketing</p> <ol style="list-style-type: none"> Develop an understanding of and an appreciation for basic international marketing concepts, theories, principles, and terminology. Be able to demonstrate an awareness and knowledge of the impact 	4	40	60



		<p>of environmental factors (cultural, economic, institutional, legal and political) on international marketing activities.</p> <p>3. Be capable of identifying international customers through conducting market analysis and developing cross-border segmentation and positioning strategies.</p> <p>4. Be capable of developing a global marketing strategy by applying the basic concepts of product, pricing, promotion, and channels of distribution in international settings.</p> <p>5. Be able to apply an integrated understanding of the course material by conducting an analysis of international marketing issues in relevant case studies and current events identifying factors that contribute to the challenges faced by marketers internationally, and developing corresponding solution options based on multiple perspectives.</p> <p>Talent Management</p> <p>1. To discuss the issues from two perspectives: managing talent in organizations as well as managing one's own talents as an individual</p> <p>2. Understand organizational impacts of knowledge management on people and organizational performance</p> <p>3. It focuses on the alignment of the talent management process with business strategy, with culture, and with people.</p> <p>4. To impart the knowledge on talent and knowledge management and its importance in contemporary business.</p> <p>5. It focuses application of concepts for the corporate sector.</p> <p>Start ups, Innovation & Funding</p> <p>1. To Define various tool required for running their Start-ups</p> <p>2. Classify & learn various Opportunity and Discovery for Expansion</p> <p>3. To Analyze various Creativity & Innovation Techniques to formulate strategies</p> <p>4. Analyze & learn various venture financing methods, strategies, art of raising funds</p> <p>5. Understand and identify available financing options and develop the skills to generate business through exposure to basic concepts of start-up economics.</p>			
IV	22MBADC 402 /	<p>International Advertising and Brand Management</p> <p>1. Identify relevance with the rigors of advertising and brand</p>	4	40	60



	<p>21MBADC 405 / 21MBADC 408 / 21MBADC 411 / 21MBADC 414</p>	<p>DSE Core – 05: International Advertising and Brand Management / Derivatives & Risk Management / Sales and Distribution Management / Human Resource Development / Strategic Leadership for Family Business Management</p>	<p>management.</p> <ol style="list-style-type: none"> 2. Understand students to be able to manage the advertising and branding activities in the international markets. 3. Aware about brand and brand management along with brand identification and brand building. 4. Understand how to create brand equity and loyalty as pillars of successful marketer as well as to establish Indian brands at global market. 5. To acquaint with the concepts of international Advertising and Brand Management <p>Derivatives & Risk Management</p> <ol style="list-style-type: none"> 1. To inculcate the risk management skill through risk identification & risk measurement. 2. To demonstrate an understanding of pricing forwards, futures and options contracts for hedging the financial risk. 3. To demonstrate critical thinking, analytical and problem solving skills in the context of derivatives pricing and hedging practice. 4. To familiarize the students with the binomial model and its extension in continuous time to the Black-Scholes model for sound financial decisions. 5. To analyse and price diverse derivatives products to generate an optimal risk management strategy. <p>Sales and Distribution Management</p> <ol style="list-style-type: none"> 1. Understanding of the sales and distribution processes in organizations. 2. Understanding of the concepts, attitudes, techniques and approaches required for effective decision making in the areas of Sales and Distribution. 3. Understanding special emphasis on the practicing manager's problems and dilemmas. 4. Understanding, skills critical for generating, evaluating and selecting sales and distribution strategies. 5. Understanding the role of Logistics, SCM in national & international markets. <p>Human Resource Development</p>			
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			<p>. To develop the understanding of the concept of human resource management and to understand its relevance in organizations.</p> <p>2. To identify individual performance deficiencies and developmental needs in planning and developing training and HRD programs.</p> <p>3. To develop understanding of significance importance of implementation & evaluation in real life.</p> <p>4. To develop relevant skills necessary for application in HR related issues</p> <p>5. To Enable the students to integrate the understanding of various HR concepts and latest trends along with the domain concept in order to take correct business decisions</p>			
IV	<p>22MBADC 403 / 21MBADC 406 / 21MBADC 409 / 21MBADC 412 / 21MBADC 415</p>	<p>DSE Core – 06: Indian Business Sustainability in International Business / Goods & Service Tax / Product & Brand Management / Compensation Management / Corporate Social Responsibility and Business Sustainability</p>	<p>Indian Business Sustainability in International Business</p> <p>1. Identify the need of a global business environment, as it is rapidly evolving every minute. By exposing on a global scale, you will have a better understanding of various businesses, markets and cultures.</p> <p>2. Understand how markets are affected by world events, and how to assess a firms' financial health.</p> <p>3. Aware students realize how Participating in international business allows countries to take advantage of their comparative advantage.</p> <p>4. Understand & engage students with the world of business through the context of current business developments and real business situations.</p> <p>5. To acquaint with the concepts of international comprehend the sectoral analysis of Indian businesses- to go international.</p> <p>Goods & Service Tax</p> <p>1. To have insights in goods and services of tax.</p> <p>2. To mechanize transactions of goods and services as per GST regulations.</p> <p>3. To compliance procedural aspects related to goods and service transactions.</p> <p>4. To insights the application in small enterprise, trade related and construction services.</p> <p>5. To insights the application in finance, business and community services.</p>	4	40	60



			<p>Product & Brand Management</p> <ol style="list-style-type: none"> 1. Understanding the significance of product strategy as a critical source of business competitiveness and long term success. 2. Understanding the theoretical and practical foundations to product management including product portfolio, development process and life cycle analysis. 3. Acquainting students with the concepts of brand building and management to keep brands strong and relevant for years to come. 4. To manage and measure the Brand through different criteria for having an effective Branding. 5. Ability of managing a brand over geographic boundaries and measuring the brand's performance. <p>Compensation Management</p> <ol style="list-style-type: none"> 1. Providing insights in to strategic choices in understanding, developing and managing compensation. 2. To inculcate analytical skills in students to identify the link between designing & developing compensation pay system 3. To learn various labour laws related to the Compensation Management. 4. To develop the understanding of designing salary component. 5. Illustrating new development in compensation as well as established approaches to compensation decision. <p>Corporate Social Responsibility and Business Sustainability</p> <ol style="list-style-type: none"> 1. To understand the concept & application of social responsibility in organization 2. To aware students regarding sustainable corporate responsibility and its relevance in India & Globe. 3. To Acquaint students with knowledge of legislation related to the corporate social responsibility 4. To Familiarize the dimension of sustainability – environment, economic & social which helps in enhancing strategic decision making 5. To develop the understanding & application of new trends of of corporate sustainability in business at national & international Level. 			
IV			Behavioral Finance			



	21MBACE 401 / 21MBACE 402	Core Elective 2: Behavioral Finance / Digital Marketing	<ol style="list-style-type: none"> 1. To inculcate an understanding of how individuals actually make financial decisions (descriptive) and guidance on how to improve financial decision making (prescriptive) in themselves and others. 2. To demonstrate effective decision making using & collaborating skills needed to make critical financial decisions and accomplish financial goals. 3. To develop analytical skills with the aim to facilitate effective financial decision making for handling finance efficiently in their real life. 4. To gain an understanding of how individuals actually make financial decisions (descriptive) and guidance on how to improve financial decision making (prescriptive) in themselves and others. 5. To understand the twisted logic that run in our head & hinders us to establish the balance between probabilistic truth & illusions that infect our decision making. <p>Digital Marketing</p> <ol style="list-style-type: none"> 1. To provide the understanding & importance of online presence to the business through website & social media 2. Design creative & innovative thinking for new & interesting ways of marketing to target customers through digital channels 3. To build competitive business strategies resulting growth in the market reach and customer's awareness towards company's products and services 4. To Demonstrate the various ways of promotion for brands or products via one or more forms of digital media 5. Analyze the e-resource for online business performance & to sustain customers with delight. 	4	40	60
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Faculty of Business & Commerce
Department of Management
Program: I.M. B. A. (2021)

Program Objective:

Courses & components offered in this program are designed such that students will be able to identify the 21st century requirements of the business world and match it with his/her competency set to move towards the advancement for the holistic development on the path of being a successful future manager. The program is intended to prepare students for lifelong learning as they undertake professional careers in Business practices with the ability to work well in a multi-disciplinary environment. Finally, students will graduate with an understanding of the context of their knowledge, skills and abilities within a broader academic and applied scenario.

Graduate Attributes:

- **Core Competence:** Possess discipline-relevant knowledge and competencies and able to link them to local, national and global issues to seek positive and sustainable solutions.
- **Transferable Global & Impactful Societal Skills:** Ability to create knowledge through research and innovations by social immersions and transferring them to impact through problem solving at local and global levels.
- **Adaptability and Resilience:** Demonstrate resilience, perseverance and positivity in unfamiliar situations and adapt their skills and knowledge to excel in new environment.
- **Sense of Purpose & Curiosity:** Possess intellectual curiosity to apply the knowledge to generate, develop and realize new ideas.
- **Ethics & Lifelong Immersive Learning:** Adhered to highest standards of ethics and always amenable to new ideas and actively seek out new ways of learning.



Program Educational Objectives (PEOs):

Our programme will produce Post Graduates who:	
PEO 1	: Depth and breadth of knowledge: will be capable to critically identify, analyze, design and solve complex and emerging problems of the 21 st century Business world.
PEO 2	: Practice, Operation and usage of modern tools and technology: will be capable to solve real time problems, to carry out research with technological approach by using modern techniques that are managerially sound, economically feasible and socially acceptable.
PEO 3	: Professional capacity and passion of learning: will be able to establish professionalism in the field of Business Administration, its applications in various sectors and core industries with continuous enhancement of skills and knowledge.
PEO 4	: Research, numeracy, scholarship and data literacy: will enhance the capability in pursuing Research in emerging areas of Business Administration and inculcate the culture of taking up the research and innovations.
PEO 5	: Global, moral and aesthetic sustainability: will have harmonies approach, ethical attitude, communication skills, team work in their profession and adapt to current trends by engaging in lifelong learning.

Program Outcomes (POs):

After completion of the programme the Post graduate will:	
PO 1	: Domain knowledge: Acquire in-depth theoretical and practical competence in Business Administration and Managerial practices.
PO 2	: Problem analysis: Analyze and understand the requirement of 21 st century Businesses to establish sustainable business models.



PO 3	:	Conduct investigations of complex problems: Exhibit skill and knowledge to perform experiments and operate through the requirements for research.
PO 4	:	Modern tool usage: Model and witness the implementation ofdynamic managerial practices with the help of case studies as a tool.
PO 5	:	Environment and sustainability: Examine global environmental problems and critically evaluate evidence to formulate and organize sustainable strategies.
PO 6	:	Ethics: Apply harmonies principles and entrust to professional ethics and responsibilities of the Business Administration & Managerial practices.
PO 7	:	Individual and team work: An ability to evaluate critically one’s own action and work and make decisions by considering professional and social responsibilities.
PO 8	:	Communication: Ability to write and presentresearch to a technically literate audience by means of research article, presentation or a written report/thesis.
PO 9	:	Life-long learning: Able to put together and evaluate the problems and data base from a variety of sourcesby appealing in lifelong learning.

Programme Specific Outcome (PSOs):

After completion of the programme the Post graduate will:		
PSO 1	:	Able to understand various Business practices related to administration and management.
PSO 2	:	Able to analyze the current problems faced by various businesses with reference to finance, marketing, human resource or international business &select appropriate strategies to solve themfor industrial and domestic applications.
PSO 3	:	Able to design, analyze and simulate various business situations through planning, organizing, staffing, directing, controlling, coordinating, reporting & budgeting (POSDCORB) techniques &systems.



PSO 4	Able to get hands on experience of business & managerial practices through internship and innovate them to lead towards the research and industrial work.
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Course Outcomes (COs): IMBA (2021 SLE)

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21IMBAC C101	Core 1: Framework of Fundamental Business Concepts (F)	<ol style="list-style-type: none"> 1. Have fundamental understanding of concepts and practices of management to learn effective managerial practices. 2. Understand traditional & contemporary management schools, theories & practices. 3. Have broad & specific outlook of economy as a whole & business practices in specific. 4. Establish entrepreneurial skill & knowledge that act as a basic requirement to start any business. 5. Study the challenges before modern businesses and familiarize students about special fields in management with their applications. 6. Understand different structures of organizations & its functionality. 7. Understand organizational strategies & tactics to handle routine business effectively. 8. Improve the knowledge of budgeting & finance to let the money flow productively. 9. See the practicability of theoretical frames through case studies. 10. Visualize real time scenarios of the learned concepts. 	4	40	60
I	21IMBAC C102	Core 2: Business Environment(F)	<ol style="list-style-type: none"> 1. To clarify the overall concept of business environment 2. To identify the content, process and the outcomes of Economic Policy and its applications. 	4	40	60



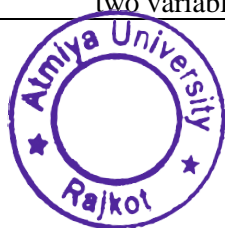
			<ol style="list-style-type: none"> 3. To develop the basic set of methods and techniques needed for managing business. 4. To learn about basic administrative processes related to business. 			
I	21IMBAC C103	Core 3: Economic Analysis for Business Decisions(F)	<ol style="list-style-type: none"> 1. Explain principles of economics. 2. Summarize the factors affecting demand and supply of commodity. 3. Classify cost into various categories. 4. Decide break-even point for a given data. 5. Differentiate various types of markets. 	4	40	60
I	21IMBAC C104	Core 4: Principles & Practices of Accounting(F)	<ol style="list-style-type: none"> 1. Identify relevant principles in connection with an accounting transactions 2. Understand the role of financial accounting in business firms and the essentials of financial accounting 3. Identify the conceptual foundation of Book keeping 4. Describe and illustrate the method of preparing Journal, Ledger, Subsidiary books, Cash Book & trial balance 5. Describe the form and content of statement of profit and loss and balance sheet of a company as per (revised) schedule VI; 6. Prepare necessary accounts in Company Final Account 7. Have a knowledge about various tools of analysis of financial statement 8. Enable to preparing statements of analysis of financial statements 9. Have a knowledge about all types of ratios 10. Enable the students to evaluate the Financial Performance through various ratios. 	4	40	60
II	21IMBAC C201	Core 5: Conceptual Study for Future Managers(F)	<ol style="list-style-type: none"> 1. Understand a conceptual frame which is the basic advantage that students gain when they are accomplishing their degree- towards the goal to be 			



II			<p>an effective manager.</p> <ol style="list-style-type: none"> 2. Familiarize the students with traditional & contemporary management schools, theories & practices with reference to Indian constitution. 3. Make available, detailed understanding regarding various functions & processes of management with their relevance and applications. 4. Let students understand career aspects from a managerial point of view & also be aware of work life balance. 5. Study the challenges before modern businesses and familiarize students about special fields in management with their applications. 6. Understand the dynamics of people management & strategies to deal with it. 7. Understand organizational management aspects to do a pilot study of models & matrix. 8. Learn with reference to modern day business requirements- the necessary strategies & tactics. 9. See the practicability of theoretical frames through case & model based studies. 10. Visualize real time scenarios of the learned concepts. 			
II	21IMBAC C202	Core 6: Business Structure & Process (F)	<ol style="list-style-type: none"> 1. Understand Business structures & processes to create sustainability in business practices, which is the essential need & requirement of the economy hence preparing future managers for the same. 2. Make available, detailed understanding regarding various functions & processes of management with their relevance and applications. 3. Study the challenges before modern businesses and familiarize students about special fields in management with their applications. 4. Let students visualize & understand about Successful organizations & their business 	4	40	60



			structures & processes. 5. Learn with reference to modern day business requirements- the necessary strategies & tactics.			
II	21IMBAC C203	Core 7: Financial Reporting(Ad)	<ol style="list-style-type: none"> 1. Describe the form and content of statement of profit and loss and balance sheet of a company as per (revised) schedule VI; 2. Prepare necessary accounts in Company Final Account 3. Explain the accounting treatment for issue of shares, forfeiture of shares and reissue of forfeited shares 4. Demonstrate the concept of issue of Equity shares and debentures 5. Have a knowledge about various tools of analysis of financial statement 6. Enable to preparing statements of analysis of financial statements 7. Assess the valuation of goodwill and shares 8. Understand the fundamental concepts of Goodwill & Shares 9. Understand the fundamental concepts of Fire Insurance claims 10. Prepare necessary accounts in Fire Insurance claims 	4	40	60
II	21IMBAID 201	IDC 2: Business Statistics	<ol style="list-style-type: none"> 1. Identify basics of quantitative statistics and different diagrams and charts used for presentation of data. 2. Classification, arrangement and properly tabulation of data. 3. Interpret statistical analysis tools commonly used in business decision making. 4. Analyzing various quantitative tools and techniques relevant to business analysis for two variables. 	4	40	60



			5. Evaluate business decision under various situation of business.			
II	22IMBAIC 202	IDC 3:(Practical) Computer Proficiency for Managers	<ol style="list-style-type: none"> 1. Understand Basics of Computer 2. Classify network types and devices. 3. Explain applications of internet. 4. Perform documentation and calculations based activities using word processor and spreadsheet applications. 5. Present report or concepts with proper animations and charts using presentation software. 	4	40	60
II	21AEHV20 2	AECC III: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Differentiate the career success, academic success and life success 2. Identify the correct priority order in life and illustrate the human goal 3. Understand that the relationships are definite. 4. Understand the Interconnectedness between all the orders in existence. 	2		
III	21IMBAC C301	Core 8: (F) Financial Framework for Decision Making – I	<ol style="list-style-type: none"> 1. Identify relevance with the concept, scope and functions of financial management. 2. Understand the role of finance in business firms and the essentials of finance manager and financial markets so as to enable the students to gain an understanding of market mechanisms. 3. Aware of the necessary pros and cons of financial instruments available in the market. 4. Understand the fundamental concepts of Finance. 5. To acquaint myself with the concepts of working capital and its requirements. 	4	40	60
III	21IMBAC C302	Core 9: (F) Fundamentals of Marketing Management	<ol style="list-style-type: none"> 1. Identify relevance with the concept, scope and functions of Marketing. 2. Understand the role of marketing functions in the overall execution of the business. 3. Bring the awareness with necessary pros and cons of neglecting/overdoing any function. 	8	-	100



			<ol style="list-style-type: none"> 4. Understand the fundamental concepts of Marketing Management. 5. To acquaint students with the concepts of Research/Productdevelopment/Communication/Distribution/Sales/After sales services amongst the business organization 6. Understanding of the basic theoretical terms used in marketing and the differences between them. 7. Ability to apply the concepts, principles of marketing to improve marketplace performance. 8. Understanding of Product Management Concepts, being the most important one. 9. Ability to identify what drives customer value and importance of buying behaviour. 10. Critically analyse an organization's and branding strategies. 			
III	21IMBAC C303	Core 10: (F) Fundamentals of Human Resource Management	<ol style="list-style-type: none"> 1. To define Organizational Structure and driving Productivity that helps to bring Coordination and Cooperation within the Organization. 2. To plan for distinguished human resources as per their knowledge & skills. 3. To facilitate a clear perspective to diagnose and effectively handle human behaviour issues in Organizations. 4. To equip the students with basic concepts of industrial Relations & its application. 5. To create a productive, engaged workforce and to eliminate the perception that organized labor and management have a perpetually adversarial relationship. 	4	40	60
III	21IMBAC C304	Core 11: (F) Fundamentals of International Business	<ol style="list-style-type: none"> 1. Identify relevance with the concept, scope and functions of International Business 2. Understand about various factors that are having impact on the functioning of business worldwide. 3. Aware with necessary pros and cons of International Business in Industry. 	4	40	60



			<ol style="list-style-type: none"> 4. Understand the fundamental concepts of International Business. 5. Acquaint students with business management as an international perspective & persuasive ability to conduct business ethics. 			
III	21IMBAC C305	Core 12:(F) Strategic Cost Management	<ol style="list-style-type: none"> 1. Impart a conceptual knowledge in Strategic Cost Management – Material Costing, Marginal Costing, Standard Costing 2. Understand and determine Stock Levels, EOQ, Stock Ledger & Inventory Turnover 3. Inculcate deeper knowledge in Marginal costing methods to analyze the costs which impact the profitability of a firm. 4. Inculcate deeper knowledge in standard costing methods to analyze the costs which impact the profitability of a firm. 5. Inculcate deeper knowledge in standard costing methods to analyze the costs which impact the profitability of a firm. 	4	40	60
IV	21IMBAC C401	Core 13:(F) Financial Framework for Decision Making – II	<ol style="list-style-type: none"> 1. Identify relevance with the concept, scope and functions of financial management. 2. Understand the role of finance in business firms and the essentials of finance manager and financial markets so as to enable the students to gain an understanding of market mechanisms. 3. Aware of the necessary pros and cons of financial instruments available in the market. 4. Understand the fundamental concepts of Finance. 5. Students acquainted with the concepts of working capital and its requirements. 			
IV	21IMBAC C402	Core 14:(Ad) Legal Aspects of Business	<ol style="list-style-type: none"> 1. Identify relevance with the concept, scope and functions of overall legal framework. 2. Understand the role of overall legal framework in business firms and its essentials of Business owner while taking decision. 3. Aware with necessary pros and cons of overall 			



			<p>legal framework available in the Indian Economy.</p> <ol style="list-style-type: none"> Understand the fundamental concepts of legal framework in India. To familiarize with the concepts of Indian Contract Act and its requirements. 			
IV	21IMBAC C403	Core 15:(Ad) Strategic Management Accounting	<ol style="list-style-type: none"> Understand the role of strategic cost management in supporting strategy development and the day-to-day operations of an organization Analyze and interpret Financial Statement through tools like Comparative Statement, Trend analysis & common size statement Analyze and interpret Financial Statement through Ratio Analysis – Balance sheet ratios, Revenue statement ratios & Combined ratios Understand & analyze Concept of Working Capital Management Analyze and interpret the Capital Budgeting Techniques through various techniques like Payback Period, Accounting Rate of Return, Net Present Value, The profitability Index, Discounted Payback 			
IV	21IMBAC C404	Core 16: (Ad) Export-Import Procedure & Documentation	<ol style="list-style-type: none"> Define the Fundamental Knowledge about the Export-Import Documentation& Procedures. Discuss the Design and understand the EXIM Strategy. Analyze the various procedures for custom clearance & Logistics for export-import. To Understand the Containerization & Shipping. To Evaluate the Benefits of Various Export Incentive Schemes. 			
IV	21IMBAC C405	Core 17: (F) Business Ethics &Corporate Governance	<ol style="list-style-type: none"> To understand and evaluate various ethical concepts & practices from the view point of Individual, Society and Business. To study the role of ethics as a Manager or an entrepreneur for futuristic decision making. To study the significance importance of corporate 			



			<p>governance and its implication.</p> <ol style="list-style-type: none"> 4. To study the real examples of corporate values and ethical practices with good governance system. 5. To study the implementation Corporate Social Responsibility (CSR) as a discharge of social obligation and its impact on corporate sustainability. 	4	40	60
V	21IMBAC C501	Core 18: Business Research Methodology(Ap)	<ol style="list-style-type: none"> 1. Understanding of various kinds of research and objectives of doing research. 2. Develop understanding of the basic framework of problem identification to develop objectives and hypothesis. 3. Develop an understanding of various research designs and techniques. 4. Identify various sources of information for literature review and data collection. 5. Understand research methodologies and analysis tools of business research to interpret the results. 	4	40	60
V	21IMBAC C502	Core 19: Banking and Financial Institution's Operations(Ap)	<ol style="list-style-type: none"> 1. To introduce the Indian Banking and acquaint students to basic concepts of Banking and different dimensions of Banking 2. To acquaint students about Merchant Banking services provided in India. 3. To make students aware about modern banking and various modes of Electronic fund Transfer. 4. To introduce the basics of Mutual Funds and functioning of mutual fund. 5. To familiarize students with basics of Insurance and types of Life Insurance Policies and Present Organizational set-up of Insurance Companies in India. 	4	40	60



V	21IMBAC C503	Core 20: (Ad) Production & Operations Management (Ap)	<ol style="list-style-type: none"> 1. Demonstrate an understanding of production as a process of converting or transforming resources for the effective production processes. 2. Demonstrate an understanding of the facility location and layout for the optimum utilization of resources to meet organizational objectives. 3. Develop an understanding of how the operations have strategic importance and can provide a competitive advantage in the workplace. 4. Understand the application of project management in production systems through effective decision making and demonstrate an understanding of the importance of scheduling and sequencing for production operations. 5. Obtain an understanding of quality management practice in organizations and how total quality management and six-sigma facilitate organizational effectiveness. 	4	40	60
V	21IMBAC C504	Core 21 (Self Study): Decision Making Skills (Case Studies)(Ap)	<ol style="list-style-type: none"> 1. Let students become aware of the importance of learning through case studies. 2. Introduce them to some of the best business practices, prevailing in the market. 3. Make students identify & recognize the importance of efforts put in by various organizations & leaders in the creation of current business scenario. 4. Establish the lens of students in a way to look at business & their managerial role in correlation. 5. Study the modern business challenges before corporate & finding out its solution. 6. Understand the application of case study learning in real time situations. 7. Consider the need & utility of a possessed skill set with the required one i.e. decision making to perform the role of an effective manager. 8. Learn the application based decision making strategies to improve upon the same. 	4	40	60



			<ol style="list-style-type: none"> 9. Learn different tools of case study solving & using them in various scenarios. 10. Learn to visualize the business problems & solving them by nipping it in the bud itself. 			
VI	21IMBAC C601	Core 22: Business Analytics for Managers (Ap)	<ol style="list-style-type: none"> 1. Understand the role of business analytics and Business Intelligence within an organization. 2. Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization. 3. Apply advanced analytical tools to analyze complex problems under uncertainty. 4. Apply analytics in customer requirement analysis, general management, marketing, finance, operations and supply chain management. 5. Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance etc. 	4	40	60
VI	21IMBAC C602	Core 23: Operations Research (Ap)	<ol style="list-style-type: none"> 1. Understand the methodology of OR problem solving and to develop the ability to choose the most suitable problem-solving techniques for a given challenge using Linear Programming (LP) methods. 2. Develop formulation skills in transportation models and finding solutions. 3. Develop strategic thinking skills by analyzing assignment problems and games for learning to anticipate and respond to the actions of opponents or competitors. 4. Determine the optimum decision strategy by using appropriate decision theory technique for solving the real world problems. 5. Provide a way for students to apply theoretical knowledge to real-world situations & in a business simulation. 	4	40	60
	21IMBACL		1. Provide comprehensive understanding of			



VI	601	Core Elective 1: Fundamentals of Investment (Ap)	<p>importance of investment to the learners.</p> <ol style="list-style-type: none"> 2. Provide foundational knowledge about various investment instruments / avenues. 3. Develop insights regarding the importance of setting financial goals as per the life style & individual's objective. 4. Empower learners with the knowledge and confidence to navigate the dynamics of financial landscape. 5. Prepare financially responsible adults who will save regularly and use credit wisely. 	4	40	60
	21IMBACL 602	Core Elective 1: Retail & E-Commerce Management (Ap)	<ol style="list-style-type: none"> 1. Understand the basic concepts of retailing to grow business. 2. Understand the digital market and strategies to appeal to the markets. 3. Recognize the importance/ impact of E-Commerce in modern business. 4. Understand how to build an online presence, online marketing strategy and the online threats 5. Understand the legal & ethical aspects of E-Commerce. 	4	40	60
	21IMBACL 603	Core Elective 1: Cross Cultural Management (Ap)	<ol style="list-style-type: none"> 1. Understand the role of cultural differences that impact cross-cultural management. 2. Understand the perspectives of other cultures and resolve possible conflicts. 3. Understand the complex set of culturally based human behaviour and identify cultural impediments to effective decision-making and management. 4. Explore varying points of view regarding management decisions in different cultural settings. 5. Apply cross-cultural knowledge to critically evaluate diverse management strategies, including resolution of cross-cultural problems in the work 			



			environment.			
VI	23IMBAD C601	DSE Core 1: Mergers & Acquisitions (Ad)/	<ol style="list-style-type: none"> 1. Gain a basic understanding of the M&A areas and process 2. Familiarize students with different methods of Corporate Restructuring. 3. Illustrate the leading methods used in the valuation of a firm for M&A. 4. Familiarize students with other takeover process and issues. 5. Make students analyze real life cases of M&A. 	4	40	60
	23IMBAD C602	DSE Core 1: Service & Relationship Marketing (Ad)	<ol style="list-style-type: none"> 1. Understanding the challenges of the journey from product to services, delivery of service quality & measuring customer satisfaction with the development of sustainable service models. 2. Acquire and demonstrate how service products differ from tangible goods, and how this impacts on marketing strategy design and execution. 3. Apply the extended services marketing mix to develop a product or marketing strategy for an organization. 4. Analyze service quality and productivity issues and key success factors in the creation of service based competitive advantage. 5. Assess the implications of establishing long-term relationships with a variety of audiences. 	4	40	60
	23IMBAD C603	DSE Core 1: Strategic Human Resource Management (Ad)	<ol style="list-style-type: none"> 1. Develop a theoretical and practical understanding of the role of HR professionals as a strategic partner in organizations. 2. Provides insights on how to develop and formulate strategies and programs to introduce and sustain competitive HR advantage in organizations. 3. Develop competency to enhance employee development and gain rational ability to manage 			



			<p>performance strategically.</p> <ol style="list-style-type: none"> 4. Develop strategic thinking and ability to integrate HR activity with organizational goal. 5. Understand the dimensions related to strategic HRM activities which contribute to an organization competitive edge and examine the irrelevance in the current globalized scenario. 	4	40	60
	23IMBAD C604	DSE Core 1: Export - Import Management (Ad)	<ol style="list-style-type: none"> 1. Understand nature of export-import management. 2. Develop strategic thinking and ability to integrate Import Export activity with organizational goal. 3. Understand strategic approach of transportation modes of foreign business. 4. Understand the purpose of shipment procedure and documentation. 5. Understand the role or marine insurance in the International Business spectrum. 	4	40	60
	-	DSE 2: <i>(from DSE-2 cluster of FoBC)</i>	<ol style="list-style-type: none"> 1. To sensitize students towards emerging environmental consciousness and concerns for a better future by protecting environment & ending poverty. 2. To find feasible & rational solutions by promoting start-ups by exploring sustainable business operations / practices. 3. To discover various perspectives of the role of business in social, economical & environmental sustainability. 4. Know how to operationalize key sustainable business strategies and tactics, such as ecological foot printing, eco-efficiency, life cycle analysis and industrial ecology. 5. To develop innovative business practices and entrepreneurial opportunities with the aim to achieve SDGs. 	4	40	60



Department of Management
Program: B. B. A. (Including Honors and Honors-Financial Services)(2023)

Program Objective:

The course is designed for students who aspire to be innovative leaders and entrepreneurs, and provides a comprehensive and integrated understanding of business in a contemporary way. The focus is also on entrepreneurship and Management, and this will equip the students with the knowledge and skills essential for managing the key business functions.

Graduate Attributes:

- **Academic Excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments with broad understanding of other disciplines.
- **Critical Thinking and Effective Communications:** Analysis and evaluation of information to form a judgment about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds.
- **Life Long Learning:** Open, curious, willing to investigate and consider new knowledge and ways of thinking and conscious of the impact of one's actions on the environment.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core Competency: will develop the competency to pursue higher education or successful professional career with synergistic combination of the knowledge and skills of management.
PEO2	:	Breadth of Knowledge: will show capabilities of independently designing, executing and interpreting small



		research problems by integrating the interdisciplinary knowledge of management and other domains.
PEO3	:	Preparedness: will reflect professional behaviour and have the potential to show preparedness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities.
PEO4	:	Professionalism: will reflect values, ethics and social responsibilities in the character to make them fit to work in a multidisciplinary team and to become socio-ethically responsible citizen.
PEO5	:	Learning Environment: will show attitude of self-learning abilities and keep themselves abreast with new development in all spheres of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain Knowledge: Demonstrates comprehensive knowledge and skills of management which includes general management, marketing, finance, HRM, etc.
PO2	:	Problem Analysis: Acquire critical thinking skills to understand and solve contemporary problems of modern-day management.
PO3	:	Design/development of Solutions: Understand the complexities of management problems and design structured mechanisms or processes that meet the required needs.
PO4	:	Conduct Investigations of Complex Problems: Gain ability to design, analyse and interpret data for investigating problems in management and allied sectors.
PO5	:	Modern Tool Usage: Use modern information technology tools for business to make them industry ready.
PO6	:	The Management Professional and Society: Understand own's role in society and act in an honest and consistent



		manner based on a strong sense of self and personal values.
PO7	:	Environment and Sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development.
PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Management practice.
PO9	:	Individual and Team Work: Able to function effectively as individual and as a member in multidisciplinary settings.
PO10	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large.
PO11	:	Project Management and Finance: Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	:	Life-long Learning: Able to recognize the need to undertake life-long learning and acquire the capacity to do so.

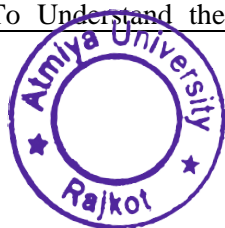
Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply the knowledge and concepts of management in managing business and realize the social responsibilities.
PSO2	:	Identify, formulate, research and analyse complex business problems to reach substantiated solution and conclusions.
PSO3	:	Develop necessary professional knowledge and skills in marketing, finance, HRM and entrepreneurship.
PSO4	:	Implement traditional and modern strategies and practices of marketing, finance, HRM and entrepreneurship.
PSO5	:	Prepare and pursue higher education and research in reputed institutes at national and international level.



Course Outcomes (COs): BBA (2021 SLE)

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGMG101	Major 1: Principles & Practices of Accounting (F)	<ol style="list-style-type: none"> 1. Identify relevant principles in connection with accounting transactions. 2. Understand the role of financial accounting in business firms and the essentials of financial accounting & book keeping. 3. Describe and illustrate the method of preparing Journal, Ledger, Subsidiary books, Cash Book & trial balance. 4. Understand the fundamental concepts of Sole Proprietorship Accounts. 5. Understand the techniques in preparing statement in inventory Valuation. 6. Drawing and understanding the preparation of Departmental Accounting. 	4	40	60
I	23UGMG102	Major 2: Economic Analysis for Business Decisions (F)	<ol style="list-style-type: none"> 1. To explain the core concepts and methods of economic analysis and apply these methods to business problems. 2. To summarize the factors affecting demand and supply of commodity. 3. To Apply the concepts of different cost and production functions with various laws. 4. To understand phenomenon of pricing and to articulate Pricing Policies. 5. To analyze operations of markets under varying competitive conditions. 	4	40	60
I	23UGMG103	Minor 1: Entrepreneurship Development (F)	<ol style="list-style-type: none"> 1. Demonstrate knowledge of the basic vocabulary and concepts of Entrepreneurial study. 2. To Identify the entrepreneurial skill to enhance business performance and sustainable competitive advantage for the corporate. 3. To Understand the good decisions and realistic 	4	40	60



			<p>action plans about entrepreneurship.</p> <p>4. To Analysis Business start-ups Opportunities in India</p> <p>5. To Know various forms of business ownerships for start-ups design</p>			
I	23UGMG104	MDC Practical 1: Computer Proficiency for Managers (F)	<p>1. Perform common editing and formatting functions of MS-Word in documents.</p> <p>2. Perform common editing and formatting functions of MS-Excel in worksheets.</p> <p>3. Perform common creating and formatting functions of MS-Power Point for presentations.</p> <p>4. Identify different types of information sources on the Internet to be able to use a Web browsing applications and be able to search the Internet for information.</p> <p>5. Demonstrate employability skills and a commitment to professionalism.</p>	1	50	50
I	23UGMG150	SEC 1: Dynamics of Management	<p>1. Help the students gain understanding of the functions and responsibilities of managers to be an effective manager in the near future.</p> <p>2. Help the students to develop cognizance of the importance of management principles.</p> <p>3. Make available, detailed understanding regarding various functions & processes of management with their relevance and applications.</p> <p>4. Enable them to analyze and understand the environment of the organization.</p> <p>5. Study the leadership traits and control for modern businesses and familiarize students about special fields in management with their applications.</p>	4	100	-
II	23UGMG201	Major 3: Modern Marketing Management (F)	<p>1. Recognize the basic concept of market and marketing philosophies</p> <p>2. Understand effective product decision requirements and its application in marketing management</p> <p>3. Understand the fundamentals of pricing and</p>	4	40	60



			<p>understand its application in marketing management</p> <ol style="list-style-type: none"> Describe the basic functions of distribution and related decisions Classify and apply the methods of market promotion 			
II	23UGMG202	Major 4: Human Resource Management (F)	<ol style="list-style-type: none"> Familiarize with the fundamental concepts of Human Resource Management Make student understand the executing concepts of job environment Memorize and describe the basic functions of HR department Classify and analyze the methods of training and performance appraisal Understand the essential concept of working environment and recent trends in HRM and its application 	4	40	60
II	23UGMG203	Minor 2: Macro Economics for Management (Ad)	<ol style="list-style-type: none"> Familiarize with the concepts of macro economics can be put into practice in management. Understands national income and issues concerned with it Helps in understanding economic fluctuations and inflation and its connection with economics Understand pricing policies necessary for a firm under various market condition Understand international concept of trade under economy of a country 	4	40	60
II	23IPMG101	MDC 2: Business Numeracy	<ol style="list-style-type: none"> Understand the basic concepts of basic Business Numeracy and its application. Develop insights and make decisions from data sets for various business problems. Interpret and solve business related real time problems with reverence to their correlation. Understand and apply regression techniques to analysis and forecast real time problems. Understand basic mathematics for money concepts 	4	40	60



			of the routine business operations.			
II	23UGEN241	AEC 2: Effective Communicative English	<ol style="list-style-type: none"> 1. To understand listening skills and fluent speaking skills 2. To infer morals through literature and enhance comprehension skills. 3. To make student capable of evaluating the literature of their domain. 4. Recognize and apply fundamental grammar usage and fluency in vocabulary 5. Apply the writing skills in the field of office and business. 	3	40	60
II	23UGVE270	VAC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 	3		



Department of Management
Program: B. B. A. (Including Honors and Honors-Financial Services)

Program Objective:

The course is designed for students who aspire to be innovative leaders and entrepreneurs, and provides a comprehensive and integrated understanding of business in a contemporary way. The focus is also on entrepreneurship and Management, and this will equip the students with the knowledge and skills essential for managing the key business functions.

Graduate Attributes:

- **Academic Excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments with broad understanding of other disciplines.
- **Critical Thinking and Effective Communications:** Analysis and evaluation of information to form a judgment about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds.
- **Life Long Learning:** Open, curious, willing to investigate and consider new knowledge and ways of thinking and conscious of the impact of one's actions on the environment.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core Competency: will develop the competency to pursue higher education or successful professional career with synergistic combination of the knowledge and skills of management.
PEO2	:	Breadth of Knowledge: will show capabilities of independently designing, executing and interpreting small research problems by integrating the interdisciplinary knowledge of management and other domains.



PEO3	:	Preparedness: will reflect professional behaviour and have the potential to show preparedness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities.
PEO4	:	Professionalism: will reflect values, ethics and social responsibilities in the character to make them fit to work in a multidisciplinary team and to become socio-ethically responsible citizen.
PEO5	:	Learning Environment: will show attitude of self-learning abilities and keep themselves abreast with new development in all spheres of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain Knowledge: Demonstrates comprehensive knowledge and skills of management which includes general management, marketing, finance, HRM, etc.
PO2	:	Problem Analysis: Acquire critical thinking skills to understand and solve contemporary problems of modern-day management.
PO3	:	Design/development of Solutions: Understand the complexities of management problems and design structured mechanisms or processes that meet the required needs.
PO4	:	Conduct Investigations of Complex Problems: Gain ability to design, analyse and interpret data for investigating problems in management and allied sectors.
PO5	:	Modern Tool Usage: Use modern information technology tools for business to make them industry ready.
PO6	:	The Management Professional and Society: Understand own's role in society and act in an honest and consistent manner based on a strong sense of self and personal values.



PO7	:	Environment and Sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development.
PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Management practice.
PO9	:	Individual and Team Work: Able to function effectively as individual and as a member in multidisciplinary settings.
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PO11	:	Project Management and Finance: Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	:	Life-long Learning: Able to recognize the need to undertake life-long learning and acquire the capacity to do so.

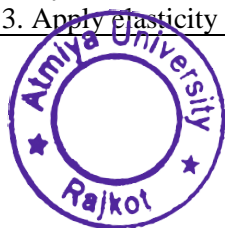
Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply the knowledge and concepts of management in managing business and realize the social responsibilities.
PSO2	:	Identify, formulate, research and analyse complex business problems to reach substantiated solution and conclusions.
PSO3	:	Develop necessary professional knowledge and skills in marketing, finance, HRM and entrepreneurship.
PSO4	:	Implement traditional and modern strategies and practices of marketing, finance, HRM and entrepreneurship.
PSO5	:	Prepare and pursue higher education and research in reputed institutes at national and international level.



Course Outcomes (COs): BBA (2022 SLE)

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
1	21ULCEN102	Development of Functional English	<ol style="list-style-type: none"> 1. Identify the characteristics of reading skill. 2. Interpret human values and ethics through literature. 3. Develop the ability to comprehend a text related to the domain area, leading to the cultivation of the reading habit. 4. Recognize and apply fundamental grammar usage. 5. Identify the characteristics of listening skill 	3	40	60
I	22BBACC101	Core 2: Management Foundation (F)	<ol style="list-style-type: none"> 1. Recognize nature and functions of management and role of a manager in business organization. 2. Understand effective planning and decision making requirements. 3. Memorize the fundamentals of organizing and to understand its working and chain of authority. 4. Apprehend the procedure of recruitment and selection and directing function in organization. 5. Apply controlling techniques in business management. 	4	30	70
I	22BBACC102	Core 2: Fundamentals of Accounting (F)	<ol style="list-style-type: none"> 1. Develop an understanding of basic concepts of Accounting 2. Provide conceptual clarity in basic Accounting process 3. Understand the concept of posting, trial balance and rectification of errors 4. Enhance the ability of students in solving practical problems in Inventory valuation and depreciation 5. Apply accounting principles, concepts and conventions to record business transactions culminating into final accounts. 	4	40	60
I	22BBACC103	Core 3: Micro Economics for Management (F)	<ol style="list-style-type: none"> 1. Familiarize the students with the fundamentals concepts and essentials of economics. 2. Make student understand the demand and supply analysis in business applications 3. Apply elasticity concepts under different market 	4	30	70



			<p>conditions.</p> <p>4. Understand the concepts of cost, revenue and relationship to business operations.</p> <p>5. Understand the causes and consequences of different market structures.</p>			
I	22BBACC104	Core 4: Fundamentals of Entrepreneurship (F)	<p>1. Recognize the concept of entrepreneurship and recent trends in entrepreneurship</p> <p>2. Analyze business opportunities and apply theoretical knowledge to establish the business</p> <p>3. Memorize and describe the concepts of family business and franchising</p> <p>4. Classify the types of E-Commerce and understand its usefulness in enterprise</p> <p>5. Memorize the work of Entrepreneurship Development Programme and initiatives taken by government</p>	4	30	70
II	21ULCEN202	Functional English	<p>1. Understand the importance of possessing good writing skills</p> <p>2. Interpret human values and ethics through literature.</p> <p>3. Develop the ability to comprehend a text related to the domain area, leading to the cultivation of the reading habit</p> <p>4. Recognize and apply fundamental grammar usage</p> <p>5. Identify the characteristics of listening skill</p>	3	40	60
II	22BBACC201	Core 5: Modern Marketing Management (F)	<p>1. Recognize the basic concept of market and marketing philosophies.</p> <p>2. Understand effective product decision requirements and its application in marketing management.</p> <p>3. Understand the fundamentals of pricing and understand its application in marketing management.</p> <p>4. Describe the basic functions of distribution and related decisions.</p> <p>5. Classify and apply the methods of market promotion.</p>	4	30	70
II	22BBACC202	Core 6: Human Resource Management (F)	<p>1. Familiarize with the fundamental concepts of Human Resource Management.</p> <p>2. Make student understand the executing concepts of job</p>	4	30	70



			<p>environment</p> <ol style="list-style-type: none"> 3. Memorize and describe the basic functions of HR. 4. Classify and analyze the methods of training and performance appraisal. 5. Understand the essential concept of working environment and recent trends in HRM and its application. 			
II	22BBACC203	Core 7: Macro Economics for Management (Ad)	<ol style="list-style-type: none"> 1. Familiarise with the concepts of macroeconomics that can be put into practice in management 2. Understand national income and issues concerned with it 3. Helps in understanding economic fluctuations and inflation and its connection with economics 4. Understand pricing policies necessary for a firm under various market conditions 5. Understand the international concept of trade under the economy of a country 	4	30	70
II	22BBACC204	Core 8: Principles of Accounting (Ad)	<ol style="list-style-type: none"> 1. Develop an understanding of the basics of Accounting Standards and understand the concept and application of depreciation using important methods 2. Understand and apply accounting principles in business forms like partnerships 3. Understand and apply accounting principles in special business forms like joint ventures 4. Provide conceptual clarity in special transactions like hire purchase and installments 5. Articulate the preparation of accounts for non-trading organizations 	4	40	60
II	21AEES201	AECC 2: Environmental Conservation and Sustainable Development	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources 2. Understand importance of natural resources and biological diversity 3. Understand the sectoral effects on the local, regional, and global environmental issues 4. Correlate the exploitation and utilization of 	2		



			conventional and non-conventional energy resources. 5. Learn about the major international treaties and our country's stand on and responses to the major international agreements.			
II	21AEHV202	AECC 3: Human Values for Holistic Living	1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature.	3		
II	22BBACC205	Core 9: Management of Financial Services (F)	1. Develop an understanding of basic concepts of Financial Service 2. Provide conceptual clarity about basics of Financial Market 3. Provide conceptual clarity on elementary of Credit rating agencies 4. Enhance the Knowledge of students in Bond Market 5. Enhance the Knowledge of students in Consumer finance	4	30	70
II	22BBACC206	Core 10: Fundamentals of Indian Securities Market	1. Develop an understanding of basic concepts of Indian securities market 2. Provide conceptual clarity in basics of saving and investment 3. Understand the concept of capital market 4. Understand the ability of students regarding primary markets 5. Understand the ability of students regarding secondary markets			
III	21ULCEN303	Effective Communicative English	1. To Explain the students with language skills for business and commerce. 2. To develop the interest in the literature and to hone the comprehensive skill, by introducing poems.			



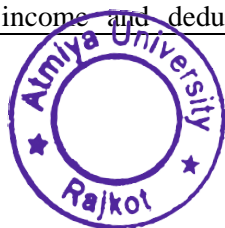
			<p>3. To enhance the ability to speak, present and negotiate in business and commerce.</p> <p>4. Apply the essential grammatical aspects of the language.</p> <p>5. To discover the ability to express ideas regarding the fields of business and commerce in written forms.</p>			
III	21BBACC301	Core 11: Financial Management	<p>6. Demonstrate an understanding of the overall role and importance of the finance function.</p> <p>7. Demonstrate basic finance management knowledge.</p> <p>8. Understand and apply time value of money.</p> <p>9. Understand and apply capital budgeting methods.</p> <p>10. Describe fundamentals of working capital management and sources of finance</p>	4	30	70
III	21BBACC302	Core 12: Business Law	<p>1. Understand the basic concepts and terminologies in Indian Contract Act and to identify essential elements to validate the contract.</p> <p>2. Identify the fundamental legal principles behind agreements and contracts.</p> <p>3. Understand the fundamentals of Indemnity, guarantee, Bailment and Pledge.</p> <p>4. Paraphrase the understanding of Sale of Goods Act, 1930.</p> <p>5. Understand the fundamental aspects of Intellectual Property Rights.</p>	4	30	70
III	21BBACC303	Core 13: Corporate Accounting	<p>1. Understanding fundamentals of various securities.</p> <p>2. Outline advanced knowledge of securities in forms of special application.</p> <p>3. Understanding of financial statement as per companies' act 2013.</p> <p>4. Develops analytical skill for decision making.</p> <p>5. Develops analytical skill for making higher order decision based on valuation of shares</p>	4	40	60
III	21BBACC304	Core 14: Statistics for Management	<p>1. Understand the purposes, calculation and to interpret the measures of central tendency (mean, medium & mode) for a set of data.</p> <p>2. Demonstrate the concepts about probability, factorial</p>	4	40	60



			<p>and counting.</p> <p>3. Define concepts of sampling and stages of sampling process.</p> <p>4. Apply the concepts of statistical quality control to business.</p> <p>5. Understand time series to get knowledge about observation and identify the variation</p>			
III	21BBACC305	Core 15: Emerging Trends of Human Resource Management	<p>1. Understand potential assessment and planning of human capital in the organisation.</p> <p>2. Demonstrate an understanding of theories/concepts and practices within the field of HRM.</p> <p>3. Understand how to build positive relations among employees.</p> <p>4. Develop proper attitude toward human capital potential (openness to new trends).</p> <p>5. Identify and appreciate the significance of the ethical issues in HR.</p>	4	30	70
III	21BBACC306	Core 16: Mutual Funds Foundations	<p>1. Understand the basics of mutual funds, their role and structure, different kinds of mutual fund schemes and their features.</p> <p>2. Know about the distribution of mutual funds in the market-place, and how to evaluate them.</p> <p>3. Examine suitable schemes to be recommended by to prospective investors.</p> <p>4. Understand the rules and regulations related to the distribution of specified products.</p> <p>5. Understand the basics of financial planning as an approach to investing in mutual funds.</p>	4	30	70
III	21UFBDE301	DSE 1: Behavioral Concepts in Organization	<p>1. Develop and understanding of basic concepts of organizational behavior.</p> <p>2. Acquaint the students with the dynamics of individual behavior.</p> <p>3. Acquaint the students with the dynamics of group behavior.</p> <p>4. Evaluate the importance of organizational change organizational development.</p>			



			5. Demonstrate the important trends of OB.			
IV	21ULCEN403	DSE 1: Business Communicative English	<ol style="list-style-type: none"> 1. To illustrate communication process 2. To connect business communication from literature 3. To design advertisement and press release 4. To develop formal communication skills 5. To assess modes of oral communication 	3	40	60
IV	21BBACC401	Core 17: Elements of Business Environment	<ol style="list-style-type: none"> 1. To provide knowledge regarding basic components of the Business Environment. 2. Identify various business environments and their applications in a business entity. 3. To develop the ability of students to forecast/indicate possible impacts of change in economic policies and laws on the operations of the Business entity. 4. To make students aware of the functioning of international institutions and their global impact. 5. To make student aware about industrial policies and regulations and make them capable to synchronize with outer industrial environment. 	3	30	70
IV	21BBACC402	Core 18: Introduction to Cost Accounting (F)	<ol style="list-style-type: none"> 1. Develop and understanding of basic concepts of cost accounting. 2. Acquaint the students with the treatment of different cost components and to acquire knowledge of various methods of remuneration and incentive system in calculation of wages. 3. Facilitate allocation and apportionment of overheads to different departments or cost centres. 4. Recording and presentation of cost data to management for measuring the efficiency. 5. To ascertain the costs of providing or operating a service. 	4	40	60
IV	21BBACC403	Core 19: Business Taxation	<ol style="list-style-type: none"> 1. Develop an understanding of basics of Indian Income Tax System. 2. Provide conceptual clarity in basic transactions and chargeability to tax by considering residential status. 3. Understand the concept and application of Total income and deductions benefit while calculating tax 	4	40	60



			liability. 4. Understand and apply Returns filling and assessment concept in business and Individual form. 5. Develop an understanding of basics of Indian Indirect Tax System (GST).			
IV	21BBACL401	Core Elective 1: Marketing Group (Sales and Distribution Management)	1. Describe basic concepts of sales management. 2. Interpret key process of personal selling. 3. Show important elements of distribution management. 4. Relate different marketing channels and product. 5. Evaluate emerging trends and cases.	3	30	70
IV	21BBACL402	Core Elective 2: Human Resource Management Group (Advanced Human Resource Management)	1. Understand policies, practices and legal framework related to employees welfare, employees safety and health. 2. Realize importance of maintaining industrial relation and to understand effect and settlement of industrial disputes. 3. Understand the need of Workers Participation in Management in recent times. 4. Know the basic concept and principles of Trade Union activities and collective bargaining. 5. Learn the importance of Ethics in Human Resource Management and Ethical issues in HR	3	30	70
IV	21BBACL403	Core Elective 3: Finance Group (Advanced Financial Management)	1. Recognize the concept of Cost of capital and application of different model given by expert. 2. To develop a sound understanding for Capital Structure. 3. Understand the fundamentals of various leverages. 4. Demonstrate the knowledge of working capital management and profit planning. 5. To develop a sound understanding of dividend policies.	3	30	70
IV	21BBACC404	Core 20: Product and Brand Management	1. Describe basic concepts of product management. 2. Interpret key process of new product planning. 3. Show important elements of brand management. 4. Relate different elements of brand positioning. 5. Evaluate emerging trends and cases.	3	30	70



IV	21BBACC405	Core 21: Securities Market Foundation	<ol style="list-style-type: none"> 1. Develop an understanding of basic concepts of Securities Market. 2. Provide conceptual Clarity about Equity and Debt Securities. 3. Understand the concepts of Primary Market. 4. Understand the concept of Secondary Market. 5. Acquaint students with the concept of Financial Planning and Securities Markets 	3	30	70
V	21BBACC501	Core - 22: Business Research Methodology	<ol style="list-style-type: none"> 1. Understanding of various kinds of research and objectives of doing research. 2. Develop understanding of the basic framework of problem identification to develop objectives and hypothesis. 3. Develop an understanding of various research designs and techniques. 4. Identify various sources of information for literature review and data collection. 5. Understand research methodologies and analysis tools of business research to interpret the results. 	4	40	60
V	21BBACC502	Core - 23: Accounting for Managers	<ol style="list-style-type: none"> 1. Understand the role of Managers in Accounting in supporting strategy development and the day-to-day operations of an organization. 2. Analyze and interpret Financial Statement through tools like Comparative Statement, Trend analysis & common size statement. 3. Analyze and interpret Financial Statement through Ratio Analysis – Balance sheet ratios, Revenue statement ratios & Combined ratios. 4. Understand & analyze Concept of Working Capital Management. 5. Inculcate deeper knowledge in Marginal costing methods to analyze the costs which impact the profitability of a firm. 	4	40	60
V	21BBACC503	Core - 24: Production & Operations Management	<ol style="list-style-type: none"> 1. Demonstrate an understanding of production as a process of converting or transforming resources for the effective production processes. 	4	40	60



			<p>2. Demonstrate an understanding of the facility location and layout for the optimum utilization of resources to meet organizational objectives.</p> <p>3. Develop an understanding of how the operations have strategic importance and can provide a competitive advantage in the workplace.</p> <p>4. Understand the application of project management in production systems through effective decision making.</p> <p>5. Obtain an understanding of quality management practice in organizations and how total quality management</p>			
V	21BBACC504	Core – 25: Decision Making Skills (Self Study)	<p>1. Let students become aware of the importance of learning through case studies.</p> <p>2. Introduce them to some of the best business practices, prevailing in the market.</p> <p>3. Make students identify & recognize the importance of efforts put in by various organizations & leaders in the creation of current business scenario.</p> <p>4. Establish the lens of students in a way to look at business & their managerial role in correlation.</p> <p>5. Study the modern business challenges before corporate & finding out its solution.</p> <p>6. Understand the application of case study learning in real time situations.</p> <p>7. Consider the need & utility of a possessed skill set with the required one i.e. decision making to perform the role of an effective manager.</p> <p>8. Learn the application based decision making strategies to improve upon the same.</p>	4	40	60
V	21BBACL501	Core Elective 2: Marketing Group: Retail Marketing	<p>1. Describe basic concepts of retail marketing.</p> <p>2. Interpret key issues of retail marketing.</p> <p>3. Show basic understanding of retail consumer.</p> <p>4. Relate retail marketing and communication.</p> <p>5. Evaluate recent trends and cases.</p>	4	30	70
V	21BBACL502	Core Elective 2: Human Resource Management	<p>1. Demonstrate knowledge about fundamental principles, theories and concepts in Managing and Developing</p>	4	30	70



		Group: Managing and Developing Human Capital	Human Capital. 2. To develop the understanding of the concept of human capital development and to understand its relevance in organizations. 3. To develop understanding & significance importance of implementation & evaluation in real life. 4. To study the human capital measurement model to enhance the intellectual capability of the students. 5. To Enable the students to integrate the understanding of various HDC concepts, latest trends & its application along with the domain concept in order to take correct business decisions.			
V	21BBACL503	Core Elective 2: Financial Management Group: Banking, Financial Services & Insurance	1. To introduce the Indian Banking and acquaint students to basic concepts of Banking and different dimensions of Banking. 2. To acquaint students about Merchant Banking services provided in India. 3. To make students aware about modern banking and various modes of Electronic fund Transfer. 4. To introduce the basics of Mutual Funds and functioning of mutual fund. 5. To familiarize students with basics of Insurance and types of Life Insurance Policies and Present Organizational set-up of Insurance Companies in India.	4	30	70
V	21BBACC506	Core - 27: Export-Import Procedure & Documentation	1. Define the Fundamental Knowledge about the Export-Import Documentation & Procedures. 2. Discuss the Design and understand the EXIM Strategy. 3. Analyze the various procedures for custom clearance & Logistics for export-import. 4. To Understand the Containerization & Shipping. 5. To Evaluate the Benefits of Various Export Incentive Schemes.	3	30	70
V	21BBACC507	Core - 28: Financial Planning	1. To Understand the importance of financial planning and the financial planning process. 2. To develop insights about various investment avenues and factors influence decision making of the financial	3	30	70



			<p>planning.</p> <p>3. To develop insights regarding the nature & suitability of various insurance schemes as per the life style & individual's objective.</p> <p>4. To understand and evaluate the appropriateness of tax strategies for different scenarios.</p> <p>5. To develop the skills with the aim to facilitate effective financial decision making for handling finance efficiently in the real life.</p>			
VI	21BBACC601	Core - 29: Strategic Management(F)	<p>1. Understand the principles of strategy formulation, implementation and control in organizations.</p> <p>2. Understand the strategic decisions that organizations make and have an ability to engage in strategic planning.</p> <p>3. Ability to think critically in relation to a particular problem, situation or strategic decision through real-world scenarios.</p> <p>4. Understanding of the concept of competitive advantage and its sources and the ability to recognize it in real-world scenarios.</p> <p>5. Develop skills to understand role of strategic implementation and emerging trends in the modern business problems.</p>	4	40	60
VI	21BBACC602	Core - 30: Public Relation & Corporate Communication(F)	<p>1. Understanding the importance of Public Relations & Corporate Communication.</p> <p>2. Understanding the Public Relation Process and Environment.</p> <p>3. Understand the need and role of Media Expectation and Campaign planning.</p> <p>4. Examine Public Relation in Business and Corporate Image Management.</p> <p>5. Explore Corporate Communication Strategies and Tools in modern businesses.</p>	4	40	60
VI	21BBACC603	Core-31: Project on SDGs	<p>1. To sensitize students towards emerging environmental consciousness and concerns for a better future by protecting environment & ending poverty.</p>	8	50	50



			<ol style="list-style-type: none"> 2. To find feasible & rational solutions by promoting start-ups by exploring sustainable business operations / practices. 3. To discover various perspectives of the role of business in social, economical & environmental sustainability. 4. Know how to operationalize key sustainable business strategies and tactics, such as ecological foot printing, eco-efficiency, life cycle analysis and industrial ecology. 5. To develop innovative business practices and entrepreneurial opportunities with the aim to achieve SDGs. 			
VI	21BBACC604	Core - 32: (Ap) Project Planning & Management	<ol style="list-style-type: none"> 1. Demonstrate an understanding of Projects and managing the same by comparing different types of project. 2. Demonstrate an understanding of analyzing the various ideas before finalizing a project with the help of market, demand and technical analysis. 3. Understand the application and importance of project planning through effective project mapping and demonstrate an understanding of the importance of planning and sequencing for production operations. 4. Develop an understanding of how the project forecasting and monitoring have strategic importance in planning and can provide a competitive advantage in the market. 5. Obtain an understanding of evaluating a project, terminating it on right time and other terminologies related to project. 	4	30	70
VI	21BBACC605	Core - 33: (Ap) International Business	<ol style="list-style-type: none"> 1. Comprehend the Dynamics of International Business. 2. Analyze nature of Multinational Corporations and Foreign Direct Investment. 3. Analyze & Apply Global Trade Theories in the Modern Businesses. 4. Develop Strategic Management Skills in an 	4	30	70



			International Context. 5. Critically Evaluate and Propose Solutions for Global Business Challenges.			
VI	21BBACC606	Core - 34: (F) Risk Management	<ol style="list-style-type: none"> 1. Understanding the purpose and scope of risk management. 2. Inculcate knowledge of the range of financial market risk for hedging the financial risk. 3. Create awareness about the foreign exchange risk to minimize the risk involved in investment. 4. Familiarize the students with various sources of liquidity risk to make sound financial decisions. 5. Learn the various other financial risks that are widely exist in the risk management. 	4	30	70
VI	21BBACC607	Core - 35: (F) Corporate Finance	<ol style="list-style-type: none"> 1. Understand and apply the role of finance while taking financial decisions in corporate world. 2. Enhance conceptual clarity of budgeting as a tool for planning, controlling, and evaluating an organization's financial performance and strategic objectives. 3. Evaluate cash flow statements to assess an organization's liquidity, solvency, and operational efficiency. 4. Evaluate cash flow statements to assess an organization's liquidity, solvency, and operational efficiency. 5. Inculcate deeper knowledge of various sources of financing available to corporations. 	4	30	70



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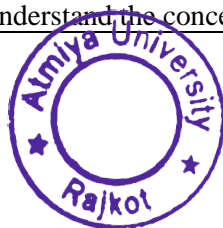
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Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
1	21ULCEN102	Development of Functional English	<ol style="list-style-type: none"> 1. Identify the characteristics of reading skill. 2. Interpret human values and ethics through literature. 3. Develop the ability to comprehend a text related to the domain area, leading to the cultivation of the reading habit. 4. Recognize and apply fundamental grammar usage. 5. Identify the characteristics of listening skill 	3	40	60
I	21BBACC101	Core 2: Management Foundation	<ol style="list-style-type: none"> 1. Recognize nature and functions of management and role of a manager in business organization. 2. Understand effective planning and decision making requirements. 3. Memorize the fundamentals of organizing and to understand its working and chain of authority. 4. Apprehend the procedure of recruitment and selection and directing function in organization. 5. Apply controlling techniques in business management. 	4	30	70
I	21BBACC102	Core 2: Fundamentals of Accounting	<ol style="list-style-type: none"> 1. Develop an understanding of basic concepts of Accounting 2. Provide conceptual clarity in basic Accounting process 3. Understand the concept of posting, trial balance and rectification of errors 4. Enhance the ability of students in solving practical problems in Inventory valuation and depreciation 5. Apply accounting principles, concepts and conventions to record business transactions culminating into final accounts. 	4	40	60
I	21BBACC103	Core 3: Principles of Micro Economics	<ol style="list-style-type: none"> 1. Familiarize the students with the fundamentals concepts and essentials of economics. 2. Make student understand the demand and supply analysis in business applications 3. Apply elasticity concepts under different market conditions. 4. Understand the concepts of cost, revenue and relationship 	4	30	70



			to business operations. 5. Understand the causes and consequences of different market structures.			
I	21BBACC104	Core 4: Fundamentals of Entrepreneurship	1. Recognize the concept of entrepreneurship and recent trends in entrepreneurship 2. Analyze business opportunities and apply theoretical knowledge to establish the business 3. Memorize and describe the concepts of family business and franchising 4. Classify the types of E-Commerce and understand its usefulness in enterprise 5. Memorize the work of Entrepreneurship Development Programme and initiatives taken by government	4	30	70
II	21ULCEN202	Functional English	1. Understand the importance of possessing good writing skills 2. Interpret human values and ethics through literature. 3. Develop the ability to comprehend a text related to the domain area, leading to the cultivation of the reading habit 4. Recognize and apply fundamental grammar usage 5. Identify the characteristics of listening skill	3	40	60
II	21BBACC201	Core 5: Economics for Effective Management	1. Familiarise with the concepts of economics can be put into practice in management. 2. Understand basic concepts and principles of Economics for Effective Management. 3. Help in taking effective decisions and effective management. 4. Understand National Income and its effects. 5. Utilize various tools for taking economic decisions.	4	30	70
II	21BBACC202	Core 6: Modern Marketing Management	1. Recognize the basic concept of market and marketing philosophies. 2. Understand effective product decision requirements and its application in marketing management. 3. Understand the fundamentals of pricing and understand its application in marketing management. 4. Describe the basic functions of distribution and related decisions	4	30	70



			5. Classify and apply the methods of market promotion.			
II	21BBACC203	Core 7: Human Resource Management	<ol style="list-style-type: none"> 1. Familiarize with the fundamental concepts of Human Resource Management. 2. Make student understand the executing concepts of job environment 3. Memorize and describe the basic functions of HR. 4. Classify and analyze the methods of training and performance appraisal. 5. Understand the essential concept of working environment and recent trends in HRM and its application. 	4	30	70
II	21BBACC204	Core 8: Principles of Accounting	<ol style="list-style-type: none"> 1. Develop an understanding of basics of Accounting Standard. 2. Provide conceptual clarity in special transactions like Hire Purchase and installment. 3. Understand the concept and application of Depreciation with the help of important methods. 4. Understand and apply accounting principles in business form like Partnership. 5. Understand and apply accounting principles in special business form like Joint Venture. 	4	40	60
II	21BBACC205	Core 9: Management of Financial Services	<ol style="list-style-type: none"> 1. Develop an understanding of basic concepts of Financial Service. 2. Provide conceptual clarity about basics of financial Market. 3. Provide conceptual clarity on elementary of Credit rating agencies. 4. Enhance the Knowledge of students in Mutual funds. 5. Enhance the Knowledge of students in Consumer finance. 	4	30	70
II	21BBACC206	Core 10: Fundamentals of Indian Securities Market	<ol style="list-style-type: none"> 1. Develop an understanding of basic concepts of Indian securities Market. 2. Provide conceptual clarity in basics of Saving and Investment. 3. Understand the concept of Capital Market. 4. Understand the ability of students in regarding Primary Markets. 5. Understand the ability of students in regarding Secondary Markets. 	4	30	70



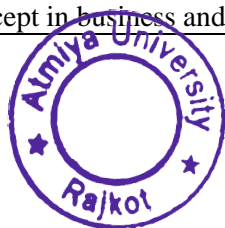
III	21ULCEN303	Effective Communicative English	<ol style="list-style-type: none"> 1. To Explain the students with language skills for business and commerce. 2. To develop the interest in the literature and to hone the comprehensive skill, by introducing poems. 3. To enhance the ability to speak, present and negotiate in business and commerce. 4. Apply the essential grammatical aspects of the language. 5. To discover the ability to express ideas regarding the fields of business and commerce in written forms. 			
III	21BBACC301	Core 11: Financial Management	<ol style="list-style-type: none"> 6. Demonstrate an understanding of the overall role and importance of the finance function. 7. Demonstrate basic finance management knowledge. 8. Understand and apply time value of money. 9. Understand and apply capital budgeting methods. 10. Describe fundamentals of working capital management and sources of finance 	4	30	70
III	21BBACC302	Core 12: Business Law	<ol style="list-style-type: none"> 1. Understand the basic concepts and terminologies in Indian Contract Act and to identify essential elements to validate the contract. 2. Identify the fundamental legal principles behind agreements and contracts. 3. Understand the fundamentals of Indemnity, guarantee, Bailment and Pledge. 4. Paraphrase the understanding of Sale of Goods Act, 1930. 5. Understand the fundamental aspects of Intellectual Property Rights. 	4	30	70
III	21BBACC303	Core 13: Corporate Accounting	<ol style="list-style-type: none"> 1. Understanding fundamentals of various securities. 2. Outline advanced knowledge of securities in forms of special application. 3. Understanding of financial statement as per companies' act 2013. 4. Develops analytical skill for decision making. 5. Develops analytical skill for making higher order decision based on valuation of shares 	4	40	60
III	21BBACC304	Core 14: Statistics for Management	<ol style="list-style-type: none"> 1. Understand the purposes, calculation and to interpret the measures of central tendency (mean, medium & mode) for a 	4	40	60



			<p>set of data.</p> <p>2. Demonstrate the concepts about probability, factorial and counting.</p> <p>3. Define concepts of sampling and stages of sampling process.</p> <p>4. Apply the concepts of statistical quality control to business.</p> <p>5. Understand time series to get knowledge about observation and identify the variation</p>			
III	21BBACC305	Core 15: Emerging Trends of Human Resource Management	<p>1. Understand potential assessment and planning of human capital in the organisation.</p> <p>2. Demonstrate an understanding of theories/concepts and practices within the field of HRM.</p> <p>3. Understand how to build positive relations among employees.</p> <p>4. Develop proper attitude toward human capital potential (openness to new trends).</p> <p>5. Identify and appreciate the significance of the ethical issues in HR.</p>	4	30	70
III	21BBACC306	Core 16: Mutual Funds Foundations	<p>1. Understand the basics of mutual funds, their role and structure, different kinds of mutual fund schemes and their features.</p> <p>2. Know about the distribution of mutual funds in the market-place, and how to evaluate them.</p> <p>3. Examine suitable schemes to be recommended by to prospective investors.</p> <p>4. Understand the rules and regulations related to the distribution of specified products.</p> <p>5. Understand the basics of financial planning as an approach to investing in mutual funds.</p>	4	30	70
III	21UFBDE301	DSE 1: Behavioral Concepts in Organization	<p>1. Develop and understanding of basic concepts of organizational behavior.</p> <p>2. Acquaint the students with the dynamics of individual behavior.</p> <p>3. Acquaint the students with the dynamics of group behavior.</p> <p>4. Evaluate the importance of organizational change organizational development.</p>			



			5. Demonstrate the important trends of OB.			
IV	21ULCEN403	Business Communicative English	1.To illustrate communication process 2.To connect business communication from literature. 3.To design advertisement and Press release 4. To develop formal communication skills. 5. To assess modes of oral communication.	3	40	60
IV	21BBACC401	Core 17: Elements of Business Environment	1. To provide knowledge regarding basic components of the Business Environment. 2. Identify various business environments and their applications in a business entity. 3. To develop the ability of students to forecast/indicate possible impacts of change in economic policies and laws on the operations of the Business entity. 4. To make students aware of the functioning of international institutions and their global impact. 5. To make student aware about industrial policies and regulations and make them capable to synchronize with outer industrial environment.	3	30	70
IV	21BBACC402	Core 18: Introduction to Cost Accounting (F)	1. Develop and understanding of basic concepts of cost accounting. 2. Acquaint the students with the treatment of different cost components and to acquire knowledge of various methods of remuneration and incentive system in calculation of wages. 3. Facilitate allocation and apportionment of overheads to different departments or cost centres. 4. Recording and presentation of cost data to management for measuring the efficiency. 5. To ascertain the costs of providing or operating a service.	4	40	60
IV	21BBACC403	Core 19: Business Taxation	1. Develop an understanding of basics of Indian Income Tax System. 2. Provide conceptual clarity in basic transactions and chargeability to tax by considering residential status. 3. Understand the concept and application of Total income and deductions benefit while calculating tax liability. 4. Understand and apply Returns filling and assessment concept in business and Individual form.	4	40	60



			5. Develop an understanding of basics of Indian Indirect Tax System (GST).			
IV	21BBACL401	Core Elective 1: Marketing Group (Sales and Distribution Management)	1. Describe basic concepts of sales management. 2. Interpret key process of personal selling. 3. Show important elements of distribution management. 4. Relate different marketing channels and product. 5. Evaluate emerging trends and cases.	3	30	70
IV	21BBACL402	Core Elective 2: Human Resource Management Group (Advanced Human Resource Management)	1. Understand policies, practices and legal framework related to employees welfare, employees safety and health. 2. Realize importance of maintaining industrial relation and to understand effect and settlement of industrial disputes. 3. Understand the need of Workers Participation in Management in recent times. 4. Know the basic concept and principles of Trade Union activities and collective bargaining. 5. Learn the importance of Ethics in Human Resource Management and Ethical issues in HR	3	30	70
IV	21BBACL403	Core Elective 3: Finance Group (Advanced Financial Management)	1. Recognize the concept of Cost of capital and application of different model given by expert. 2. To develop a sound understanding for Capital Structure. 3. Understand the fundamentals of various leverages. 4. Demonstrate the knowledge of working capital management and profit planning. 5. To develop a sound understanding of dividend policies.	3	30	70
IV	21BBACC404	Core 20: Product and Brand Management	1. Describe basic concepts of product management. 2. Interpret key process of new product planning. 3. Show important elements of brand management. 4. Relate different elements of brand positioning. 5. Evaluate emerging trends and cases.	3	30	70
IV	21BBACC405	Core 21: Securities Market Foundation	1. Develop an understanding of basic concepts of Securities Market. 2. Provide conceptual Clarity about Equity and Debt Securities. 3. Understand the concepts of Primary Market. 4. Understand the concept of Secondary Market. 5. Acquaint students with the concept of Financial Planning	3	30	70



			and Securities Markets			
V	21BBACC501	Core 22: Business Research Methodology	<ol style="list-style-type: none"> 1. Understanding of various kinds of research and objectives of doing research. 2. Develop understanding of the basic framework of problem identification to develop objectives and hypothesis. 3. Develop an understanding of various research designs and techniques. 4. Identify various sources of information for literature review and data collection. 5. Understand research methodologies and analysis tools of business research to interpret the results. 	4	40	60
V	21BBACC502	Core 23: Accounting for Managers	<ol style="list-style-type: none"> 1. Understand the role of Managers in Accounting in supporting strategy development and the day-to-day operations of an organization. 2. Analyze and interpret Financial Statement through tools like Comparative Statement, Trend analysis & common size statement. 3. Analyze and interpret Financial Statement through Ratio Analysis – Balance sheet ratios, Revenue statement ratios & Combined ratios. 4. Understand & analyze Concept of Working Capital Management. 5. Inculcate deeper knowledge in Marginal costing methods to analyze the costs which impact the profitability of a firm. 	4	40	60
V	21BBACC503	Core 24: Production & Operations Management	<ol style="list-style-type: none"> 1. Demonstrate an understanding of production as a process of converting or transforming resources for the effective production processes. 2. Demonstrate an understanding of the facility location and layout for the optimum utilization of resources to meet organizational objectives. 3. Develop an understanding of how the operations have strategic importance and can provide a competitive advantage in the workplace. 4. Understand the application of project management in production systems through effective decision making and demonstrate an understanding of the importance of scheduling 	4	40	60



			and sequencing for production operations. 5. Obtain an understanding of quality management practice in organizations and how total quality management and six-sigma facilitate organizational effectiveness.			
V	21BBACC504	Core 25: Decision Making Skills (Self Study)	<ol style="list-style-type: none"> 1. Let students become aware of the importance of learning through case studies. 2. Introduce them to some of the best business practices, prevailing in the market. 3. Make students identify & recognize the importance of efforts put in by various organizations & leaders in the creation of current business scenario. 4. Establish the lens of students in a way to look at business & their managerial role in correlation. 5. Study the modern business challenges before corporate & finding out its solution. 6. Understand the application of case study learning in real time situations. 7. Consider the need & utility of a possessed skill set with the required one i.e. decision making to perform the role of an effective manager. 8. Learn the application based decision making strategies to improve upon the same. 9. Learn different tools of case study solving & using them in various scenarios. 10. Learn to visualize the business problems & solving them by nipping it in the bud itself. 	4	40	60
V	21BBACL501	Core Elective 2: Marketing Group: Retail Marketing	<ol style="list-style-type: none"> 1. Describe basic concepts of retail marketing. 2. Interpret key issues of retail marketing. 3. Show basic understanding of retail consumer. 4. Relate retail marketing and communication. 5. Evaluate recent trends and cases. 	4	30	70
V	21BBACL502	Core Elective 2: Human Resource Management Group: Managing and Developing	<ol style="list-style-type: none"> 1. Demonstrate knowledge about fundamental principles, theories and concepts in Managing and Developing Human Capital. 2. To develop the understanding of the concept of human capital development and to understand its relevance in 	4	30	70



		Human Capital	<p>organizations.</p> <p>3. To develop understanding & significance importance of implementation & evaluation in real life.</p> <p>4. To study the human capital measurement model to enhance the intellectual capability of the students.</p> <p>5. To Enable the students to integrate the understanding of various HDC concepts, latest trends & its application along with the domain concept in order to take correct business decisions.</p>			
V	21BBACL503	Core Elective 2: Financial Management Group: Banking, Financial Services & Insurance	<p>1. To introduce the Indian Banking and acquaint students to basic concepts of Banking and different dimensions of Banking.</p> <p>2. To acquaint students about Merchant Banking services provided in India.</p> <p>3. To make students aware about modern baking and various modes of Electronic fund Transfer.</p> <p>4. To introduce the basics of Mutual Funds and functioning of mutual fund.</p> <p>5. To familiarize students with basics of Insurance and types of Life Insurance Policies and Present Organizational set-up of Insurance Companies in India.</p>	4	30	70
V	21BBACC506	Core 27: Export-Import Procedure & Documentation	<p>1. Define the Fundamental Knowledge about the Export-Import Documentation& Procedures.</p> <p>2. Discuss the Design and understand the EXIM Strategy.</p> <p>3. Analyze the various procedures for custom clearance & Logistics for export-import.</p> <p>4. To Understand the Containerization & Shipping.</p> <p>5. To Evaluate the Benefits of Various Export Incentive Schemes.</p>	3	30	70
V	21BBACC507	Core 28: Financial Planning	<p>1. To Understand the importance of financial planning and the financial planning process.</p> <p>2. To develop insights about various investment avenues and factors influence decision making of the financial planning.</p> <p>3. To develop insights regarding the nature & suitability of various insurance schemes as per the life style & individual's objective.</p>	3	30	70



			<p>4. To understand and evaluate the appropriateness of tax strategies for different scenarios.</p> <p>5. To develop the skills with the aim to facilitate effective financial decision making for handling finance efficiently in the real life.</p>			
VI	21BBACC601	Core 29: (F) Strategic Management	<p>1. Understand the principles of strategy formulation, implementation and control in organizations.</p> <p>2. Understand the strategic decisions that organizations make and have an ability to engage in strategic planning.</p> <p>3. Ability to think critically in relation to a particular problem, situation or strategic decision through real-world scenarios.</p> <p>4. Understanding of the concept of competitive advantage and its sources and the ability to recognize it in real-world scenarios.</p> <p>5. Develop skills to understand role of strategic implementation and emerging trends in the modern business problems.</p>	4	40	60
VI	21BBACC602	Core 30: (F) Public Relation & Corporate Communication	<p>1. Understanding the importance of Public Relations & Corporate Communication.</p> <p>2. Understanding the Public Relation Process and Environment.</p> <p>3. Understand the need and role of Media Expectation and Campaign planning.</p> <p>4. Examine Public Relation in Business and Corporate Image Management.</p> <p>5. Explore Corporate Communication Strategies and Tools in modern businesses.</p>	4	40	60
VI	21BBACC603	Core 31: Project on SDGs	<p>1. To sensitize students towards emerging environmental consciousness and concerns for a better future by protecting environment & ending poverty.</p> <p>2. To find feasible & rational solutions by promoting start-ups by exploring sustainable business operations / practices.</p> <p>3. To discover various perspectives of the role of business in social, economical & environmental sustainability.</p> <p>4. Know how to operationalize key sustainable business</p>	8	50	50



			<p>strategies and tactics, such as ecological foot printing, eco-efficiency, life cycle analysis and industrial ecology.</p> <p>5. To develop innovative business practices and entrepreneurial opportunities with the aim to achieve SDGs.</p>			
VI	21BBACC604	Core 32: (Ap) Project Planning & Management	<p>1. Demonstrate an understanding of Projects and managing the same by comparing different types of project.</p> <p>2. Demonstrate an understanding of analyzing the various ideas before finalizing a project with the help of market, demand and technical analysis.</p> <p>3. Understand the application and importance of project planning through effective project mapping and demonstrate an understanding of the importance of planning and sequencing for production operations.</p> <p>4. Develop an understanding of how the project forecasting and monitoring have strategic importance in planning and can provide a competitive advantage in the market.</p> <p>5. Obtain an understanding of evaluating a project, terminating it on right time and other terminologies related to project.</p>	4	30	70
VI	21BBACC605	Core 33: (Ap) International Business	<p>1. Comprehend the Dynamics of International Business.</p> <p>2. Analyze nature of Multinational Corporations and Foreign Direct Investment.</p> <p>3. Analyze & Apply Global Trade Theories in the Modern Businesses.</p> <p>4. Develop Strategic Management Skills in an International Context.</p> <p>5. Critically Evaluate and Propose Solutions for Global Business Challenges.</p>	4	30	70
VI	21BBACC606	Core 34: (F) Risk Management	<p>1. Understanding the purpose and scope of risk management.</p> <p>2. Inculcate knowledge of the range of financial market risk for hedging the financial risk.</p> <p>3. Create awareness about the foreign exchange risk to minimize the risk involved in investment.</p> <p>4. Familiarize the students with various sources of liquidity risk to make sound financial decisions.</p>	4	30	70



			5. Learn the various other financial risks that are widely exist in the risk management.			
VI	21BBACC607	Core 35: (F) Corporate Finance	<ol style="list-style-type: none"> 1. Understand and apply the role of finance while taking financial decisions in corporate world. 2. Enhance conceptual clarity of budgeting as a tool for planning, controlling, and evaluating an organization's financial performance and strategic objectives. 3. Evaluate cash flow statements to assess an organization's liquidity, solvency, and operational efficiency. 4. Evaluate cash flow statements to assess an organization's liquidity, solvency, and operational efficiency. 5. Inculcate deeper knowledge of various sources of financing available to corporations. 	4	30	70



Department of Management
Program: B. B. A. (Entrepreneurship and family business) 2023

Program Objective:

BBA (EFB) programme aims at exploring inculcated entrepreneurial skills in the students to manage their Family business/Startup/New ventures with enhanced Knowledge, Skill & Ability. The curriculum is designed to create innovative leaders & entrepreneurs through unique pedagogies; imbued with projects, internships & experiential learning. The programme structure offers a good mix of training in simulated & real business scenarios. The subject structure is designed in a way that will take students from fundamental to advance level with abundance of Classroom practice, Case study/Group discussions, Assignments & Projects to make students ready with analysis of their own strengths to gain the opportunities & weaknesses to overcome threats.

Graduate Attributes:

- **Academic Excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective Communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation		
PEO1	:	Core Competency: will develop the competency to pursue higher education or successful professional career with synergistic combination of the knowledge and skills of entrepreneurship and allied branches
PEO2	:	Breadth of Knowledge: will show capabilities of independently designing, executing and interpreting small research problems by integrating the interdisciplinary knowledge of entrepreneurship and other domains.
PEO3	:	Preparedness: will reflect professional behaviour and have the potential to show preparedness to take any task or



		assignment in the capacity of a leader or team member in their chosen occupations or careers and communities.
PEO4	:	Professionalism: will reflect values and responsibilities in the character to make them fit to work in a multidisciplinary team and to become socio-ethically responsible citizen.
PEO5	:	Learning Environment: will show attitude of self-learning abilities and keep themselves abreast with new development in all spheres of life.

Program Outcomes (POs):

The students who gain the BBA (EFB) Degree will be able to:		
PO1	:	Domain Knowledge: Demonstrate the knowledge of concepts, principles and applications of Entrepreneurship in various fields.
PO2	:	Problem Analysis: Acquire critical thinking skills to understand and solve contemporary problems with Entrepreneurship and economic domain knowledge and skills.
PO3	:	Design/ Development of Solutions: Understand the complex business problems and or processes that meet the specified needs.
PO4	:	Conduct Investigations of Complex Problems: Gain ability to analyse and interpret data for investigating problems in Entrepreneurship and allied sectors.
PO5	:	Modern Tool Usage: Understand standard operating procedures and acquire in-depth technical competence proficiency with technology and analytical techniques for problem solving/critical thinking & decision-making.
PO6	:	The Entrepreneur And Society: Understand own's role in society and act in an honest and consistent manner based on a strong sense of self and personal values.
PO7	:	Environment And Sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development.
PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Entrepreneurial practices.
PO9	:	Individual And Teamwork: Able to function effectively as individual and as a member in multidisciplinary settings.
PO10	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with



		scientific community but also with the society at large.
PO11	:	Project Management And Finance: Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	:	Life-long Learning: Able to recognize the need to undertake life-long learning and acquire the capacity to do so.

Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Acquire knowledge on the fundamentals of entrepreneurship for sound and solid base which enables them to understand the emerging concepts in Entrepreneurship and economy.
PSO2	:	To equip the students to pursue higher education and research in reputed institutes at national and international level.
PSO3	:	Be able to understand knowledge of Entrepreneurship to find innovative solutions for business, industry and economy.
PSO4	:	Deduce the possibilities and impression of economic revolutions for finding sustainable ethical solutions to existing problem.
PSO5	:	Be able to explore problems related to enterprise and provide effective solution through industry-academia interactions.

Course Outcomes (COs): BBA EFB (2023 SLE)

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGMG101	Major 1: Principles & Practices of Accounting (F)	1. Identify relevant principles in connection with accounting transactions. 2. Understand the role of financial accounting in business firms and the	4	40	60



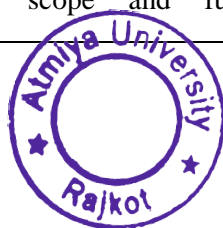
			<p>essentials of financial accounting.</p> <ol style="list-style-type: none"> 3. Identify the conceptual foundation of Book keeping. 4. Describe and illustrate the method of preparing Journal, Ledger, Subsidiary books, Cash Book & trial balance. 5. Prepare necessary accounts in Sole Proprietorship. 6. Understand the fundamental concepts of Sole Proprietorship Accounts. 7. Understand the techniques in preparing statement in inventory Valuation. 8. Understand the fundamental concepts of Inventory Valuation. 9. Drawing and understanding the preparation of Departmental Accounting. 10. Illustrate the practical accounting aspects of Departmental Accounting. 			
I	23UGMG120	<p>Major 2: Entrepreneurship Development (F)</p>	<ol style="list-style-type: none"> 1. Demonstrate knowledge of the basic vocabulary and concepts of Entrepreneurial study. 2. To identify the entrepreneurial skill to enhance business performance and sustainable competitive advantage for the corporate. 3. To understand the good decisions and realistic action plans about entrepreneurship. 4. To Analysis Business start-ups Opportunities in India 5. To Know various forms of business ownerships for start-ups design 	4	40	60



I	23UGMG121	Minor 1: Business Environment (F)	<ol style="list-style-type: none"> 1. To provide knowledge of the environment in which businesses operate, the economic operational and financial framework. 2. To identify and evaluate the complexities of business environment and their impact on the business. 3. To analyze current economic conditions in developing emerging markets, and evaluate present and future opportunities. 4. To gain knowledge about the operation of different institutions in international business environment. 5. To enable students to examine and evaluate business in International Environment. 	4	40	60
I	23UGMG104	MDC Practical 1: Computer Proficiency for Managers (F)	<ol style="list-style-type: none"> 1. Perform common editing and formatting functions of MS-Word in documents. 2. Perform common editing and formatting functions of MS-Excel in worksheets. 3. Perform common creating and formatting functions of MS-Power Point for presentations. 4. Identify different types of information sources on the Internet to be able to use a Web browsing applications and be able to search the Internet for information. 5. Demonstrate employability skills and a commitment to professionalism. 	1	50	50



I	23UGMG150	SEC 1: Dynamics of Management	<ol style="list-style-type: none"> 1. Help the students gain understanding of the functions and responsibilities of managers to be an effective manager in the near future. 2. Help the students to develop cognizance of the importance of management principles. 3. Make available, detailed understanding regarding various functions & processes of management with their relevance and applications. 4. Enable them to analyze and understand the environment of the organization. 5. Study the leadership traits and control for modern businesses and familiarize students about special fields in management with their applications. 	4	100	-
I	23UGCI070	VAC 1: Environmental Studies	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources 2. Understand importance of natural resources and biological diversity 3. Understand the sectoral effects on the local, regional, and global environmental issues 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources 5. Learn about the major international treaties and our country's stand on and responses to the major international agreements. 	2		
II	23UGMG201	Major-1: Financial	<ol style="list-style-type: none"> 1. Identify relevance with the concept, scope and functions of financial 	4	40	60



		Management (F)	<p>management.</p> <ol style="list-style-type: none"> Understand the role of finance in business firms and the essentials of finance manager and financial markets so as to enable the students to gain an understanding of market mechanisms. Aware of the necessary pros and cons of financial instruments available in the market. Understand the fundamental concepts of Finance. To acquaint myself with the concepts of working capital and its requirements. 			
II	23UGMG202	<p>Major-2: Legal Aspect of Business (F)</p>	<ol style="list-style-type: none"> Identify relevance with the concept, scope and functions of overall legal framework Understand the role of overall legal framework in business firms and its essentials of Business owner while taking decision. Aware with necessary pros and cons of overall legal framework available in the Indian Economy. Understand the fundamental concepts of legal framework in India. To familiarize with the concepts of Indian Contract Act and its requirements. 	4	40	60
II	23UGMG203	<p>Minor-1: Marketing Skills (F)</p>	<ol style="list-style-type: none"> Understand the difference between knowledge, skills & abilities: specifically the buzz word skill- in the marketing context. Familiarize the students with traditional & contemporary management schools, theories & practices Make available, detailed understanding 	4	40	60



			<p>regarding various functions & processes of management with their relevance and applications.</p> <ol style="list-style-type: none"> 4. Establish primary understanding about extended functions of management with their practicability and implications. 5. Study the challenges before modern businesses and familiarize students about special fields in management with their applications. 6. Understand the importance of functional alignment & relationship plus value management. 			
II	23IPMG101	MDC-2: Business Numeracy	<ol style="list-style-type: none"> 1. Understand the basic concepts of basic Business Numeracy and its application. 2. Develop insights and make decisions from data sets for various business problems. 3. Interpret and solve business related real time problems with reverence to their correlation. 4. Understand and apply regression techniques to analysis and forecast real time problems. 5. Understand basic mathematics for money concepts of the routine business operations. 	4	40	60
II	23UGEN242	AEC: Advanced English for Entrepreneur	<ol style="list-style-type: none"> 1. To understand and analyze Listening and Speaking Skills 2. Understanding the values, honor and integrity through literature. 3. Recognizing and analyzing a text related to the domain area, leading to the cultivation of the reading 	3	40	60



			<p>habit.</p> <p>4. Apply fundamental grammar usage</p> <p>5. Learning and applying ways of business correspondence.</p>			
II	23UGVE270	<p>VAC 3:</p> <p>Human Values for Holistic Living</p>	<p>1. Recall basic guidelines of value education and understand the basic aspirations.</p> <p>2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration.</p> <p>3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations.</p> <p>4. Understand required skills to understand the laws of nature.</p>	3		



Department of Management
Program: B. B. A. (Entrepreneurship and family business)(2021)

Program Objective:

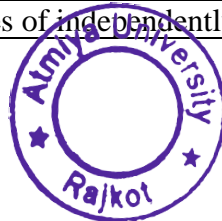
BBA (EFB) programme aims at exploring inculcated entrepreneurial skills in the students to manage their Family business/Startup/New ventures with enhanced Knowledge, Skill & Ability. The curriculum is designed to create innovative leaders & entrepreneurs through unique pedagogies; imbued with projects, internships & experiential learning. The programme structure offers a good mix of training in simulated & real business scenarios. The subject structure is designed in a way that will take students from fundamental to advance level with abundance of Classroom practice, Case study/Group discussions, Assignments & Projects to make students ready with analysis of their own strengths to gain the opportunities & weaknesses to overcome threats.

Graduate Attributes:

- **Academic Excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective Communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation		
PEO1	:	Core Competency: will develop the competency to pursue higher education or successful professional career with synergistic combination of the knowledge and skills of entrepreneurship and allied branches
PEO2	:	Breadth of Knowledge: will show capabilities of independently designing, executing and interpreting small



		research problems by integrating the interdisciplinary knowledge of entrepreneurship and other domains.
PEO3	:	Preparedness: will reflect professional behaviour and have the potential to show preparedness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities.
PEO4	:	Professionalism: will reflect values and responsibilities in the character to make them fit to work in a multidisciplinary team and to become socio-ethically responsible citizen.
PEO5	:	Learning Environment: will show attitude of self-learning abilities and keep themselves abreast with new development in all spheres of life.

Program Outcomes (POs):

The students who gain the BBA (EFB) Degree will be able to:		
PO1	:	Domain Knowledge: Demonstrate the knowledge of concepts, principles and applications of Entrepreneurship in various fields.
PO2	:	Problem Analysis: Acquire critical thinking skills to understand and solve contemporary problems with Entrepreneurship and economic domain knowledge and skills.
PO3	:	Design/ Development of Solutions: Understand the complex business problems and or processes that meet the specified needs.
PO4	:	Conduct Investigations of Complex Problems: Gain ability to analyse and interpret data for investigating problems in Entrepreneurship and allied sectors.
PO5	:	Modern Tool Usage: Understand standard operating procedures and acquire in-depth technical competence proficiency with technology and analytical techniques for problem solving/critical thinking & decision-making.
PO6	:	The Entrepreneur And Society: Understand own's role in society and act in an honest and consistent manner based on a strong sense of self and personal values.
PO7	:	Environment And Sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development.
PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Entrepreneurial practices.



PO9	:	Individual And Teamwork: Able to function effectively as individual and as a member in multidisciplinary settings.
PO10	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large.
PO11	:	Project Management And Finance: Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	:	Life-long Learning: Able to recognize the need to undertake life-long learning and acquire the capacity to do so.

Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Acquire knowledge on the fundamentals of entrepreneurship for sound and solid base which enables them to understand the emerging concepts in Entrepreneurship and economy.
PSO2	:	To equip the students to pursue higher education and research in reputed institutes at national and international level.
PSO3	:	Be able to understand knowledge of Entrepreneurship to find innovative solutions for business, industry and economy.
PSO4	:	Deduce the possibilities and impression of economic revolutions for finding sustainable ethical solutions to existing problem.
PSO5	:	Be able to explore problems related to enterprise and provide effective solution through industry-academia interactions.



Course Outcomes (COs): BBA EFB (2021 SLE)

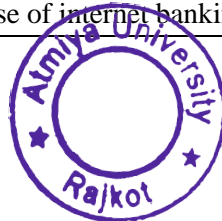
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21ULCEN103	Development of Functional English	<ol style="list-style-type: none"> 1. Recognize reading as a skill along with its techniques and classify viewpoints and opinions of texts 2. Analyze literary works and infer values from them 3. Interpret literary works, having background of the domain 4. Construct base of grammar and enhance vocabulary 5. Recognize listening as a skill accompanied with its characteristics and types through practice 	3	40	60
I	21BBECC101	Core 1: Dynamics of Management (F)	<ol style="list-style-type: none"> 1. Understand the meaning of the word dynamic & learning see the practicability of it through conceptual frames to be an effective manager. 2. Familiarize the students with traditional & contemporary management schools, theories & practices. 3. Make available, detailed understanding regarding various functions & processes of management with their relevance and applications. 4. Establish primary understanding about extended functions of management with their practicability and implications. 5. Study the challenges before modern businesses and familiarize students about special fields in management with their applications. 	4	30	70
I	21BBECC102	Core 2: (F) Fundamentals of Accounting (F)	<ol style="list-style-type: none"> 1. Identify relevant principles in connection with an accounting transaction 2. Understand the role of financial accounting in business firms and the essentials of financial accounting 3. Identify the conceptual foundation of bookkeeping 4. Describe and illustrate the method of preparing Journal, Ledger, Subsidiary books, Cash Book & Trial Balance 5. Prepare necessary accounts in sole proprietorship 6. Understand the fundamental concepts of sole proprietorship accounts 7. Understand the fundamental concepts of depreciation 8. Understand the methods in preparing Assets A/c & Depreciation A/c 	4	40	60



			9. Understand the techniques in preparing statements in inventory valuation 10. Understand the fundamental concepts of inventory valuation			
I	21BBECC103	Core 3: (F) Business Environment (F)	1. To clarify the overall concept of business environment 2. To identify the content, process, and outcomes of Economic Policy and its applications 3. To develop the basic set of methods and techniques needed for managing business 4. To learn about basic administrative processes related to business	4	30	70
I	21BBECC104	Core 4: (F) Entrepreneurship Development (F)	1. Demonstrate knowledge of the basic vocabulary and concepts of Entrepreneurial study 2. To identify the entrepreneurial skill to enhance business performance and sustainable competitive advantage for the corporate 3. To understand the good decisions and realistic action plans about entrepreneurship 4. To analyze business start-up opportunities in India 5. To know various forms of business ownerships for start-up design	4	40	60
I	-	AECC III: Human Values for Holistic Living	1. Recall basic guidelines of value education and understand the basic aspirations 2. Understand the needs of self and body based on their natural acceptance and solve their conflicts using self-exploration 3. Identify the relations between human-human and have the ability to fulfill the expectations in relations 4. Understand required skills to comprehend the laws of nature			
II	21ULCEN203	Functional English	1. Understand the importance of possessing good writing skills 2. Interpret human values and ethics through literature 3. Develop the ability to comprehend a text related to the domain area, leading to the cultivation of the reading habit 4. Recognize and apply fundamental grammar usage 5. Identify the characteristics of speaking skill	3	40	60
II	21BBECC201	Core 5: Financial Management (F)	1. Identify relevance with the concept, scope, and functions of financial management 2. Understand the role of finance in business firms and the essentials of finance manager and financial markets so as to enable the students	4	30	70



			<p>to gain an understanding of market mechanisms</p> <ol style="list-style-type: none"> 3. Aware of the necessary pros and cons of financial instruments available in the market 4. Understand the fundamental concepts of finance 5. To acquaint myself with the concepts of working capital and its requirements 			
II	21BBECC202	Core 6: Legal Aspect of Business (F)	<ol style="list-style-type: none"> 1. Identify relevance with the concept, scope, and functions of the overall legal framework 2. Understand the role of the overall legal framework in business firms and its essentials for business owners while taking decisions 3. Aware of the necessary pros and cons of the overall legal framework available in the Indian economy 4. Understand the fundamental concepts of the legal framework in India 5. To familiarize with the concepts of the Indian Contract Act and its requirements 	4	30	70
II	21BBECC203	Core 7: Marketing Skills (F)	<ol style="list-style-type: none"> 1. Understand the difference between knowledge, skills & abilities: specifically the buzzword skill in the marketing context 2. Familiarize the students with traditional & contemporary management schools, theories & practices 3. Make available, detailed understanding regarding various functions & processes of management with their relevance and applications 4. Establish primary understanding about extended functions of management with their practicability and implications 5. Study the challenges before modern businesses and familiarize students about special fields in management with their applications 6. Understand the importance of functional alignment & relationship plus value management 7. Check the marketing health & unleash the DIY potential 8. Learn tactical audit & make the decisions that will have real-time know-how 9. See the practicability of theoretical frames through case studies 10. Visualize real-time scenarios of the learned concepts 	4	30	70
II	21BBECC204	Core 8:	<ol style="list-style-type: none"> 1. Evaluate the use of internet banking and mobile banking in emerging 	4	30	70



		Banking and Financial Institution's Operations (F)	<p>economies</p> <ol style="list-style-type: none"> Analyze the mechanism of digital financial services and its importance in business Evaluate problems of non-performing businesses and suggest measures of recovery of loans Compare the Indian banking standards with other countries Knowledge of dos and don'ts of digital financial services for safety and security of funds 			
II	21BBEIC201	IDC 2: Business Statistics	<ol style="list-style-type: none"> Identify basics of quantitative statistics and different diagrams and charts used for presentation of data Classification, arrangement, and proper tabulation of data Interpret statistical analysis tools commonly used in business decision making Analyzing various quantitative tools and techniques relevant to business analysis for two variables Evaluate business decisions under various situations of business 	4	40	60
II	21AEHV202	AECC III: Human Values for Holistic Living	<ol style="list-style-type: none"> Recall basic guidelines of value education and understand the basic aspirations Understand the needs of self and body based on their natural acceptance and solve their conflicts using self-exploration Identify the relations between human-human and have the ability to fulfill the expectations in relations Understand required skills to comprehend the laws of nature 	3		
III	21ULCEN304	Effective Communicative English	<ol style="list-style-type: none"> Determine and explore advanced writing skills Infer the true meaning of the text Ascertain the skills which will help them to present themselves Allocate vocabulary and grammar in different forms Differentiate what to speak and how to speak 	3	40	60
III	21BBECC301	Core 9: (F) Managing and Developing Human	<ol style="list-style-type: none"> Demonstrate knowledge about fundamental principles, theories, and concepts in Managing and Developing Human Capital Understand the importance of procurement and selection of the right person for the right job and at the right time To develop the basic set of methods and techniques needed for 	4	30	70



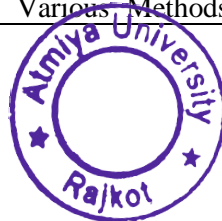
		Capital	<p>managing human capital</p> <p>4. To learn about basic administrative processes related to human capital management</p> <p>5. Secure industrial peace and harmony by providing machinery and procedure and to learn current challenges allied with managing Human Capital</p>			
III	21BBECC302	Core 10: (F) Strategic Cost Management	<p>1. Impart a conceptual knowledge in Strategic Cost Management – Material Costing, Marginal Costing, Standard Costing</p> <p>2. Understand and determine Stock Levels, EOQ, Stock Ledger & Inventory Turnover</p> <p>3. Inculcate deeper knowledge in Marginal costing methods to analyze the costs which impact the profitability of a firm</p> <p>4. Inculcate deeper knowledge in standard costing methods to analyze the costs which impact the profitability of a firm</p> <p>5. Enable the students to understand the fundamental concepts of cost sheet, to prepare cost sheet and pricing the materials</p>	4	30	70
III	21BBECC303	Core 11: (F) Business Economics	<p>1. Identify relevance with the concept, scope, and functions of Economics in the current era</p> <p>2. Understand the role of Economics in business firms and the essentials of managers and markets so as to enable the students to gain an understanding of market mechanisms</p> <p>3. Aware of the necessary pros and cons of economic conditions available in the market</p> <p>4. Understand the fundamental concepts of pricing</p> <p>5. To acquaint students with the concepts of market structure and its requirements</p>	4	30	70
III	21BBECC304	Core 12: (Pr) Business Plan-I (Practical)	<p>1. To generate an idea for a start-up by understanding the market opportunity</p> <p>2. To check the feasibility of the idea on the basis of resources</p> <p>3. To understand their business/entrepreneurial potential and explore new opportunities</p>	2	30	70
IV	21ULCEN404	Business Communicative English	<p>1. Evaluate and support a text related to business, leading to the cultivation of the reading habit.</p> <p>2. Deduce the correct practices of the strategies of effective business writing.</p>	3	40	60



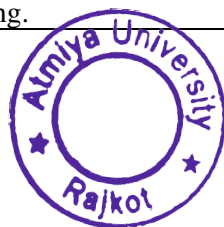
			<p>3. Compose and revise accurate business documents.</p> <p>4. Articulate their ideas, perspectives, and thoughts through speaking.</p> <p>5. To demonstrate his verbal and non-verbal communication ability through presentations.</p>			
IV	21BBECC401	Core 13: Branding and Product Portfolio	<p>1. To understand the purpose of evolution of branding with respect to product development as it deals with promotion, image, and constructive marketing & conduct of affairs of companies.</p> <p>2. To demonstrate the relationship between product and brand by developing in the student an awareness of branding principles involved in competitive market and business transactions.</p> <p>3. To make them aware of marketing management and how branding and its aspects affect the market for businesses that are initiating or developing new products through various sources.</p> <p>4. To make students understand the practical applications of consumer behavior to greater strategic decision-making for the effective functioning of the company.</p> <p>5. To enrich the students with brands and strategies of companies and developmental stages in the company.</p>	4	30	70
IV	21BBECC402	Core 14: (Pr) Business Plan –II (Practical)	<p>1. Be critical thinkers who are capable of identifying new business opportunities / expansion of family businesses.</p> <p>2. Communicate clearly and effectively to develop and evaluate business plans and funding proposals.</p> <p>3. Apply relevant financial principles to assess capital needs / cash flow needed for growth, break-even analysis, and pre-and post-funding valuation.</p> <p>4. Understand ethical issues related to owning a business and the responsibility towards both investors and employees.</p> <p>5. Apply interpersonal skills to effectively market a product or service and develop skills needed to effectively lead an organization</p>	4	50	50
IV	21BBECC403	Core 15: Government Schemes and Procedure	<p>1. Identify and relate various opportunities available based on MSME start-up schemes and their basic requirements.</p> <p>2. To analyze a firm's internal environment, competitive environment, and firm's suitability/eligibility to tap the benefits of supports or funds available under different govt. schemes and</p>	4	30	70



			<p>initiatives.</p> <p>3. To evaluate and recommend opportunities in the global markets for MSMEs and start-ups.</p> <p>4. To infer the distinguishing parameters of culture influencing start-ups.</p> <p>5. To prepare a detailed simulation of setting up a start-up.</p>			
V	21BBECC501	Core 16: Business Structure & Strategies (Ad)	<p>1. Understand modern business structures, importance of strategies & best strategic business practices, prevailing in the market</p> <p>2. Establish the lens of students in a way to look at environmental factors, strategic business tactics & their managerial role in correlation</p> <p>3. Study the modern business challenges before corporate & finding out its strategic solutions</p> <p>4. Understand the application-based strategic thinking and structural strategies in the workplace/business organizations</p> <p>5. Analyze different tools & types of strategic thinking in solving business problems for various scenarios</p>	4	30	70
V	21BBECC502	Core 17: Digital Marketing (Ad)	<p>1. To familiarize students with digital marketing practices and its importance for business.</p> <p>2. To aware students about social media platforms, tools, and techniques for advertisement and promotion.</p> <p>3. To give practical understanding of search engine advertising and display marketing (digital marketing mix).</p> <p>4. To aware students about types of digital advertisement and introduce the use of blogs for advertisement.</p> <p>5. To acquaint students with digital tools and models for building customer networks.</p>	4	30	70
V	21BBECC503	Core 18: Foreign Trade Documentati on (Ad)	<p>1. Identify relevance with the concept, scope, and functions of International Business & Procedure for registration as an exporter/importer.</p> <p>2. Understand various factors of Export Shipment practices like Pre-Shipment Procedure & Documentation.</p> <p>3. Make students aware of the various Methods of Payments for Export-Import Business.</p> <p>4. Study the Various Methods of Quality Control & Insurance</p>	4	30	70



			Policy for International Business. 5. Understand the fundamental concepts of Export Promotion Organization (Practical Demonstration of Websites).			
V	21BBECC504	Core 19 (Self Study): Decision Making Skills (Case Studies) (Ap)	<ol style="list-style-type: none"> 1. Let students become aware of the importance of learning through case studies. 2. Introduce them to some of the best business practices, prevailing in the market. 3. Make students identify & recognize the importance of efforts put in by various organizations & leaders in the creation of the current business scenario. 4. Establish the lens of students in a way to look at business & their managerial role in correlation. 5. Study the modern business challenges before corporate & finding out its solution. 6. Understand the application of case study learning in real-time situations. 7. Consider the need & utility of a possessed skill set with the required one i.e. decision making to perform the role of an effective manager. 8. Learn the application-based decision-making strategies to improve upon the same. 9. Learn different tools of case study solving & using them in various scenarios. 	4	30	70
VI	21BBECC601	Core 21: (Pr) Business Plan–III (Internship, Project Report & Presentation)	<ol style="list-style-type: none"> 1. Identify and understand the characteristics of entrepreneurs. 2. Describe the problems involved in starting a small business and potential solutions. 3. Develop Communication, Interpersonal, Analytical and Critical Skill sets in creating their business plans and presentations. 4. Analyze viability of a business before investing time & money. 5. Market and pitch the business venture to target customers and other stakeholders, including potential investors. 6. Understand competitive economic and sociological environments through PESTLE analysis. 7. Identify business opportunities by integrating business knowledge in problem-solving. 	14	150	150



			8. Prepare roadmap with timeline of anticipated results.			
VI	21BBECC602	Core 22: Project on SDGs	<ol style="list-style-type: none"> 1. To sensitize students towards emerging environmental consciousness and concerns for a better future by protecting environment & ending poverty. 2. To find feasible & rational solutions by promoting start-ups by exploring sustainable business operations / practices. 3. To discover various perspectives of the role of business in social, economical & environmental sustainability. 4. Know how to operationalize key sustainable business strategies and tactics, such as ecological foot printing, eco-efficiency, life cycle analysis and industrial ecology. 5. To develop innovative business practices and entrepreneurial opportunities with the aim to achieve SDGs. 	8	50	50



Faculty of Engineering & Technology
Department of Computer Engineering
Program: Ph.D. – Computer Engineering

Preamble

Atmiya University offers Ph. D. Programmes in Computer Engineering being its major research discipline. Considering the magnitude of research in present scenario and to augment the quality of research the syllabus for the Course Work, as a prerequisite to continue with the programme in Computer discipline, has been designed.

The course work aims to provide a full research based program to equip the Scholars with necessary tools so that they can grasp the area of study better as well as improve on their scientific writing skills, which is essential in any kind of quality research. The course further aims at familiarizing the perspectives, pedagogy and their implications in various areas of investigations.

As per the university ordinance and new guidelines of UGC, the research scholars who are provisionally registered under the Ph.D. Programme will have to undergo a Course Work.

The main objectives of the Course Work are to inculcate the following qualities in the Research Scholar:

- **Inquisition:** The ability to inquire about the research problem and to relate this with current socio-economic scenario.
- **Understanding:** Understand the theories that strengthen their dissertation research, with the depth needed to produce their own hypothesis and find out the research gape.
- **Analysis:** Student will be able to design the experiment and analysis the research problem.
- **Interpretation:** Interpret and compare the research outcomes.
- **Assessment:** Appraise the results and draw a conclusion.



- **Writing, editing, proof reading and designing:** Ability to write the scientific draft (*viz.* manuscript, review article, book chapter, research proposal etc)

Semester	Course code	Course Title	Course Outcomes	Credit	CIA	SEE
I	23PHID101	Course I - Research Methodology	<ol style="list-style-type: none"> 1. Demonstrate: Knowledge of research processes (reading, evaluating, and developing); 2. Understand: Perform literature reviews using print and online databases; 3. Analyze: Identify, explain, compare, and prepare the key elements of a research proposal/report 4. Apply: Describe sampling methods, measurement scales and instruments, and appropriate uses of each 	4	30	70
II	23PHCE101	Course II - Seminar Presentation (Recent Trends in Computer Engineering)	<ol style="list-style-type: none"> 1. Recall and describe recent trends in computer engineering. 2. Explain the significance of these trends in the field of computer engineering. 3. Demonstrate how these trends are applied in real-world scenarios. 4. Compare and contrast different trends in computer engineering. 5. Critique the effectiveness of these trends in addressing current challenges in computer engineering. 	1	50	-
II	23PHCE201	Course III - DSE-Core Digital Image Processing	<ol style="list-style-type: none"> 1. Be able to compare the domains and methods of image processing. 2. Learn Image Restoration & Enhancement techniques, colour image processing. 3. Be able to make proper use of image processing tools. 4. Familiar with morphological image processing 	4	30	70



II	23PHCE202	AI & ML Using Python	<ol style="list-style-type: none"> 1. Demonstrate reasoning and learning techniques to real world problem. 2. Identify the problems those are amenable to solution by AI methods and which AI techniques may be suited to solve given problems 3. Formalize a given problem in the framework of different AI methods. 4. Practice and implement an end-to-end application that uses machine learning at its core. 5. Able to implement these techniques in Python 	4	30	70
II	23PHCE203	Data Science & Deep Learning	<ol style="list-style-type: none"> 1. Be able to extract patterns from complex real world image and text datasets by using deep learning methods 2. Understand the basic concepts of neural networks and deep learning methods 3. To learn the difference between optimal reasoning Vs human like reasoning 4. Know the basic concepts and terminology of neural networks and deep learning. 5. Understand the issues involved in training deep learning models and the various "tricks" commonly used to get good model performance 	4	30	70
II	23PHCE204	Course II - Seminar Presentation (Review of Literature)	<ol style="list-style-type: none"> 1. Recall and describe recent trends in computer engineering. 2. Explain the significance of these trends in the field of computer engineering. 3. Demonstrate how these trends are applied in real-world scenarios. 4. Compare and contrast different trends in computer engineering. 5. Critique the effectiveness of these trends in addressing current challenges in computer engineering. 	1	50	-



II	23PHCE205	Course V Research and Professional Ethics	<ol style="list-style-type: none"> 1. Remember: Recall and describe key principles of research ethics. 2. Understand: Explain the importance of ethical considerations in research and professional practice. 3. Apply: Apply ethical guidelines to specific research scenarios, identifying potential ethical issues and proposing solutions. 4. Analyze: Analyze case studies to determine the ethical implications of various research decisions. 5. Evaluate: Evaluate the ethical implications of research designs, methodologies, and reporting practices. 	1	50	-
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Faculty of Engineering & Technology
Department of Computer Engineering
Programme: M. Tech Computer Engineering

OBJECTIVES OF THE PROGRAMME

Courses offered in this program are designed such that students will be able to integrate theory and practice, recognize the importance of abstraction and appreciate the value of efficient design created to meet clearly developed requirements. The program is intended to prepare students for lifelong learning as they undertake professional careers in computing with the ability to work well in a multi-disciplinary environment. Finally, students will graduate with an understanding of the context of their skills within a broader academic and applied environment.

GRADUATE ATTRIBUTES

- **Core Competence:** Possess discipline-relevant knowledge and competencies and able to link them to local, national and global issues to seek positive and sustainable solutions
- **Transferable global & impactful societal skills:** Ability to create knowledge through research and innovations by social immersions and transferring them to impact through problem solving at local and global levels.
- **Adaptability and Resilience:** Demonstrate resilience, perseverance and positivity in unfamiliar situations and adapt their skills and knowledge to excel in new environment
- **Sense of purpose & curiosity:** Possess intellectual curiosity to apply the knowledge to generate, develop and realize new ideas
- **Ethics & lifelong immersive learning:** Adhered to highest standards of ethics and always amenable to new ideas and actively seek out new ways of learning

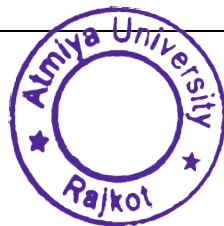


PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Our Programme will produce Post Graduates who:		
PEO1	:	Depth and breadth of knowledge: will be employ expertise in engineering to resolve various industrial and technological problems.
PEO2	:	Practice, Operation and usage of modern tools and technology: will be build up an ability to analyze the requirements, understand the technical specification, design and provide novel engineering solutions and produce efficient product design.
PEO3	:	Professional capacity and passion of learning: will be reveal professionalism, ethical attitude, and strong communication skills and maintain good teamwork spirit in the profession.
PEO4	:	Research, numeracy, scholarship and data literacy: will interact with the peers in industry and society as engineering professionals and leaders to set up technical ambience in the society.
PEO5	:	Global, moral and aesthetic sustainability: will employ skill with a strong base to prepare them for higher learning and research activities.

PROGRAM OUTCOMES

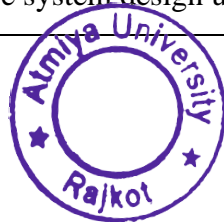
After completion of the programme the Post graduate will:		
PO1	:	Domain knowledge: Required expertise and knowledge of advanced computing and applications of engineering.
PO2	:	Problem analysis: Acquire skill set to design and conduct scientific experiments as well as to analyze and interpret numerous data sets.



PO3	:	Conduct investigations of complex problems: Investigates complex problems, deriving joy from learning and discovering new things.
PO4	:	Modern tool usage: Analyzed the techniques, skills, and modern engineering tools, including simulation and modeling for engineering needs
PO5	:	Environment and sustainability: Understand the impact of engineering solutions in a global, economic, environmental, and societal context
PO6	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO7	:	Individual and team work: Ability to function or lead multidisciplinary team, work cohesively and produce results.
PO8	:	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO9	:	Life-long learning: Understanding of lifelong learning, professional development, social and ethical responsibility.

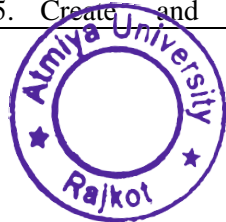
PROGRAM SPECIFIC OUTCOMES

After completion of the programme the Post graduate will:		
PSO 1	:	Apply Software Engineering Principles and Practices to provide software Solutions.
PSO 2	:	Able to take up higher studies, Research & Development and Entrepreneurships in the modern computing environment
PSO 3	:	Solve complex problems through innovative system design using modern tools and techniques.

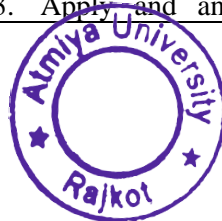


PSO 4	Understand, design, and analyze computer programs in the areas related to Algorithms, System Software, Web design, Big data, Artificial Intelligence, Machine Learning, and Networking.
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Semester	Course code	Course Title	Course Outcomes	Credit	CIA	SE E
I	21MCESCC101	Core 2: Cryptography & Network Security (F)	<ol style="list-style-type: none"> 1. Evaluate cryptography and network security concepts and application 2. Create security principles to system design 3. Apply & investigate network security threat 4. Analyze and design network security protocols 5. Justify research in network security 	3	30	70
I	21MCESCC102	Core 2: Machine Learning (F)	<ol style="list-style-type: none"> 1. Create and design different learning algorithms 2. Apply the machine learning concepts in real life problems 3. Evaluate various machine learning algorithms in a range of real-world applications. 4. Understand regression, classification, clustering, retrieval, recommender systems, and deep learning. 5. Analyze an end-to-end application that uses machine learning at its core. 6. Recognize these techniques in Python 	3	30	70
I	21MCESCC103	Core 3: Computer Algorithms (F)	<ol style="list-style-type: none"> 1. Understand need of complexity analysis of the algorithm and find out best case and worst case analysis of algorithm 2. Applying various techniques to solve recursive problem. 3. Apply and analyze various problems using greedy technique. 4. Apply dynamic approach to evaluate optimal solution of various problems and differentiate Greedy technique and Dynamic technique 5. Create and implement various Approximation 	3	30	70



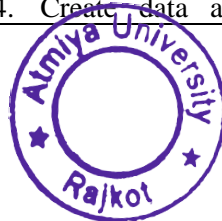
			algorithms			
I	21MCESID104	DSE-ID 1: Wireless Communication Standards	<ol style="list-style-type: none"> 1. Optimize a radio channel system 2. Select the apt diversity scheme for a given wireless system to improve the performance. 3. Perform efficient spectral allocation using multiple access techniques such as CDMA and OFDM. 4. Performance comparison of HSPA and LTE. 5. Gain knowledge of underlying mobile standards and the future mobile technologies Wi-Max; and also the coming 4G and 5G mobile standards 	3	30	70
I	21MCESCC104	Core Practical 1: Cryptography & Network Security (F)	<ol style="list-style-type: none"> 1. Evaluate cryptography and network security concepts and application 2. Create security principles to system design 3. Apply & investigate network security threat 4. Analyze and design network security protocols 5. Justify research in network security 	1	40	60
I	21MCESCC105	Core Practical 2: Machine Learning (F)	<ol style="list-style-type: none"> 1. Create and design different learning algorithms 2. Apply the machine learning concepts in real life problems 3. Evaluate various machine learning algorithms in a range of real-world applications. 4. Understand regression, classification, clustering, retrieval, recommender systems, and deep learning. 5. Analyze an end-to-end application that uses machine learning at its core. 6. Recognize these techniques in Python 	1	40	60
I	21MCESCC106	Core Practical 3: Computer Algorithms (F)	<ol style="list-style-type: none"> 1. Understand need of complexity analysis of the algorithm and find out best case and worst case analysis of algorithm 2. Applying various techniques to solve recursive problem. 3. Apply and analyze various problems using greedy 	1	40	60



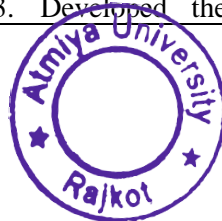
			<p>technique.</p> <p>4. Apply dynamic approach to evaluate optimal solution of various problems and differentiate Greedy technique and Dynamic technique</p> <p>5. Create and implement various algorithms</p>			
I	21MCESCC107	Core Practical 4: Research Methodology (Ap)	<p>1. Design a quality literature review and find the research gap.</p> <p>2. Identify an original and relevant problem and identify methods to find its solution</p> <p>3. Understanding the problem formulation, modeling by analytical method or experimental set up, validating the model.</p> <p>4. Recognize the solution obtained in an effective manner in written or spoken form also justify the problem solution.</p> <p>5. Apply skill for technical writing with facts, rules, ideas and concepts.</p>	1	40	60
I	21MCESID108	DSE-ID Practical 1: Wireless Communication Standards	<p>1. Optimize a radio channel system</p> <p>2. Select the apt diversity scheme for a given wireless system to improve the performance.</p> <p>3. Perform efficient spectral allocation using multiple access techniques such as CDMA and OFDM.</p> <p>4. Performance comparison of HSPA and LTE.</p> <p>5. Gain knowledge of underlying mobile standards and the future mobile technologies Wi-Max; and also the coming 4G and 5G mobile standards</p>	1	40	60
II	21CEWE201	SEC 1: Wisdom & Ethics for Success in Life	<p>1. Differentiate the career success, academic success and life success</p> <p>2. Identify the correct priority order in life and illustrate the human goal</p> <p>3. Understand that the relationships are definite.</p> <p>4. Understand the Interconnectedness between all the orders in existence.</p>			



II	21MCESCC201	Core 4: Design of Language Translators (Ad)	<ol style="list-style-type: none"> 1. Understand basic principles and advanced techniques of compiler design. 2. Create Grammars for Natural Languages and find the Syntactical Errors/Semantic errors during the compilations using parsing techniques 3. Analyze on intermediate representations and simple optimizations like register allocation and instruction scheduling. 4. Applying techniques for intermediate code and machine code optimization. 5. Analyzing the structures and support required for compiling advanced language features. 	3	30	70
II	21MCESCC202	Core 5: Computer Vision (Ap)	<ol style="list-style-type: none"> 1. Identify basic concepts, terminology, theories, models and methods in the field of computer vision. 2. Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition 3. Developed the practical skills necessary to build computer vision applications. 4. To have gained exposure to object and scene recognition and categorization from images 	3	30	70
II	21MCESCC203	Core 6: Cyber Forensics (Ap)	<ol style="list-style-type: none"> 1. Understand basic Concept of Ethical Hacking. 2. Apply the techniques to Evaluate Vulnerability in Network Server and Operating System. 3. Analyze cyber Crime Cases and IT act India and amendments. 4. Understand Analyze cybercrime Forensic technique. 5. Design a secure System and Privacy Policy. 	3	30	70
II	21MCESCC204	Core 7: Data Analytics and Visualization (Ap)	<ol style="list-style-type: none"> 1. Understand the concepts of data and analytics. 2. Analyze various architecture and concepts of visualization. 3. Design a data and will be able to address the issues that arise when implemented. 4. Create data analysis techniques from extracting 	3	30	70



			<p>knowledge from a data source.</p> <ol style="list-style-type: none"> Recognize appropriate data analytics algorithms for preprocessing. Apply the techniques in real life application. 			
II	21MCESID204	DSE-ID 2: Arduino & Raspberry Pi Programming	<ol style="list-style-type: none"> Understanding the basics of Arduino and Raspberry Pi, including their components and capabilities. Developing skills in programming languages commonly used with Arduino and Raspberry Pi, such as C/C++ for Arduino and Python for Raspberry Pi. Ability to design and implement simple to complex projects using Arduino and Raspberry Pi. Understanding interfacing of sensors, actuators, and other peripheral devices with Arduino and Raspberry Pi. Developing problem-solving and debugging skills specific to hardware and software interactions. 	3	30	70
II	21MCESCC205	Core Practical 5: Design of Language Translators (Ad)	<ol style="list-style-type: none"> Understand basic principles and advanced techniques of compiler design. Create Grammars for Natural Languages and find the Syntactical Errors/Semantic errors during the compilations using parsing techniques Analyze on intermediate representations and simple optimizations like register allocation and instruction scheduling. Applying techniques for intermediate code and machine code optimization. Analyzing the structures and support required for compiling advanced language features. 	1	40	60
II	21MCESCC206	Core Practical 6: Computer Vision (Ap)	<ol style="list-style-type: none"> Identify basic concepts, terminology, theories, models and methods in the field of computer vision. Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition Developed the practical skills necessary to build 	1	40	60



			<p>computer vision applications.</p> <p>4. To have gained exposure to object and scene recognition and categorization from images</p>			
II	21MCESCC207	Core Practical 7: Cyber Forensics (Ap)	<p>1. Understand basic Concept of Ethical Hacking.</p> <p>2. Apply the techniques to Evaluate Vulnerability in Network Server and Operating System.</p> <p>3. Analyze cyber Crime Cases and IT act India and amendments.</p> <p>4. Understand and Analyze the cyber crime using Digital Forensic technique.</p> <p>5. Design a secure System and Privacy Policy.</p>	1	40	60
II	21MCESCC208	Core Practical 8: Data Analytics and Visualization (Ap)	<p>1. Understand the concepts of data and analytics.</p> <p>2. Analyze various architecture and concepts of visualization.</p> <p>3. Design a data and will be able to address the issues that arise when implemented.</p> <p>4. Create data analysis techniques from extracting knowledge from a data source.</p> <p>5. Recognize appropriate data analytics algorithms for preprocessing.</p> <p>6. Apply the techniques in real life application.</p>	1	40	60
II	21MCESID208	DSE-ID Practical 2: Arduino & Raspberry Pi Programming	<p>1. Understanding the basics of Arduino and Raspberry Pi, including their components and capabilities.</p> <p>2. Developing skills in programming languages commonly used with Arduino and Raspberry Pi, such as C/C++ for Arduino and Python for Raspberry Pi.</p> <p>3. Ability to design and implement simple to complex projects using Arduino and Raspberry Pi.</p> <p>4. Understanding interfacing of sensors, actuators, and other peripheral devices with Arduino and Raspberry Pi.</p> <p>5. Developing problem-solving and debugging skills specific to hardware and software interactions.</p>	1	40	60



II	21CEWE201	SEC 1: Wisdom & Ethics for Success in Life	<ol style="list-style-type: none"> 1. Differentiate the career success, academic success and life success 2. Identify the correct priority order in life and illustrate the human goal 3. Understand that the relationships are definite. 4. Understand the Interconnectedness between all the orders in existence. 			
III	21MCESCC301	Core 8: Multicore Architecture (Self Study)	<ol style="list-style-type: none"> 1. Understand the challenges in parallel and multi – threading programming. 2. Identify characteristics, challenges and solution to programming parallel processor 3. Design parallel programming solution to common problems 4. Apply multicore architecture for design a system 5. Compare and contrast programming of serial processor and parallel processor 	3	30	70
III	21MCESDC301	DSE-Core 1: Deep Learning	<ol style="list-style-type: none"> 1. Understand complexity of Machine Learning algorithms and their limitations. 2. Understand modern notions in data analysis-oriented computing 3. Analyze different library and platform of deep learning 4. Apply deep learning model for object detection using CNN 5. Evaluate different case of recent innovation in artificial intelligent domain. 	4	30	70
III	21MCESDC302	DSE-Core 1: IOT Technology & Application (Ad)	<ol style="list-style-type: none"> 1. Understand building blocks of Internet of Things and characteristics 2. Analyze various M2M and IoT architectures 3. Apply design concept to IoT solutions 4. Define the infrastructure for supporting IoT deployments 5. Create IoT solutions using sensors, actuators and devices 	4	30	70



III	21MCESDC303	DSE-Core Practical 1: Deep Learning (Ad)	<ol style="list-style-type: none"> 1. Understand complexity of Machine Learning algorithms and their limitations. 2. Understand modern notions in data analysis-oriented computing 3. Analyze different library and platform of deep learning 4. Apply deep learning model for object detection using CNN 5. Evaluate different case of recent innovation in artificial intelligent domain. 	1	40	60
III	21MCESDC304	DSE-Core Practical 1: IOT Technology & Application (Ad)	<ol style="list-style-type: none"> 1. Understand building blocks of Internet of Things and characteristics 2. Analyze various M2M and IoT architectures 3. Apply design concept to IoT solutions 4. Define the infrastructure for supporting IoT deployments 5. Create IoT solutions using sensors, actuators and devices 	1	40	60
III	21MCESGE301	TDE 1: DataBase Management System	<ol style="list-style-type: none"> 1. Understand preliminaries of database management system concepts and its applications 2. Conceptualize and formalize relation amongst various entities of the database 3. Understand and design optimal way of storage and retrieval, in correlation with relational model through appropriate indexing and normalization 4. Create optimal query using structured query language 5. Understand the uses the database schema and need for normalization 	1	30	70
IV	21MCESDC401	DSE-Core 2: Distributed DBMS	<ol style="list-style-type: none"> 1. Understand what is Distributed DBMS 2. Understand various architectures of D\DBMS 3. Apply various fragmentation techniques given a problem 4. Understand and calculate the cost of enforcing semantic integrity control 5. Understand the steps of query processing 	3	30	70



IV	21MCESDC402	DSE-Core 2: Software Engineering Methodologies	<ol style="list-style-type: none"> 1. Correctly create a model of the structure and behavior of a software system 2. Design and implement, in a programming language, an executable solution to a given problem using common software principles and best practices. 3. Apply appropriate software testing techniques and evaluate the quality of a software product at module, integration, and system granularity levels. 4. Select and adapt suitable elements from among conventional and evolving software development Collaborate in teams to develop a significantly sized software system from conceptualization to completion 	3	30	70
IV	21MCESDC403	DSE-Core Practical 2: Distributed DBMS	<ol style="list-style-type: none"> 1. Understand what is Distributed DBMS 2. Understand various architectures of D\DBMS 3. Apply various fragmentation techniques given a problem 4. Understand and calculate the cost of enforcing semantic integrity control 5. Understand the steps of query processing 	1	40	60
IV	21MCESDC404	DSE-Core Practical 2: Software Engineering Methodologies	<ol style="list-style-type: none"> 1. Correctly create a model of the structure and behavior of a software system 2. Design and implement, in a programming language, an executable solution to a given problem using common software principles and best practices. 3. Apply appropriate software testing techniques and evaluate the quality of a software product at module, integration, and system granularity levels. 4. Select and adapt suitable elements from among conventional and evolving software development life-cycle processes and apply the resulting process to a software project 5. Collaborate in teams to develop a significantly sized software system from conceptualization to completion 	1	40	60



Department of Computer Engineering
Programme: B.Tech Computer Engineering

Program Objective:

- Department of Computer Engineering welcomes young aspirants around the globe to shape their career by undertaking various courses offered by the department. We are a growing department with an outstanding faculty, keeping pace with the rapid proliferation of, and advance in, computing and information technology. Our commitments to quality undergraduate teaching provide a solid foundation for those seeking to become well-prepared, talented, and indispensable computing professionals.
- The Department offers a course on Bachelors degree in Computer Engineering since the inception of the institute with an intake of 120. The department also offers a course on Masters Degree with an intake of 18 and Ph.D.
- The Department provides world class infrastructure with state of the art Computer labs equipped with latest software. The Department has always kept pace with the rapid advancements in the field.
- The Department is known for its strength in Artificial Intelligence and Deep Learning, Internet of Things, Data Mining, Cloud Computing, Networking and Cyber Security. The combination of qualified and committed faculty, a strong peer group, core and interdisciplinary research, collaboration with leading industries and research organizations offer students of this department an enriching learning experience.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core competency: To impart strong foundation in basic sciences, mathematics and engineering fundamentals, knowledge and capability.
PEO2	:	Breadth of knowledge: To be able to comprehend, understand and analyze Computer Engineering problems and relate them with real life.
PEO3	:	Preparedness: To provide in depth knowledge to design and develop novel products and innovative solution for real life problems in Computer Engineering field and related domains.
PEO4	:	Professionalism: To inculcate a conviction to believe in self, impart professional and ethical attitude, nurture to be an effective team member, infuse leadership qualities, build proficiency in soft skills and the abilities to relate engineering with the social issues.

After completion of the programme the Graduate will be able to:

PO1	Domain knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.



PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

After completion of the programme the Graduate will:		
PSO1	:	Implementation of professional engineering solutions for the betterment of society along with professional ethics and human values.
PSO2	:	The ability to apply engineering knowledge for developing solution of the problems using open-ended programming



		environments to deliver a quality product in multidisciplinary environment.
PSO3	:	Apply appropriate techniques and modern engineering techniques for the design and integration of computer system and related technologies, to engage students in lifelong learning for the advancement of technology.
PSO4	:	The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
PSO5	:	The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Semester	Course code	Course Title	Course Outcomes	Credit	CI A	SE E
I	23UGSH101	Fundamentals of Engineering Mathematics	<ol style="list-style-type: none"> 1. Solve simultaneous linear equations using various methods of Matrix Algebra. 2. Calculate Fourier series of a function 3. Evaluate partial derivatives and can implement to estimate maxima and minima of a function 4. Apply the knowledge of Differential Calculus to solve the various problems in Engineering 5. Apply Beta and Gamma functions in solving various mathematical problems 	4	50	50
I	23UGSH140	Effective Communication Skills	<ol style="list-style-type: none"> 1. To listen and comprehend complex academic texts 2. To read and infer the denotative and connotative meanings of technical texts 3. To write definitions, descriptions, narrations and essays on various topics 4. To speak fluently and accurately in formal and informal communicative contexts 5. To express their opinions effectively in both oral and written medium 	2	50	50



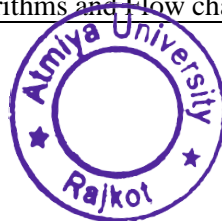
			of communication			
I	23UGCI070	Environmental Studies	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources 2. Understand importance of natural resources and biological diversity 3. Understand the sectoral effects on the local, regional, and global environmental issues 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources 5. Learn about the major international treaties and our country's stand on and responses to the major international agreements. 	2		
I	23UGSH102	Engineering Science	<ol style="list-style-type: none"> 1. The student will demonstrate the understanding of basic principles properties and its applications associated with semiconducting materials and specifically LASER. 2. The student will gain knowledge of basic theoretical and practical concept of optical fibre structure and their applications towards telecommunications. (U, A cognitive level) 3. The student will demonstrate the understanding of basic principles properties and its applications associated with electromagnetic waves. (U, A cognitive level) 4. The student will demonstrate understanding of basic theory, properties and applications of batteries, fuel cells and solar cell (U, A cognitive level) 5. The student will gain knowledge of various corrosions and their preventions and the different preparation techniques to characterize various advance engineering materials and their properties (U, A cognitive level) 	4	90	60
I	23UGEE101	Fundamentals of Electrical Engineering	<ol style="list-style-type: none"> 1. Apply fundamental electrical laws to electrical circuits. 2. Analyze single phase and three phase AC circuits. 3. Describe operating principle and applications of static and rotating electrical machines. 	4	90	60



I	23UGME101	Fundamentals of Mechanical Engineering	<ol style="list-style-type: none"> 1. Infer the scope & application of mechanical engineering & significance of thermodynamic process. 2. Understand the vapour power cycle used in thermal power plant. 3. Analyze various heat engine cycles and understand Construction & working of Internal Combustion Engine 4. Identify and select various power transmission & motion & their application in Industry. 5. Explain Quality Control and Contemporary Management Concept like 5S,JIT,KAIZAN 	4	90	60
I	23UGME103	Engineering Workshop	<ol style="list-style-type: none"> 1. Understand the Basics of workshop practices. 2. Demonstrate and produce different types of fitting models, carpentry Models and Tin smithy. 3. Understand welding on metal with different welded joints. 4. Identify the different materials for construction projects 5. Understand the safety measures and apply for construction work. 	1	100	-
I	23UGLI050	Information & Digital Literacy	<ol style="list-style-type: none"> 1. Navigate libraries, conduct proper referencing, and apply APA style 2. Enroll in MOOCs, understand FOSS, and differentiate between MOOC platforms 3. Apply note-taking and prewriting strategies, create effective search formulas, and build basic websites 4. Identify and access scholarly resources, avoid plagiarism, and utilize referencing styles 5. Demonstrate digital literacy, understand internet safety, and gain introductory knowledge of AI and app development 	1	100	-
II	23UGSH201	Calculus & Higher Order Differential Equation	<ol style="list-style-type: none"> 1. Understand the Higher Order Differential Equations 2. Understand and apply the Laplace transforms for solving various differential equations 3. Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts 4. Apply the knowledge of Calculate double and triple integral using various integration techniques. 5. Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus 	4	50	50



II	23UGSH240	Technical Communication Skills	<ol style="list-style-type: none"> 1. To listen and comprehend complex academic text 2. To read and infer the denotative and connotative meanings of technical texts 3. To write definitions, descriptions, narrations, and essays on various topics 4. To speak fluently and accurately in formal and informal communicative contexts 5. To express their opinions effectively in both oral and written medium of communication 	2	50	50
II	23UGUH070	Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 	3		
II	23UGCI101	Applied Civil Engineering	<ol style="list-style-type: none"> 1. Recognize the general terminology related to civil engineering while handling day to day problems of society 2. Apply the fundamentals to find out the various levels, angles situated on the earth 3. Recognize the general terminology related to applied mechanics 4. Understand principles of statics to calculate the various forces 5. Understand the fundamentals of support reactions in beams 	4	90	60
II	23UGCE101	Fundamentals of Computer Programming	<ol style="list-style-type: none"> 1. Have basic knowledge of Computer, System applications and Programming Language 2. Have knowledge in using C language for solving problems 3. Have knowledge of the syntax and semantics of C programming language 4. Write algorithms and Flow chart for problems 	2	100	-



			<ol style="list-style-type: none"> 5. Code a given logic of control structure, arrays and string in C language 6. Code a given logic of advanced concept like structure, pointer and union C language 			
II	23UGEC101	Fundamentals of Electronics	<ol style="list-style-type: none"> 1. Explain characteristic and working of basic semiconductor devices like diode, transistor, logic gates and operational amplifier 2. Perform analysis of different electronics circuits based on devices covered in the course and compare their operations. 3. Build and test electronic circuits based on devices covered in the course 4. Explain basic concepts of electronics communication systems. 	3	90	60
II	23UGME102	Engineering Drawing	<ol style="list-style-type: none"> 1. Understand engineering curves with proficiency in tracing the paths of simple machine components 2. Illustrate the projection of points, lines and planes with different conditions. 3. Develop proficiency in drawing the projections of various solids 4. Improve the visualization and technical skills for given orthographic views and can apply it in developing new products. 5. Improve the visualization and technical skills in isomeric projections and can apply it in developing new products. 	2	50	50
II	23UGEC102	Tinkering Lab	<ol style="list-style-type: none"> 1. Understanding of the fundamental principles of automation, including microcontroller, development boards, sensors, actuators, embedded systems, logic building and feedback mechanisms. 2. Apply the fundamental principles to illustrate the real world problems 3. Select, Interface, Integrate, and troubleshoot different sensors and actuators with the development board. 4. Identify the real world problem and design solution 5. Think creatively and find innovative solutions to automation challenges. 	1	100	-



Department of Computer Engineering
Programme: B.Tech Computer Engineering

Program Objective:

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- The Department offers a course on Bachelor's degree in Computer Engineering since the inception of the institute with an intake of 120. The department also offers a course on Master's Degree with an intake of 18 and Ph.D.
- The Department provides world class infrastructure with state of the art Computer labs equipped with latest software. The Department has always kept pace with the rapid advancements in the field.
- The Department is known for its strength in Artificial Intelligence and Deep Learning, Internet of Things, Data Mining, Cloud Computing, Networking and Cyber Security. The combination of qualified and committed faculty, a strong peer group, core and inter-disciplinary research, collaboration with leading industries and research organizations offer students of this department an enriching learning experience.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core competency: To impart strong foundation in basic sciences, mathematics and engineering fundamentals, knowledge and capability.
PEO2	:	Breadth of knowledge: To be able to comprehend, understand and analyze Computer Engineering problems and relate them with real life.
PEO3	:	Preparedness: To provide in depth knowledge to design and develop novel products and innovative solution for real life problems in Computer Engineering field and related domains.
PEO4	:	Professionalism: To inculcate a conviction to believe in self, impart professional and ethical attitude, nurture to be an effective team member, infuse leadership qualities, build proficiency in soft skills and the abilities to relate engineering with the social issues.

After completion of the programme the Graduate will be able to:

PO1	Domain knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.



PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

After completion of the programme the Graduate will:		
PSO1	:	Implementation of professional engineering solutions for the betterment of society along with professional ethics and human values.
PSO2	:	The ability to apply engineering knowledge for developing solution of the problems using open-ended programming

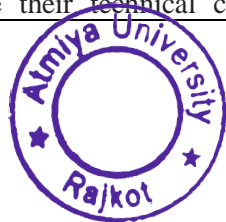


		environments to deliver a quality product in multidisciplinary environment.
PSO3	:	Apply appropriate techniques and modern engineering techniques for the design and integration of computer system and related technologies, to engage students in lifelong learning for the advancement of technology.
PSO4	:	The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
PSO5	:	The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Semester	Course code	Course Title	Course Outcomes	Credit	CIA	SEE
I	21UHSEN101	Communicative English	<ol style="list-style-type: none"> 1. Students will be able to grasp the basic tools of communication. 2. Students will be able to understand the role of non-verbal elements of communication. 3. Students will be able to exchange their ideas and views precisely and clearly. 4. Students will be able to learn the fundamental components of English Grammar and vocabulary. 5. Students will be able to inculcate human values through studying literature. 	3	40	60
I	21UH SMA101	HSM 1: Fundamentals of Engineering Mathematics	<ol style="list-style-type: none"> 1. Understand the Fundamental of Differential Equation and Matrix Algebra 2. Understand and apply Partial Derivatives 3. Understand the application of Matrix Algebra 4. Apply the knowledge of Diff. Calculus to solve the various problems in Engineering. 	4	40	60



			5. Solve simultaneous linear equations using various methods of Matrix Algebra.			
I	21UHSPY101	HSM 2: Fundamentals of Engineering Physics	<ol style="list-style-type: none"> 1. Understand the Fundamental role of Optical Fiber, Acoustics, Semiconductor Physics and advanced engineering materials and their behavior under various system conditions. 2. Understand and Describe qualitative comparison between various diodes. 3. Identify the Various material testing technologies 4. Apply the knowledge of material science to use various advanced engineering materials to solve the problems in Engineering. 5. Solve the problem of bad acoustics in Auditorium or Cinema hall by using various acoustical solutions. 	4	40	60
I	21BTCEIC101	IDC 1: Fundamentals of Electrical Engineering	<ol style="list-style-type: none"> 1. Apply fundamental electrical laws to electrical circuits. 2. Use Ohm's law, Kirchoff's law and star-delta transformation for solving resistive series, parallel and series-parallel circuits. 3. Define electric field, lines of force, electric field intensity, electric flux, flux density and permittivity. 4. Analyze single phase and three phase AC circuits. 	4	40	60
I	21BTCEIC102	IDC 2: Engineering Graphics and Computer Drafting	<ol style="list-style-type: none"> 1. Understand the conventions and construct basic as well as intermediate geometry along with method of engineering drawing. 2. Interpret engineering drawings using fundamental technical mathematics. 3. Construct basic and intermediate geometry by understanding the theory of projection. 4. Improve their visualization skills in orthographic and isometric projections so that they can apply these skills in developing new products. 5. Improve their technical communication skill in the 	4	40	60



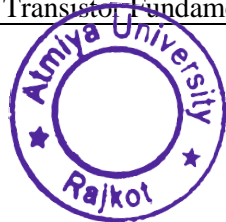
			form of communicative drawings.			
I	21BTCEIC103	IDC Practical 1: Electronics Workshop	<ol style="list-style-type: none"> 1. Basic knowledge of electrical and electronics components and its standard symbols. 2. Knowledge of measuring voltage, current, frequency, phase difference, power, power factor for single and three-phase supply. 3. Knowledge of how to use different types of tools which is used in electrical and electronics field. 4. Knowledge of Arduino and Decentralized solar PV system. 5. Justify circuit design concept. 	1	100	-
I	21AESD101	AECC 1: Introduction to SDG (online course)	<ol style="list-style-type: none"> 1. Recall the Sustainable Development Goals and their targets. 2. Explain the concept of sustainable development and the importance of the SDGs in addressing global challenges. 3. Apply knowledge of the SDGs to analyze real-world issues and propose solutions. 4. Analyze the interconnections between different SDGs and their impact on various communities and regions. 5. Evaluate the progress made towards achieving the SDGs and the challenges faced in implementation. 			
I	21AEHV202	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 			



I	21AEFS701	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Remember the message coming through different communication channels 2. Understand the message coming through different communication channels to think critically, logically and creatively 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Develop personality & right attitude through communication skills. 			
II	21UHSEN201	Technical Communication	<ol style="list-style-type: none"> 1. Gain knowledge and use of the technical English 2. Apply the knowledge of presentation skills to make presentations in their academic and professional life. 3. Learn various aspects of Morphology of English 4. Use the basics of Syntax of English 5. Students will be able to enrich their language and life skills through studying literature. 	3	40	60
II	21BTCECC201	Core 2: Problem Solving Techniques using C (F)	<ol style="list-style-type: none"> 1. Design C programs using function and array. 2. Implement C programs using pointers and structure. 3. Understand how to draw the flowchart and write an algorithm for any problem. 4. Analyze a different conditional and looping statement. 5. Apply their knowledge and conduct programmatical approach to solve a problem using C language. 	4	40	60
II	21UH SMA201	HSM 3: Multivariate calculus and differential equations	<ol style="list-style-type: none"> 1. Understand the Higher Order Differential Equations 2. Understand and apply the Laplace transforms for solving various differential equations 3. Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization 	4	40	60



			<p>problems and other problems involving vector concepts.</p> <ol style="list-style-type: none"> 4. Apply the knowledge to calculate double and triple integral using various integration techniques. 5. Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus 			
II	21BTCEIC201	IDC 3: Fundamentals of Civil Engineering	<ol style="list-style-type: none"> 1. Recognize the general terminology related to civil engineering while handling day to day problems of society 2. Understand the different material & its properties 3. Apply the fundamentals to find out the various levels, angles situated on the earth 4. Understand the different parameters of mass transportation systems. 5. Remember & apply the recent technological tools for the harmony of society 	4	40	60
II	21BTCEIC202	IDC 4: Fundamentals of Mechanical Engineering	<ol style="list-style-type: none"> 1. Classify various component design & general procedure of design. 2. Explain the fundamental laws of Thermodynamics and describe their application in thermal systems like air standard cycles of IC engines. 3. Apply the theoretical concepts of manufacturing process & their application in Industry. 4. Illustrate the Application of AR and VR, Cloud computing, Big Data Analytics, IOT, 3D Printing, Cyber Security in industry. 5. Explain Quality Control and Contemporary Management Concept like 5S,JIT,KAIZAN. 	4	40	60
II	21BTCEIC203	IDC 5: Basic Electronics	<ol style="list-style-type: none"> 1. Understand Introductory concepts 2. Understand Semiconductor physics 3. Define Diode applications 4. Understand Bipolar Junction Transistor 5. Analyze Transistor Fundamentals 	4	40	60



II	21BTCECC202	Core Practical 1: Web Development (F)	<ol style="list-style-type: none"> 1. Design a static web page using different HTML tags and also design data using XML File. 2. Identify and create a web page using different CSS Features with Different Layout as per need of Application. 3. Understanding basic concept of web designing. 4. Recognize tags and features of CSS create responsive webpage using bootstrap. 5. Apply and integrate the features of HTML and CSS using Bootstrap to develop a responsive and mobile-first websites 	1	100	-
II	21BTCEIC204	IDC Practical 2: Mechanical Workshop	<ol style="list-style-type: none"> 1. Demonstrate and produce different types of fitting models and carpentry Models. 2. Apply the knowledge of development of sheet metal models with an understanding of their applications. 3. Understand the Basics of workshop practices. 4. Understand welding on metal with different welded joints. 5. Demonstrate and produce different types of fitting models and carpentry Models. 	1	100	-
II	21AEHV202	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 			
II	21AEFS701	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Recognize the message coming through different channels 2. Understand the given situation to think critically, logically and creatively and deal accordingly based on that. 			



			<ol style="list-style-type: none"> 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Reframe personality & right attitude through traditional Soft skills. 			
III	21BTCECC301	Core 2: Database Management System	<ol style="list-style-type: none"> 1. Know preliminaries of database management system concepts and its applications 2. Understand and formalize relation amongst various entities of the database 3. Apply optimal way of storage and retrieval, in correlation with relational model through appropriate indexing and normalization 4. Analyze optimal query using structured query language 5. Synthesize advanced DBMS concepts like transaction processing, concurrency control and recovery 	4	40	60
III	21BTCECC302	Core 3: Data Structure	<ol style="list-style-type: none"> 1. Understand the concept of Dynamic memory management, data types, algorithms, Big O notation. 2. Understand basic data structures such as arrays, linked lists, stacks and queues. 3. Describe the hash function and concepts of collision and its resolution methods 4. Solve problem involving graphs, trees and heaps. 5. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data. 	4	40	60
III	21BTCECC303	Core 4: Computer Organization	<ol style="list-style-type: none"> 1. Ability to understand basic structure of computer 2. Ability to Doing and apply computer arithmetic operations. 3. Understand and Evaluate the concept of cache mapping techniques. 4. Create memory organization that uses banks for different word size operations 5. Create and analysing fundamentals concepts of pipeline and vector processing 	4	40	60



III	21BTCECC304	Core 5: Object Oriented Programming using C++	<ol style="list-style-type: none"> 1. Understand the skeleton of C++ program. 2. Develop the applications using object-oriented programming with C++. 3. Implement the simple object-oriented programs in C++ using objects and classes. 4. Describe the concept of function overloading, operator overloading, virtual functions and polymorphism. 5. Demonstrate the use of various OOPs concepts with the help of programs 	4	40	60
III	21UH SMA301	HSM4: Numerical Techniques for Engineers	<ol style="list-style-type: none"> 1. Apply the concepts and principles in basic numerical approximation in well-defined contexts beyond those in which they were first studied, showing the ability to evaluate critically the appropriateness of different tools and techniques. 2. Demonstrate the capability to use a range of established techniques and a reasonable level of skill in calculation and manipulation of the material to solve problems in the following areas: root finding, interpolation, numerical quadrature, finite differences, and initial-value problems for ODEs. 3. Compare the viability of different approaches to the numerical solution of problems arising in roots of solution of non-linear equations, interpolation and approximation, numerical differentiation and integration, solution of linear systems. 4. Demonstrate knowledge and critical understanding of the well-established principles within a wide range of basic numerical methods, including iterative methods 5. Develop and apply the appropriate numerical techniques for a given problem, interpret the results, and assess accuracy 	4	40	60
III	21BTCEIC301	IDC 6: Digital Electronics	<ol style="list-style-type: none"> 1. Design register and counter using Jk FFs. 2. Implement sequential circuit using FFs. 3. Understand how to convert one number system to another. 	4	40	60



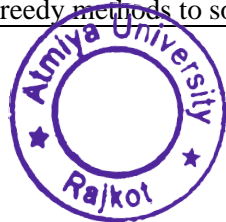
			<ol style="list-style-type: none"> 4. Analyze different types of combinational circuit. 5. Apply their knowledge to design combination circuit. 			
III		Core Enrichment 1: Concept to Practice Course	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written and oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 			
III	21AEFS701	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Understand the need of 21st century skills, Understand and Analyze the skills through Learning : Critical Thinking, Creativity & Innovation 2. Understand the leading skills through edge of : Communication, Collaboration and Networking 3. Understand the skills through digital literacy : Information, Media and Technology Literacy 4. Recall, Understand and Analyze Life Skills : Flexibility and Adaptability, Leadership and Responsibility 5. Recall, Understand and Analyze Life Skills : Productivity and Accountability, Social and Cross-Cultural Interaction 			
IV	21BTCECC401	Core 6: Operating System	<ol style="list-style-type: none"> 1. Understand fundamentals of Operating System and the concept of program, process and thread. Understand the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance. 2. Solve Inter Process Communication problems using various methods. 3. Compare various Memory Management Schemes especially paging and Segmentation in Operating 	4	40	60



			<p>System.</p> <ol style="list-style-type: none"> 4. Apply various Page Replacement Techniques. 5. Understand Deadlock characteristics and strategies to deal with deadlocks. 			
IV	21BTCECC402	Core 7: Computer Network	<ol style="list-style-type: none"> 1. Interpret the basics of Computer Networks and Various Protocols. 2. Generalize functionalities and services of each layer of OSI model. 3. Explains the concept of data framing and error control mechanisms 4. Compares Different routing protocols 5. Identify the concepts of network security, Mobile and World Wide Web concepts 	4	40	60
IV	21BTCECC403	Core 8: Object Oriented Programming using JAVA	<ol style="list-style-type: none"> 1. Understand the basics of object-oriented programming using C++ and JAVA. 2. Apply the concept of classes, Java, JDK Components and develop Simple Java Programs. 3. Develop Simple Java Programs using inheritance and Exception handling. 4. Develop Multi-threading Programming and Interfaces. 5. Develop concept of network programming. 	4	40	60
IV	21BTCECC404	Core 9: Web Programming	<ol style="list-style-type: none"> 1. Use operators, variables, arrays, control structures, functions and objects in JavaScript, Create dynamic styles and animation on a web page 2. Use regular expressions for form validation, Understand how JavaScript works with HTML and CSS 3. Understand to debug and solve basic JavaScript errors, Develop MVC Based Web Application 4. Build Dynamic website using server side PHP Programming and Database connectivity 5. Use Session and Cookie Management in website, Create, backup and restore a MySQL database 	4	40	60



IV	21UHSMA401	HSM 5: Applied Discrete Mathematics And Statistics	<ol style="list-style-type: none"> 1. To develop a strategic approach to organizing data and calculate the measure of central tendency. 2. To identify the direction and strength of correlation and regression between two variables. 3. To calculate probabilities by applying probability laws and theoretical results. 4. Design different programs in computer using the concept of Group Theory. Using the knowledge of Graph Theory students can able to analyze the Networking system. 	4	40	60
IV	21UHSMMG401	Core : Economics & Business Management	<ol style="list-style-type: none"> 1. To introduce economics, its types and its impact. 2. To learn production management and various laws associated with production. 3. To learn the fundamental principles of management. 4. To understand the functions of management. 5. To learn the types of management. 	2	40	60
IV		Core Enrichment 1: Concept to Practice Course	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written and oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. 5. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 			
IV		FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Understand the basic concepts of quantitative ability 2. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions 3. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc. 			
V	21BTCECC501	Core 10: Analysis & Design of Algorithms	<ol style="list-style-type: none"> 1. Derive efficiency of the algorithms using asymptotic notations 2. Derive the complexity of divide-and-conquer algorithms using recurrence 3. Apply Greedy methods to solve various problems 	4	40	60



			<ol style="list-style-type: none"> 4. Compare Greedy method and dynamic method for problem solving 5. Apply pattern matching algorithms to find particular pattern 			
V	21BTCECC502	Core 11: Software Engineering (F)	<ol style="list-style-type: none"> 1. Demonstrate an understanding of and apply current theories, models, tools and techniques that provide a basis for the software lifecycle. 2. Apply software engineering principles and techniques. 3. Ability to work in one or more significant application domains 4. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics 5. Apply new knowledge as needed, using appropriate learning strategies. 	3	40	60
V	21BTCECC503	Core 12: Python for Data Science	<ol style="list-style-type: none"> 1. Apply various Python data structures to effectively manage various types of data. 2. To create applications using Python Programming 3. Understand various data visualization tools for effective interpretations and insights of data. 4. Remember basic data types in Python. 5. Analyze the need for data preprocessing and visualization techniques. 	3	40	60
V	21BTCECC505	Core Practical 2: Python for Data Science	<ol style="list-style-type: none"> 1. Apply various Python data structures to effectively manage various types of data. 2. To create applications using Python Programming 3. Understand various data visualization tools for effective interpretations and insights of data. 4. Remember basic data types in Python. 5. Analyze the need for data preprocessing and visualization techniques. 	1	40	60



V	21BTCECC504	Core 13: Modern Network (F)	<ol style="list-style-type: none"> 1. Identify the components required to build different types of networks 2. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies 3. Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols 4. Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure 5. Have a working knowledge of datagram and internet socket programming 	4	40	60
V	21BTCECC506	Core Practical 3: Cyber Security	<ol style="list-style-type: none"> 1. Analyze and Assess the Security and Privacy Policy of a System 2. Test Web Application for Vulnerability 3. Develop a Secure Network and Prepare Assessment report for network Scanning 4. Create IPS and IDS for Intrusion Detection. 5. Apply the Techniques to find Vulnerability in Web App and Web Server. 	1	40	60
V		DSE 1: Microcontroller & Interfacing	<ol style="list-style-type: none"> 1. Understand the architecture and various features of AVR,Controller 2. Write, debug and simulate embedded C language programs 3. Interface I/O peripheral devices with microcontroller 4. Understand Timer operation and generate time delays 5. Create square and rectangular waveforms using Waveform generator and PWM Programming 	4	40	60
V		Core Enrichment 1: Concept to Practice Course	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written and oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. 			



			Demonstrate the knowledge, skills, values and attitudes of professional graduates.			
V	21BTCECR501	Core Enrichment 2: Internship 1	<ol style="list-style-type: none"> 1. Recall and summarize the key concepts, theories, and skills learned during the internship. 2. Demonstrate comprehension of the internship experience by explaining its significance and relevance to the field of study. 3. Apply the knowledge, skills, and techniques acquired during the internship to solve practical problems in the field. 4. Analyze the internship experience to identify its components, patterns, and relationships. 5. Assess the effectiveness and value of the internship experience in achieving personal and professional goals. 	1	100	-
V	21AEFS501	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Understand the basic concepts of quantitative ability 2. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions 3. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc. 			
VI	21BTCECC601	Core 14: Artificial Intelligence (Ad)	<ol style="list-style-type: none"> 1. Understand various search methods 2. Use various knowledge representation methods 3. Analyze and represent an AI problem 4. Evaluate Prolog Programming language using predicate logic 5. Relate knowledge in AI Applications and advances in Artificial Intelligence 	4	40	60
VI	21BTCECC602	Core 15: Automata Theory	<ol style="list-style-type: none"> 1. Define key terms and concepts related to automata theory and formal languages and recall the properties of various automata models, such as finite automata and pushdown automata. 2. Describe the principles behind language recognition and generation using automata and Develop finite 	4	40	60



			<p>automata, pushdown automata, and context-free grammars to recognize and generate specific formal languages.</p> <ol style="list-style-type: none"> 3. Apply automata theory concepts to the development of lexers and parsers in compiler construction. 4. Analyze the computational complexity of algorithms and problems, categorizing them into complexity classes. 5. Assess the relevance of formal language theory and automata theory to compiler design, formal methods, and software verification and Develop innovative algorithms based on automata theory to tackle novel and challenging tasks. 			
VI	21BTCECC603	Core 16: Data Mining & Data Warehousing	<ol style="list-style-type: none"> 1. Define key data mining and data warehousing concepts. 2. Design a data warehouse and will be able to address the issues that arise when implementing a data warehouse. 3. Design and create data mining models to solve specific business problems. 4. Analyze the data warehousing architecture and its role in supporting business intelligence. 5. Apply and interpret interesting patterns for further analysis. 	4	40	60
VI	21BTCECL601	Core Elective 1: Advance Web Programming	<ol style="list-style-type: none"> 1. Recall and identify basic PHP concepts such as class, object, properties, and methods. Recognize Bootstrap components and their usage in web interfaces. 2. Understand the architecture of Laravel, including routes, controllers, and views. Comprehend the use of CSRF protection, validation, and error handling mechanisms. 3. Understand the concepts of master layouts, conditional statements, loops, and including assets in Blade templates. Comprehend the integration of Bootstrap components with Blade templates. 4. Understand how to create and modify database schemas using migrations. Comprehend the usage of query 	4	40	60



			<p>builder for data retrieval and manipulation.</p> <p>5. Apply Eloquent ORM to design database models, establish relationships, and perform data operations. Apply models in controllers to handle user input and display data in views.</p>			
VI	21BTCECL602	Core Elective 2: Net Technology	<ol style="list-style-type: none"> 1. Understand the foundations of CLR execution 2. Implement technologies of the .NET framework 3. Analyze the object-oriented aspects of C# 4. Apply windows form for Desktop base application development 5. Create and analyze Database interaction for Application 	4	40	60
VI	21BTCECL603	Core Elective 3: Big Data Analytics	<ol style="list-style-type: none"> 1. Define fundamental Big Data concepts, terminologies, and technologies. And describe the Map-Reduce paradigm and its role in processing large datasets. 2. Explain the principles of distributed computing and how they apply to Big Data. 3. Design and implement data models using MongoDB for specific Big Data applications. 4. Evaluate the scalability and fault tolerance of distributed systems in handling large datasets. 5. Develop innovative approaches to solving complex Big Data problems, integrating multiple technologies. 	4	40	60
VI	21UFEDE602	DSE 2: Cloud Computing	<ol style="list-style-type: none"> 1. Understand the fundamental concepts and principles of cloud computing. 2. Understand different cloud development models and services. 3. Evaluate various problems using the concept of MapReduce. 4. Create various solutions for Disaster Recovery. 5. Understand increased availability of high-performance applications to small/ medium-sized businesses. 	4	40	60



VI	21UTDE003	TDE 1: Fundamentals of Computer Networks	<ol style="list-style-type: none"> 1. Understand the significance and functionalities of various layers in computer network. 2. Compare various devices and protocols that builds computer network. 3. Identify design issues related to various layers in computer network. 4. Create client server application using socket programming. 5. Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure. 	2	100	-
VI	21UTDE004	TDE 1: System Analysis and Design	<ol style="list-style-type: none"> 1. Ability to understand software lifecycle development models. 2. Ability to understand and apply software requirements engineering techniques. 3. Ability to understand software project management. 4. UML is rapidly accepted throughout the software industry for modeling of software requirement and design. 5. To understand what the Unified Modeling Language (UML) is, and why it is relevant to the development of software-intensive systems. 6. To learn how to apply the UML. 	2	100	-
VI	21BTCECR601	Core Enrichment 1: Concept to Practice Course	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written an oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. <p>Demonstrate the knowledge, skills, values and attitudes of professional graduates.</p>			



VI		FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Understand the given situation to think critically, logically and creatively and deal accordingly based on that. 2. Apply the knowledge, skills and judgment around human communication that facilitate employability skills. 3. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions 4. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc. 			
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Department of Computer Engineering
Programme: B.Tech Artificial Intelligence & Data Science

Program Objective:

- Department of Computer Engineering welcomes young aspirants around the globe to shape their career by undertaking various courses offered by the department. We are a growing department with an outstanding faculty, keeping pace with the rapid proliferation of, and advance in, computing and information technology. Our commitments to quality undergraduate teaching provide a solid foundation for those seeking to become well-prepared, talented, and indispensable computing professionals.
- The Department offers a course on Bachelor's degree in Computer Engineering, Computer Science & Engineering and Artificial Intelligence & Data Science. The department also offers a course on Master's Degree with an intake of 18 and Ph.D.
- The Department provides world class infrastructure with state of the art Computer labs equipped with latest software. The Department has always kept pace with the rapid advancements in the field.
- The Department is known for its strength in Artificial Intelligence and Deep Learning, Internet of Things, Data Mining, Cloud Computing, Networking and Cyber Security. The combination of qualified and committed faculty, a strong peer group, core and interdisciplinary research, collaboration with leading industries and research organizations offer students of this department an enriching learning experience.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking



After completion of the Programme the Graduate will be able to:

PO1	Domain knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core competency: To impart strong foundation in basic sciences, mathematics and engineering fundamentals, knowledge and capability.
PEO2	:	Breadth of knowledge: To be able to comprehend, understand and analyze Computer Engineering problems and relate them with real life.
PEO3	:	Preparedness: To provide in depth knowledge to design and develop novel products and innovative solution for real life problems in Computer Engineering field and related domains.
PEO4	:	Professionalism: To inculcate a conviction to believe in self, impart professional and ethical attitude, nurture to be an effective team member, infuse leadership qualities, build proficiency in soft skills and the abilities to relate engineering with the social issues.

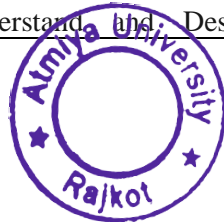
Program Specific Outcomes

After completion of the programme the Graduate will:		
PSO1	:	Implementation of professional engineering solutions for the betterment of society along with professional ethics and human values.
PSO2	:	The ability to apply engineering knowledge for developing solution of the problems using open-ended programming environments to deliver a quality product in multidisciplinary environment.
PSO3	:	Apply appropriate techniques and modern engineering techniques for the design and integration of computer system and related technologies, to engage students in lifelong learning for the advancement of technology.

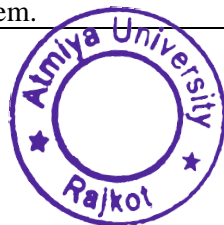


PSO4	:	The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
PSO5	:	The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

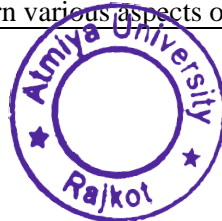
Semester	Course code	Course Title	Course Outcomes	Credit	CIA	SEE
I	21UHSEN101	Communicative English	<ol style="list-style-type: none"> 1. Students will be able to grasp the basic tools of communication. 2. Students will be able to understand the role of non-verbal elements of communication. 3. Students will be able to exchange their ideas and views precisely and clearly. 4. Students will be able to learn the fundamental components of English Grammar and vocabulary. 5. Students will be able to inculcate human values through studying literature. 	3	40	60
I	21UH SMA101	HSM 1: Fundamentals of Engineering Mathematics	<ol style="list-style-type: none"> 1. Understand the Fundamental of Differential Equation and Matrix Algebra 2. Understand and apply Partial Derivatives 3. Understand the application of Matrix Algebra 4. Apply the knowledge of Diff. Calculus to solve the various problems in Engineering. 5. Solve simultaneous linear equations using various methods of Matrix Algebra. 	4	40	60
I	21UHSPY101	HSM 2: Fundamentals of Engineering Physics	<ol style="list-style-type: none"> 1. Understand the Fundamental role of Optical Fiber, Acoustics, Semiconductor Physics and advanced engineering materials and their behavior under various system conditions. 2. Understand and Describe qualitative comparison 	4	40	60



			<p>between various diodes.</p> <ol style="list-style-type: none"> Identify the Various material testing technologies Apply the knowledge of material science to use various advanced engineering materials to solve the problems in Engineering. Solve the problem of bad acoustics in Auditorium or Cinema hall by using various acoustical solutions. 			
I	21BTADIC101	IDC 1: Fundamentals of Electrical Engineering	<ol style="list-style-type: none"> Apply fundamental electrical laws to electrical circuits. Use Ohm's law, Kirchhoff's law and star-delta transformation for solving resistive series, parallel and series-parallel circuits. Define electric field, lines of force, electric field intensity, electric flux, flux density and permittivity. Analyze single phase and three phase AC circuits. 	4	40	60
I	21BTADIC102	IDC 2: Engineering Graphics and Computer Drafting	<ol style="list-style-type: none"> Understand the conventions and construct basic as well as intermediate geometry along with method of engineering drawing. Interpret engineering drawings using fundamental technical mathematics. Construct basic and intermediate geometry by understanding the theory of projection. Improve their visualization skills in orthographic and isometric projections so that they can apply these skills in developing new products. Improve their technical communication skill in the form of communicative drawings. 	4	40	60
I	21BTADIC103	IDC Practical 1: Electronics Workshop	<ol style="list-style-type: none"> Basic knowledge of electrical and electronics components and its standard symbols. Knowledge of measuring voltage, current, frequency, phase difference, power, power factor for single and three-phase supply. Knowledge of how to use different types of tools which is used in electrical and electronics field. Knowledge of Arduino and Decentralized solar PV system. 	1	100	-



			5. Justify circuit design concept.			
I	21AESD101	AECC 1: Introduction to SDG (online course)	<ol style="list-style-type: none"> 1. Recall the Sustainable Development Goals and their targets. 2. Explain the concept of sustainable development and the importance of the SDGs in addressing global challenges. 3. Apply knowledge of the SDGs to analyze real-world issues and propose solutions. 4. Analyze the interconnections between different SDGs and their impact on various communities and regions. 5. Evaluate the progress made towards achieving the SDGs and the challenges faced in implementation. 			
II	21AEHV202	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 			
II	21AEFS701	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Remember the message coming through different communication channels 2. Understand the message coming through different communication channels to think critically, logically and creatively 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Develop personality & right attitude through communication skills. 			
II	21UHSEN201	Technical Communication	<ol style="list-style-type: none"> 1. Gain knowledge and use of the technical English 2. Apply the knowledge of presentation skills to make presentations in their academic and professional life. 3. Learn various aspects of Morphology of English 	3	40	60



			<ol style="list-style-type: none"> 4. Use the basics of Syntax of English 5. Students will be able to enrich their language and life skills through studying literature. 			
II	21BTADCC201	Core 2: Problem Solving Techniques using C (F)	<ol style="list-style-type: none"> 1. Design C programs using function and array. 2. Implement C programs using pointers and structure. 3. Understand how to draw the flowchart and write an algorithm for any problem. 4. Analyze a different conditional and looping statement. 5. Apply their knowledge and conduct programmatical approach to solve a problem using C language. 	4	40	60
II	21UH SMA201	HSM 3: Multivariate calculus and differential equations	<ol style="list-style-type: none"> 1. Understand the Higher Order Differential Equations 2. Understand and apply the Laplace transforms for solving various differential equations 3. Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts. 4. Apply the knowledge to calculate double and triple integral using various integration techniques. 5. Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus 	4	40	60
II	21BTADIC201	IDC 3: Fundamentals of Civil Engineering	<ol style="list-style-type: none"> 1. Recognize the general terminology related to civil engineering while handling day to day problems of society 2. Understand the different material & its properties 3. Apply the fundamentals to find out the various levels, angles situated on the earth 4. Understand the different parameters of mass transportation systems. 5. Remember & apply the recent technological tools for the harmony of society 	4	40	60



II	21BTADIC202	IDC 4: Fundamentals of Mechanical Engineering	<ol style="list-style-type: none"> 1. Classify various component design & general procedure of design. 2. Explain the fundamental laws of Thermodynamics and describe their application in thermal systems like air standard cycles of IC engines. 3. Apply the theoretical concepts of manufacturing process & their application in Industry. 4. Illustrate the Application of AR and VR, Cloud computing, Big Data Analytics, IOT, 3D Printing, Cyber Security in industry. 5. Explain Quality Control and Contemporary Management Concept like 5S,JIT,KAIZAN. 	4	40	60
II	21BTADIC203	IDC 5: Basic Electronics	<ol style="list-style-type: none"> 1. Understand Introductory concepts 2. Understand Semiconductor physics 3. Define Diode applications 4. Understand Bipolar Junction Transistor 5. Analyze Transistor Fundamentals 	4	40	60
II	21BTADCC202	Core Practical 1: Web Designing (F)	<ol style="list-style-type: none"> 1. Design a static web page using different HTML tags and also design data using XML File. 2. Identify and create a web page using different CSS Features with Different Layout as per need of Application. 3. Understanding basic concept of web designing. 4. Recognize tags and features of CSS create responsive webpage using bootstrap. 5. Apply and integrate the features of HTML and CSS using Bootstrap to develop a responsive and mobile-first websites 	1	100	-
II	21BTADIC204	IDC Practical 2: Mechanical Workshop	<ol style="list-style-type: none"> 1. Demonstrate and produce different types of fitting models and carpentry Models. 2. Apply the knowledge of development of sheet metal models with an understanding of their applications. 3. Understand the Basics of workshop practices. 4. Understand welding on metal with different welded joints. 	1	100	-



			5. Demonstrate and produce different types of fitting models and carpentry Models.			
II	21AEHV202	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 			
II	21AEFS701	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Recognize the message coming through different channels 2. Understand the given situation to think critically, logically and creatively and deal accordingly based on that. 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Reframe personality & right attitude through traditional Soft skills. 			



Department of Computer Engineering
Name of Programme: B.Tech Computer Engineering

Program Objective:

- Department of Computer Engineering welcomes young aspirants around the globe to shape their career by undertaking various courses offered by the department. We are a growing department with an outstanding faculty, keeping pace with the rapid proliferation of, and advance in, computing and information technology. Our commitments to quality undergraduate teaching provide a solid foundation for those seeking to become well-prepared, talented, and indispensable computing professionals.
- The Department offers a course on Bachelors degree in Computer Engineering since the inception of the institute with an intake of 120. The department also offers a course on Masters Degree with an intake of 18 and Ph.D.
- The Department provides world class infrastructure with state of the art Computer labs equipped with latest software. The Department has always kept pace with the rapid advancements in the field.
- The Department is known for its strength in Artificial Intelligence and Deep Learning, Internet of Things, Data Mining, Cloud Computing, Networking and Cyber Security. The combination of qualified and committed faculty, a strong peer group, core and inter-disciplinary research, collaboration with leading industries and research organizations offer students of this department an enriching learning experience.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core competency: To impart strong foundation in basic sciences, mathematics and engineering fundamentals, knowledge and capability.
PEO2	:	Breadth of knowledge: To be able to comprehend, understand and analyze Computer Engineering problems and relate them with real life.
PEO3	:	Preparedness: To provide in depth knowledge to design and develop novel products and innovative solution for real life problems in Computer Engineering field and related domains.
PEO4	:	Professionalism: To inculcate a conviction to believe in self, impart professional and ethical attitude, nurture to be an effective team member, infuse leadership qualities, build proficiency in soft skills and the abilities to relate engineering with the social issues.

After completion of the programme the Graduate will be able to:

PO1	Domain knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.



PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
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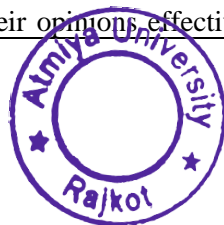
Program Specific Outcomes

After completion of the programme the Graduate will:		
PSO1	:	Implementation of professional engineering solutions for the betterment of society along with professional ethics and human values.
PSO2	:	The ability to apply engineering knowledge for developing solution of the problems using open-ended programming



		environments to deliver a quality product in multidisciplinary environment.
PSO3	:	Apply appropriate techniques and modern engineering techniques for the design and integration of computer system and related technologies, to engage students in lifelong learning for the advancement of technology.
PSO4	:	The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
PSO5	:	The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Semester	Course code	Course Title	Course Outcomes	Credit	CIA	SEE
I	23UGSH101	Fundamentals of Engineering Mathematics	<ol style="list-style-type: none"> 1. Solve simultaneous linear equations using various methods of Matrix Algebra. 2. Calculate Fourier series of a function 3. Evaluate partial derivatives and can implement to estimate maxima and minima of a function 4. Apply the knowledge of Differential Calculus to solve the various problems in Engineering 5. Apply Beta and Gamma functions in solving various mathematical problems 	4	50	50
I	23UGSH140	Effective Communication Skills	<ol style="list-style-type: none"> 1. To listen and comprehend complex academic texts 2. To read and infer the denotative and connotative meanings of technical texts 3. To write definitions, descriptions, narrations and essays on various topics 4. To speak fluently and accurately in formal and informal communicative contexts 5. To express their opinions effectively in both oral and written medium 	2	50	50



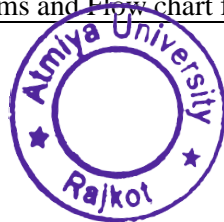
			of communication			
I	23UGCI070	Environmental Studies	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources 2. Understand importance of natural resources and biological diversity 3. Understand the sectoral effects on the local, regional, and global environmental issues 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources 5. Learn about the major international treaties and our country's stand on and responses to the major international agreements. 	2		
I	23UGSH102	Engineering Science	<ol style="list-style-type: none"> 1. The student will demonstrate the understanding of basic principles properties and its applications associated with semiconducting materials and specifically LASER. 2. The student will gain knowledge of basic theoretical and practical concept of optical fibre structure and their applications towards telecommunications. (U, A cognitive level) 3. The student will demonstrate the understanding of basic principles properties and its applications associated with electromagnetic waves. (U, A cognitive level) 4. The student will demonstrate understanding of basic theory, properties and applications of batteries, fuel cells and solar cell (U, A cognitive level) 5. The student will gain knowledge of various corrosions and their preventions and the different preparation techniques to characterize various advance engineering materials and their properties (U, A cognitive level) 	4	90	60
I	23UGEE101	Fundamentals of Electrical Engineering	<ol style="list-style-type: none"> 1. Apply fundamental electrical laws to electrical circuits. 2. Analyze single phase and three phase AC circuits. 3. Describe operating principle and applications of static and rotating electrical machines. 	4	90	60



I	23UGME101	Fundamentals of Mechanical Engineering	<ol style="list-style-type: none"> 1. Infer the scope & application of mechanical engineering & significance of thermodynamic process. 2. Understand the vapour power cycle used in thermal power plant. 3. Analyze various heat engine cycles and understand Construction & working of Internal Combustion Engine 4. Identify and select various power transmission & motion & their application in Industry. 5. Explain Quality Control and Contemporary Management Concept like 5S,JIT,KAIZAN 	4	90	60
I	23UGME103	Engineering Workshop	<ol style="list-style-type: none"> 1. Understand the Basics of workshop practices. 2. Demonstrate and produce different types of fitting models, carpentry Models and Tin smithy. 3. Understand welding on metal with different welded joints. 4. Identify the different materials for construction projects 5. Understand the safety measures and apply for construction work. 	1	100	-
I	23UGLI050	Information & Digital Literacy	<ol style="list-style-type: none"> 1. Navigate libraries, conduct proper referencing, and apply APA style 2. Enroll in MOOCs, understand FOSS, and differentiate between MOOC platforms 3. Apply note-taking and prewriting strategies, create effective search formulas, and build basic websites 4. Identify and access scholarly resources, avoid plagiarism, and utilize referencing styles 5. Demonstrate digital literacy, understand internet safety, and gain introductory knowledge of AI and app development 	1	100	-
II	23UGSH201	Calculus & Higher Order Differential Equation	<ol style="list-style-type: none"> 1. Understand the Higher Order Differential Equations 2. Understand and apply the Laplace transforms for solving various differential equations 3. Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts 4. Apply the knowledge of Calculate double and triple integral using various integration techniques. 5. Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus 	4	50	50



II	23UGSH240	Technical Communication Skills	<ol style="list-style-type: none"> 1. To listen and comprehend complex academic text 2. To read and infer the denotative and connotative meanings of technical texts 3. To write definitions, descriptions, narrations, and essays on various topics 4. To speak fluently and accurately in formal and informal communicative contexts 5. To express their opinions effectively in both oral and written medium of communication 	2	50	50
II	23UGUH070	Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 	3		
II	23UGCI101	Applied Civil Engineering	<ol style="list-style-type: none"> 1. Recognize the general terminology related to civil engineering while handling day to day problems of society 2. Apply the fundamentals to find out the various levels, angles situated on the earth 3. Recognize the general terminology related to applied mechanics 4. Understand principles of statics to calculate the various forces 5. Understand the fundamentals of support reactions in beams 	4	90	60
II	23UGCE101	Fundamentals of Computer Programming	<ol style="list-style-type: none"> 1. Have basic knowledge of Computer, System applications and Programming Language 2. Have knowledge in using C language for solving problems 3. Have knowledge of the syntax and semantics of C programming language 4. Write algorithms and Flow chart for problems 	2	100	-



			<ol style="list-style-type: none"> 5. Code a given logic of control structure, arrays and string in C language 6. Code a given logic of advanced concept like structure, pointer and union C language 			
II	23UGEC101	Fundamentals of Electronics	<ol style="list-style-type: none"> 1. Explain characteristic and working of basic semiconductor devices like diode, transistor, logic gates and operational amplifier 2. Perform analysis of different electronics circuits based on devices covered in the course and compare their operations. 3. Build and test electronic circuits based on devices covered in the course 4. Explain basic concepts of electronics communication systems. 	3	90	60
II	23UGME102	Engineering Drawing	<ol style="list-style-type: none"> 1. Understand engineering curves with proficiency in tracing the paths of simple machine components 2. Illustrate the projection of points, lines and planes with different conditions. 3. Develop proficiency in drawing the projections of various solids 4. Improve the visualization and technical skills for given orthographic views and can apply it in developing new products. 5. Improve the visualization and technical skills in isomeric projections and can apply it in developing new products. 	2	50	50
II	23UGEC102	Tinkering Lab	<ol style="list-style-type: none"> 1. Understanding of the fundamental principles of automation, including microcontroller, development boards, sensors, actuators, embedded systems, logic building and feedback mechanisms. 2. Apply the fundamental principles to illustrate the real world problems 3. Select, Interface, Integrate, and troubleshoot different sensors and actuators with the development board. 4. Identify the real world problem and design solution 5. Think creatively and find innovative solutions to automation challenges. 	1	100	-



Department of Computer Engineering
Programme: B.Tech Computer Science & Engineering

Program Objective:

- Department of Computer Engineering welcomes young aspirants around the globe to shape their career by undertaking various courses offered by the department. We are a growing department with an outstanding faculty, keeping pace with the rapid proliferation of, and advance in, computing and information technology. Our commitments to quality undergraduate teaching provide a solid foundation for those seeking to become well-prepared, talented, and indispensable computing professionals.
- The Department offers a course on Bachelors degree in Computer Science & Engineering since the inception of the institute with an intake of 60. The department also offers a course on Masters Degree with an intake of 18 and Ph.D.
- The Department provides world class infrastructure with state of the art Computer labs equipped with latest software. The Department has always kept pace with the rapid advancements in the field.
- The Department is known for its strength in Artificial Intelligence and Deep Learning, Internet of Things, Data Mining, Cloud Computing, Networking and Cyber Security. The combination of qualified and committed faculty, a strong peer group, core and inter-disciplinary research, collaboration with leading industries and research organizations offer students of this department an enriching learning experience.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
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After completion of the programme the Graduate will be able to:

PO1	Domain knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
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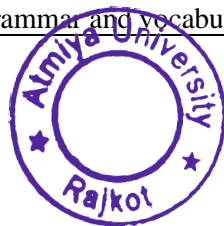


Program Specific Outcomes

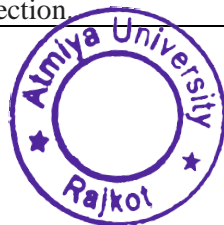
After completion of the programme the Graduate will:		
PSO1	:	Implementation of professional engineering solutions for the betterment of society along with professional ethics and human values.
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PSO3	:	Apply appropriate techniques and modern engineering techniques for the design and integration of computer system and related technologies, to engage students in lifelong learning for the advancement of technology.
PSO4	:	The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
PSO5	:	The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

Course Outcome:

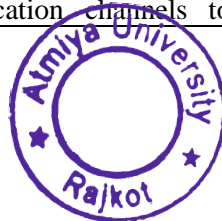
Semester	Course code	Course Title	Course Outcomes	Credit	CIA	SEE
I	21UHSEN101	Communicative English	<ol style="list-style-type: none"> 1. Students will be able to grasp the basic tools of communication. 2. Students will be able to understand the role of non-verbal elements of communication. 3. Students will be able to exchange their ideas and views precisely and clearly. 4. Students will be able to learn the fundamental components of English Grammar and vocabulary. 	3	40	60



			5. Students will be able to inculcate human values through studying literature.			
I	21UH SMA101	HSM 1: Fundamentals of Engineering Mathematics	<ol style="list-style-type: none"> 1. Understand the Fundamental of Differential Equation and Matrix Algebra 2. Understand and apply Partial Derivatives 3. Understand the application of Matrix Algebra 4. Apply the knowledge of Diff. Calculus to solve the various problems in Engineering. 5. Solve simultaneous linear equations using various methods of Matrix Algebra. 	4	40	60
I	21UH SPY101	HSM 2: Fundamentals of Engineering Physics	<ol style="list-style-type: none"> 1. Understand the Fundamental role of Optical Fiber, Acoustics, Semiconductor Physics and advanced engineering materials and their behavior under various system conditions. 2. Understand and Describe qualitative comparison between various diodes. 3. Identify the Various material testing technologies 4. Apply the knowledge of material science to use various advanced engineering materials to solve the problems in Engineering. 5. Solve the problem of bad acoustics in Auditorium or Cinema hall by using various acoustical solutions. 	4	40	60
I	21BTCSIC101	IDC 1: Fundamentals of Electrical Engineering	<ol style="list-style-type: none"> 1. Apply fundamental electrical laws to electrical circuits. 2. Use Ohm's law, Kirchoff's law and star-delta transformation for solving resistive series, parallel and series-parallel circuits. 3. Define electric field, lines of force, electric field intensity, electric flux, flux density and permittivity. 4. Analyze single phase and three phase AC circuits. 	4	40	60
I	21BTCSIC102	IDC 2: Engineering Graphics and Computer Drafting	<ol style="list-style-type: none"> 1. Understand the conventions and construct basic as well as intermediate geometry along with method of engineering drawing. 2. Interpret engineering drawings using fundamental technical mathematics. 3. Construct basic and intermediate geometry by understanding the theory of projection. 	4	40	60



			<ol style="list-style-type: none"> 4. Improve their visualization skills in orthographic and isometric projections so that they can apply these skills in developing new products. 5. Improve their technical communication skill in the form of communicative drawings. 			
I	21BTCSIC103	IDC Practical 1: Electronics Workshop	<ol style="list-style-type: none"> 1. Basic knowledge of electrical and electronics components and its standard symbols. 2. Knowledge of measuring voltage, current, frequency, phase difference, power, power factor for single and three-phase supply. 3. Knowledge of how to use different types of tools which is used in electrical and electronics field. 4. Knowledge of Arduino and Decentralized solar PV system. 5. Justify circuit design concept. 	1	100	-
I	21AESD101	AECC 1: Introduction to SDG (online course)	<ol style="list-style-type: none"> 1. Recall the Sustainable Development Goals and their targets. 2. Explain the concept of sustainable development and the importance of the SDGs in addressing global challenges. 3. Apply knowledge of the SDGs to analyze real-world issues and propose solutions. 4. Analyze the interconnections between different SDGs and their impact on various communities and regions. 5. Evaluate the progress made towards achieving the SDGs and the challenges faced in implementation. 			
I	21AEHV202	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 			
I	21AEFS701	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Remember the message coming through different communication channels 2. Understand the message coming through different communication channels to think critically, logically and 			



			<p>creatively</p> <ol style="list-style-type: none"> 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Develop personality & right attitude through communication skills. 			
II	21UHSEN201	Technical Communication	<ol style="list-style-type: none"> 1. Gain knowledge and use of the technical English 2. Apply the knowledge of presentation skills to make presentations in their academic and professional life. 3. Learn various aspects of Morphology of English 4. Use the basics of Syntax of English 5. Students will be able to enrich their language and life skills through studying literature. 	3	40	60
II	21BTCSCC201	Core 2: Problem Solving Techniques using C (F)	<ol style="list-style-type: none"> 1. Design C programs using function and array. 2. Implement C programs using pointers and structure. 3. Understand how to draw the flowchart and write an algorithm for any problem. 4. Analyze a different conditional and looping statement. 5. Apply their knowledge and conduct programmatical approach to solve a problem using C language. 	4	40	60
II	21UH SMA201	HSM 3: Multivariate calculus and differential equations	<ol style="list-style-type: none"> 1. Understand the Higher Order Differential Equations 2. Understand and apply the Laplace transforms for solving various differential equations 3. Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts. 4. Apply the knowledge to calculate double and triple integral using various integration techniques. 5. Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus 	4	40	60



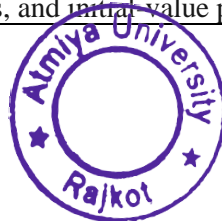
II	21BTCSIC201	IDC 3: Fundamentals of Civil Engineering	<ol style="list-style-type: none"> 1. Recognize the general terminology related to civil engineering while handling day to day problems of society 2. Understand the different material & its properties 3. Apply the fundamentals to find out the various levels, angles situated on the earth 4. Understand the different parameters of mass transportation systems. 5. Remember & apply the recent technological tools for the harmony of society 	4	40	60
II	21BTCSIC202	IDC 4: Fundamentals of Mechanical Engineering	<ol style="list-style-type: none"> 1. Classify various component design & general procedure of design. 2. Explain the fundamental laws of Thermodynamics and describe their application in thermal systems like air standard cycles of IC engines. 3. Apply the theoretical concepts of manufacturing process & their application in Industry. 4. Illustrate the Application of AR and VR, Cloud computing, Big Data Analytics, IOT, 3D Printing, Cyber Security in industry. 5. Explain Quality Control and Contemporary Management Concept like 5S,JIT,KAIZAN. 	4	40	60
II	21BTCSIC203	IDC 5: Basic Electronics	<ol style="list-style-type: none"> 1. Understand Introductory concepts 2. Understand Semiconductor physics 3. Define Diode applications 4. Understand Bipolar Junction Transistor 5. Analyze Transistor Fundamentals 	4	40	60
II	21BTCSCC202	Core Practical 1: Web Development (F)	<ol style="list-style-type: none"> 1. Design a static web page using different HTML tags and also design data using XML File. 2. Identify and create a web page using different CSS Features with Different Layout as per need of Application. 3. Understanding basic concept of web designing. 4. Recognize tags and features of CSS create responsive webpage using bootstrap. 5. Apply and integrate the features of HTML and CSS using Bootstrap to develop a responsive and mobile-first websites 	1	100	-



II	21BTCSIC204	IDC Practical 2: Mechanical Workshop	<ol style="list-style-type: none"> 1. Demonstrate and produce different types of fitting models and carpentry Models. 2. Apply the knowledge of development of sheet metal models with an understanding of their applications. 3. Understand the Basics of workshop practices. 4. Understand welding on metal with different welded joints. 5. Demonstrate and produce different types of fitting models and carpentry Models. 	1	100	-
II	21AEHV202	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 			
II	21AEFS701	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Recognize the message coming through different channels 2. Understand the given situation to think critically, logically and creatively and deal accordingly based on that. 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Reframe personality & right attitude through traditional Soft skills. 			
III	21BTCSCC30 1	Core 2: Database Management System	<ol style="list-style-type: none"> 1. Know preliminaries of database management system concepts and its applications 2. Understand and formalize relation amongst various entities of the database 3. Apply optimal way of storage and retrieval, in correlation with relational model through appropriate indexing and normalization 4. Analyze optimal query using structured query language 5. Synthesize advanced DBMS concepts like transaction processing, concurrency control and recovery 	4	40	60



III	21BTCSCC30 2	Core 3: Data Structure	<ol style="list-style-type: none"> 1. Understand the concept of Dynamic memory management, data types, algorithms, Big O notation. 2. Understand basic data structures such as arrays, linked lists, stacks and queues. 3. Describe the hash function and concepts of collision and its resolution methods 4. Solve problem involving graphs, trees and heaps. 5. Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data. 	4	40	60
III	21BTCSCC30 3	Core 4: Computer Organization	<ol style="list-style-type: none"> 1. Ability to understand basic structure of computer 2. Ability to Doing and apply computer arithmetic operations. 3. Understand and Evaluate the concept of cache mapping techniques. 4. Create memory organization that uses banks for different word size operations 5. Create and analysing fundamentals concepts of pipeline and vector processing 	4	40	60
III	21BTCSCC30 4	Core 5: Object Oriented Programming using C++	<ol style="list-style-type: none"> 1. Understand the skeleton of C++ program. 2. Develop the applications using object-oriented programming with C++. 3. Implement the simple object-oriented programs in C++ using objects and classes. 4. Describe the concept of function overloading, operator overloading, virtual functions and polymorphism. 5. Demonstrate the use of various OOPs concepts with the help of programs 	4	40	60
III	21UH SMA301	HSM4: Numerical Techniques for Engineers	<ol style="list-style-type: none"> 1. Apply the concepts and principles in basic numerical approximation in well-defined contexts beyond those in which they were first studied, showing the ability to evaluate critically the appropriateness of different tools and techniques. 2. Demonstrate the capability to use a range of established techniques and a reasonable level of skill in calculation and manipulation of the material to solve problems in the following areas: root finding, interpolation, numerical quadrature, finite differences, and initial value problems for ODEs. 	4	40	60



			<ol style="list-style-type: none"> 3. Compare the viability of different approaches to the numerical solution of problems arising in roots of solution of non-linear equations, interpolation and approximation, numerical differentiation and integration, solution of linear systems. 4. Demonstrate knowledge and critical understanding of the well-established principles within a wide range of basic numerical methods, including iterative methods 5. Develop and apply the appropriate numerical techniques for a given problem, interpret the results, and assess accuracy 			
III	21BTCSIC301	IDC 6: Digital Electronics	<ol style="list-style-type: none"> 1. Design register and counter using Jk FFs. 2. Implement sequential circuit using FFs. 3. Understand how to convert one number system to another. 4. Analyze different types of combinational circuit. Apply their knowledge to design combination circuit. 	4	40	60
III		Core Enrichment 1: Concept to Practice Course	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written and oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 			
III	21AEFS701	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Understand the need of 21st century skills, Understand and Analyze the skills through Learning : Critical Thinking, Creativity & Innovation 2. Understand the leading skills through edge of : Communication, Collaboration and Networking 3. Understand the skills through digital literacy : Information, Media and Technology Literacy 4. Recall, Understand and Analyze Life Skills : Flexibility and Adaptability, Leadership and Responsibility 5. Recall, Understand and Analyze Life Skills : Productivity and Accountability, Social and Cross-Cultural Interaction 			



IV	21BTCSCC401	Core 6: Operating System	<ol style="list-style-type: none"> 1. Understand fundamentals of Operating System and the concept of program, process and thread. Understand the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance. 2. Solve Inter Process Communication problems using various methods. 3. Compare various Memory Management Schemes especially paging and Segmentation in Operating System. 4. Apply various Page Replacement Techniques. 5. Understand Deadlock characteristics and strategies to deal with deadlocks. 	4	40	60
IV	21BTCSCC402	Core 7: Computer Network	<ol style="list-style-type: none"> 1. Interpret the basics of Computer Networks and Various Protocols. 2. Generalize functionalities and services of each layer of OSI model. 3. Explains the concept of data framing and error control mechanisms 4. Compares Different routing protocols 5. Identify the concepts of network security, Mobile and World Wide Web concepts 	4	40	60
IV	21BTCSCC403	Core 8: Object Oriented Programming using JAVA	<ol style="list-style-type: none"> 1. Understand the basics of object-oriented programming using C++ and JAVA. 2. Apply the concept of classes, Java, JDK Components and develop Simple Java Programs. 3. Develop Simple Java Programs using inheritance and Exception handling. 4. Develop Multi-threading Programming and Interfaces. 5. Develop concept of network programming. 	4	40	60
IV	21BTCSCC404	Core 9: Web Programming	<ol style="list-style-type: none"> 1. Use operators, variables, arrays, control structures, functions and objects in JavaScript, Create dynamic styles and animation on a web page 2. Use regular expressions for form validation, Understand how JavaScript works with HTML and CSS 3. Understand to debug and solve basic JavaScript errors, Develop MVC Based Web Application 	4	40	60



			<ol style="list-style-type: none"> Build Dynamic website using server side PHP Programming and Database connectivity Use Session and Cookie Management in website, Create, backup and restore a MySQL database 			
IV	21UH SMA401	HSM 5: Applied Discrete Mathematics And Statistics	<ol style="list-style-type: none"> To develop a strategic approach to organizing data and calculate the measure of central tendency. To identify the direction and strength of correlation and regression between two variables. To calculate probabilities by applying probability laws and theoretical results. Design different programs in computer using the concept of Group Theory. Using the knowledge of Graph Theory students can able to analyze the Networking system. 	4	40	60
IV	21UH SMMG401	Core : Economics & Business Management	<ol style="list-style-type: none"> To introduce economics, its types and its impact. To learn production management and various laws associated with production. To learn the fundamental principles of management. To understand the functions of management. To learn the types of management. 	2	40	60
IV		Core Enrichment 1: Concept to Practice Course	<ol style="list-style-type: none"> Understand problem identification, formulation and solution. Design an engineering solution to complex problems. Communicate with the community at large in written an oral forms. Demonstrate a sound technical knowledge of their societal problems. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 			
IV		FS 3: Career Acceleration Program	<ol style="list-style-type: none"> Understand the basic concepts of quantitative ability Apply the knowledge, information parameters and mathematical skills to develop time saving solutions Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc. 			



Faculty of Engineering & Technology
Department of Information Technology
Program: B.Tech. I.T.

Program Objective:

- The Department of Information Technology Engineering welcomes young aspirants around the globe to shape their career by undertaking various courses offered by the department. We are a growing department with an outstanding faculty, keeping pace with the rapid proliferation of, and advance in, computing and information technology. Our commitments to quality undergraduate teaching provide a solid foundation for those seeking to become well-prepared, talented, and indispensable computing professionals.
- The Department offers a course on Bachelors degree in Information Technology Engineering since the inception of the institute with an intake of 60. The Department provides world class infrastructure with state of the art Computer labs equipped with latest software. The Department has always kept pace with the rapid advancements in the field.
- The Department is known for its strength in Data Science , Artificial Intelligence and Deep Learning, Internet of Things, Data Mining, Cloud Computing, Networking and Cyber Security. The combination of qualified and committed faculty, a strong peer group, core and interdisciplinary research, collaboration with leading industries and research organizations offer students of this department an enriching learning experience.

Graduate Attributes:

1. **Technical Proficiency:** Graduates should have a solid understanding of core IT concepts, including programming languages, database management, networking, cybersecurity, and system design.
2. **Problem-Solving Skills:** The ability to analyze complex problems and devise effective solutions is crucial in IT engineering. Graduates should be adept at troubleshooting issues and thinking critically to resolve them.



3. **Adaptability:** The IT landscape is constantly evolving, so graduates must be adaptable and able to quickly learn new technologies and methodologies to stay relevant in their careers.
4. **Communication Skills:** Effective communication is essential for conveying technical information to non-technical stakeholders, collaborating with team members, and presenting ideas and solutions effectively.
5. **Teamwork and Collaboration:** IT projects often require collaboration with colleagues from diverse backgrounds. Graduates should be able to work effectively in teams, contribute their expertise, and collaborate to achieve common goals.
6. **Project Management:** Understanding project management principles and methodologies is important for overseeing IT projects from conception to completion, including planning, scheduling, budgeting, and risk management.
7. **Ethical and Professional Behavior:** Graduates should adhere to ethical standards and professional codes of conduct in their work, including respecting privacy and confidentiality, maintaining integrity, and considering the societal impact of their technology solutions.
8. **Continuous Learning:** The field of IT is dynamic, so graduates should be committed to lifelong learning and professional development to stay abreast of emerging technologies and trends.
9. **Entrepreneurial Mindset:** In addition to traditional employment opportunities, graduates should have the skills and mindset to pursue entrepreneurial ventures, such as starting their own technology companies or consulting practices.
10. **Global Awareness:** IT engineering is a global profession, so graduates should have an understanding of global issues, cultural differences, and international business practices that may impact their work.



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Breadth and depth of domain knowledge: Fulfill the needs of society in solving technical problems using engineering principles, tools and practices.
PEO2	:	Curiosity and truth seeking: Able to handle any kind of contingencies by the skill of critical thinking and problem-solving ability.
PEO3	:	Analytical & practical skills: Develop the ability to resolve the practical problems of Electrical Domain as per the society needs.
PEO4	:	Digital capabilities: Able to collect, interpretation, analyze data and make remote control of electrical system.
PEO5	:	Confidence & Tolerance: Demonstrate lifelong learning and technical skills in the workplace and function professionally in the global competitive environment.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Engineering knowledge: Apply the knowledge of mathematics, science, IT engineering fundamentals, and an IT engineering specialization to the solution of complex engineering problems for sustainable development.
PO2	:	Problem analysis: Analyze Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	:	Design/development of solutions: Design solutions for complex IT engineering problems & design system components or/and processes that meet the specified needs with appropriate consideration for the public health & safety, cultural, societal and environmental considerations.



PO4	:	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	:	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	:	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional IT engineering practice.
PO7	:	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional IT engineering practice.
PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	:	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings leading to harmony between oneself and others.
PO10	:	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	:	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	:	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

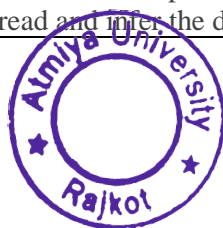


Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Develop scientific thinking and acquire deep knowledge of electrical engineering to meet requirements of industries and society
PSO2	:	Integrate the knowledge of fundamental electrical, machine, power electronics and power systems for the controllability, reliability of electrical systems and analyzed the current problem.
PSO3	:	Demonstrate their knowledge in analysis, design, erection and laboratory experimentation regarding electrical engineering.
PSO4	:	Apply science, engineering, mathematics through differential and integral calculus, complex variables to solve electrical engineering problems.
PSO5	:	Able to develop and support systems based on renewable and sustainable energy sources using modern tools and techniques.

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGSH101	Fundamentals of Engineering Mathematics	<ol style="list-style-type: none"> Solve simultaneous linear equations using various methods of Matrix Algebra. Calculate Fourier series of a function Evaluate partial derivatives and can implement to estimate maxima and minima of a function Apply the knowledge of Differential Calculus to solve the various problems in Engineering Apply Beta and Gamma functions in solving various mathematical problems 	4	50	50
		Effective Communication	<ol style="list-style-type: none"> To listen and comprehend complex academic texts To read and infer the denotative and connotative meanings 	2	50	50



I	23UGSH140	Skills	<p>of technical texts</p> <ol style="list-style-type: none"> To write definitions, descriptions, narrations and essays on various topics To speak fluently and accurately in formal and informal communicative contexts To express their opinions effectively in both oral and written medium of communication 			
I	23UGCI070	Environmental Studies	<ol style="list-style-type: none"> Gain insights into the international efforts to safeguard the Earth's environment and resources Understand importance of natural resources and biological diversity Understand the sectoral effects on the local, regional, and global environmental issues Correlate the exploitation and utilization of conventional and non-conventional energy resources Learn about the major international treaties and our country's stand on and responses to the major international agreements. 	2	Evaluation by Remarks based on CIA	
I	23UGLI070	Introduction to SDG (online)	<ol style="list-style-type: none"> Define and relate to concepts of sustainability and development Identify and interpret the SDG's Recognize and Classify the SDG's into 5 P's Infer the importance of SDG as Development Index Summarize the interdependence and interconnectedness of SDGs in three dimensions – Social, Economical and Environmental 	1	Evaluation by Remarks based on CIA	
I	23UGCI101	Applied Civil Engineering	<ol style="list-style-type: none"> Recognize the general terminology related to civil engineering while handling day to day problems of society. Apply the fundamentals to find out the various levels, angles situated on the earth. Recognize the general terminology related to applied mechanics. Understand principles of statics to calculate the various forces. Understand the fundamentals of support reactions 	4	90	60



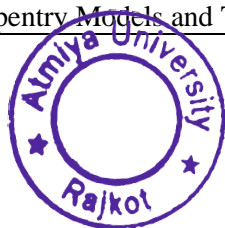
I	23UGCE101	Fundamentals of Computer Programming	<ol style="list-style-type: none"> 1. Have basic knowledge of Computer, System applications and Programming Language. 2. Have knowledge in using C language for solving problems. 3. Have knowledge of the syntax and semantics of C programming language. 4. Write algorithms and Flow chart for problems 5. Code a given logic of control structure, arrays and string in C language 6. Code a given logic of advanced concept like structure, pointer and union C language. 	2	100	-
I	23UGEC101	Fundamentals of Electronics	<ol style="list-style-type: none"> 1. Explain characteristic and working of basic semiconductor devices like diode, transistor, logic gates and operational amplifier 2. Perform analysis of different electronics circuits based on devices covered in the course and compare their operations. 3. Build and test electronic circuits based on devices covered in the course. 4. Explain basic concepts of electronics communication systems. 	3	90	60
I	23UGME102	Engineering Drawing	<ol style="list-style-type: none"> 1. Understand the conventions and construct basic as well as intermediate geometry along with method of engineering drawing. 2. Interpret engineering drawings using fundamental technical mathematics. 3. Construct basic and intermediate geometry by understanding of the theory of projection. 4. Improve their visualization skills in orthographic and isomeric projections so that they can apply these skills in developing new products. 5. Improve their technical communication skill in the form of communicative drawings. 	2	50	50
I	23UGEC102		<ol style="list-style-type: none"> 1. Understanding of the fundamental principles of automation, including microcontroller, development boards, sensors, actuators, embedded systems, logic 	1	100	-



		Tinkering Lab	<p>building and feedback mechanisms.</p> <ol style="list-style-type: none"> Apply the fundamental principles to illustrate the real world problems. Select, Interface, Integrate, and troubleshoot different sensors and actuators with the development board. Identify the real world problem and design solution Think creatively and find innovative solutions to automation challenges 			
II	23UGSH201	Calculus & Higher Order Differential Equation	<ol style="list-style-type: none"> Understand the Higher Order Differential Equations Understand and apply the Laplace transforms for solving various differential equations Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts Apply the knowledge of Calculate double and triple integral using various integration techniques. Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus 	4	50	50
II	23UGSH240	Technical Communication Skills	<ol style="list-style-type: none"> To listen and comprehend complex academic text To read and infer the denotative and connotative meanings of technical texts To write definitions, descriptions, narrations, and essays on various topics To speak fluently and accurately in formal and informal communicative contexts To express their opinions effectively in both oral and written medium of communication 	2	50	50
II	23UGVE070	Human Values for Holistic Living	<ol style="list-style-type: none"> Recall basic guidelines of value education and understand the basic aspirations. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. Understand required skills to understand the laws of 	3	Evaluation by Remarks based on CIA	



			nature.			
II	23UGSH102	Engineering Science	<ol style="list-style-type: none"> 1. The student will demonstrate the understanding of basic principles properties and its applications associated with semiconducting materials and specifically LASER.(U, Acognitivelevel) 2. The student will gain knowledge of basic theoretical and practical concept of optical fiber structure and their applications towards telecommunications. (U, Acognitivelevel) 3. The student will demonstrate the understanding of basic principles properties and its applications associated with electromagnetic waves.(U, Acognitivelevel) 4. The student will demonstrate understanding of basic theory, properties and applications of batteries, fuel cells and solar cell(U, Acognitive level) 5. The student will gain knowledge of various corrosions and their preventions and the different preparation techniques to characterize various advance engineering materials and their properties(U, Acognitive level) 	4	90	60
II	23UGEE101	Fundamentals of Electrical Engineering	<ol style="list-style-type: none"> 1. Apply fundamental electrical laws to electrical circuits. 2. Analyze single phase and three phase AC circuits. 3. Describe operating principle and applications of static and rotating electrical machines. 	4	90	60
II	23UGME101	Fundamentals of Mechanical Engineering	<ol style="list-style-type: none"> 1. Infer the scope & application of mechanical engineering & significance of thermodynamic process. 2. Understand the vapour power cycle used in thermal power plant. 3. Analyze various heat engine cycles and understand Construction & working of Internal Combustion Engine 4. Identify and select various power transmission & motion & their application in Industry. 5. Explain Quality Control and Contemporary Management Concept like 5S,JIT,KAIZAN 	4	90	60
II	23UGIT101	ICT Workshop	<ol style="list-style-type: none"> 1. Understand the Basics of workshop practices. 2. Demonstrate and produce different types of fitting models, carpentry Models and Tin smithy. 	1	100	-



			<ol style="list-style-type: none"> 3. Understand welding on metal with different welded joints. 4. Identify the different materials for construction projects 5. Understand the safety measures and apply for construction work. 			
II	23UGME103	Engineering Workshop	<ol style="list-style-type: none"> 1. Understand the Basics of workshop practices. 2. Demonstrate and produce different types of fitting models, carpentry Models and Tin smithy. 3. Understand welding on metal with different welded joints. 4. Identify the different materials for construction projects 5. Understand the safety measures and apply for construction work. 	1	100	-



Department of Information Technology
Program: B.Tech. I.T.

Program Objective:

- The Department of Information Technology Engineering welcomes young aspirants around the globe to shape their career by undertaking various courses offered by the department. We are a growing department with an outstanding faculty, keeping pace with the rapid proliferation of, and advance in, computing and information technology. Our commitments to quality undergraduate teaching provide a solid foundation for those seeking to become well-prepared, talented, and indispensable computing professionals.
- The Department offers a course on Bachelor's degree in Information Technology Engineering since the inception of the institute with an intake of 60. The Department provides world class infrastructure with state of the art Computer labs equipped with latest software. The Department has always kept pace with the rapid advancements in the field.
- The Department is known for its strength in Data Science, Artificial Intelligence and Deep Learning, Internet of Things, Data Mining, Cloud Computing, Networking and Cyber Security. The combination of qualified and committed faculty, a strong peer group, core and interdisciplinary research, collaboration with leading industries and research organizations offer students of this department an enriching learning experience.

Graduate Attributes:

1. **Technical Proficiency:** Graduates should have a solid understanding of core IT concepts, including programming languages, database management, networking, cybersecurity, and system design.
2. **Problem-Solving Skills:** The ability to analyze complex problems and devise effective solutions is crucial in IT engineering. Graduates should be adept at troubleshooting issues and thinking critically to resolve them.



3. **Adaptability:** The IT landscape is constantly evolving, so graduates must be adaptable and able to quickly learn new technologies and methodologies to stay relevant in their careers.
4. **Communication Skills:** Effective communication is essential for conveying technical information to non-technical stakeholders, collaborating with team members, and presenting ideas and solutions effectively.
5. **Teamwork and Collaboration:** IT projects often require collaboration with colleagues from diverse backgrounds. Graduates should be able to work effectively in teams, contribute their expertise, and collaborate to achieve common goals.
6. **Project Management:** Understanding project management principles and methodologies is important for overseeing IT projects from conception to completion, including planning, scheduling, budgeting, and risk management.
7. **Ethical and Professional Behavior:** Graduates should adhere to ethical standards and professional codes of conduct in their work, including respecting privacy and confidentiality, maintaining integrity, and considering the societal impact of their technology solutions.
8. **Continuous Learning:** The field of IT is dynamic, so graduates should be committed to lifelong learning and professional development to stay abreast of emerging technologies and trends.
9. **Entrepreneurial Mindset:** In addition to traditional employment opportunities, graduates should have the skills and mindset to pursue entrepreneurial ventures, such as starting their own technology companies or consulting practices.
10. **Global Awareness:** IT engineering is a global profession, so graduates should have an understanding of global issues, cultural differences, and international business practices that may impact their work.



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Breadth and depth of domain knowledge: Fulfill the needs of society in solving technical problems using engineering principles, tools and practices.
PEO2	:	Curiosity and truth seeking: Able to handle any kind of contingencies by the skill of critical thinking and problem-solving ability.
PEO3	:	Analytical & practical skills: Develop the ability to resolve the practical problems of Electrical Domain as per the society needs.
PEO4	:	Digital capabilities: Able to collect, interpretation, analyze data and make remote control of electrical system.
PEO5	:	Confidence & Tolerance: Demonstrate lifelong learning and technical skills in the workplace and function professionally in the global competitive environment.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Engineering knowledge: Apply the knowledge of mathematics, science, IT engineering fundamentals, and an IT engineering specialization to the solution of complex engineering problems for sustainable development.
PO2	:	Problem analysis: Analyze Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	:	Design/development of solutions: Design solutions for complex IT engineering problems & design system components or/and processes that meet the specified needs with appropriate consideration for the public health & safety, cultural, societal and environmental considerations.



PO4	:	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	:	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	:	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional IT engineering practice.
PO7	:	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	:	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings leading to harmony between oneself and others.
PO 10	:	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	:	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	:	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

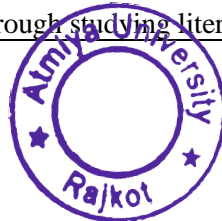


Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Develop scientific thinking and acquire deep knowledge of electrical engineering to meet requirements of industries and society
PSO2	:	Integrate the knowledge of fundamental electrical, machine, power electronics and power systems for the controllability, reliability of electrical systems and analyzed the current problem.
PSO3	:	Demonstrate their knowledge in analysis, design, erection and laboratory experimentation regarding electrical engineering.
PSO4	:	Apply science, engineering, mathematics through differential and integral calculus, complex variables to solve electrical engineering problems.
PSO5	:	Able to develop and support systems based on renewable and sustainable energy sources using modern tools and techniques.

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21UHSEN101	Communicative English	<ol style="list-style-type: none"> 1. Students will be able to grasp the basic tools of communication. 2. Students will be able to understand the role of non-verbal elements of communication. 3. Students will be able to exchange their ideas and views precisely and clearly. 4. Students will be able to learn the fundamental components of English Grammar and vocabulary. 5. Students will be able to inculcate human values through studying literature. 	3	40	60



I	21UH SMA101	HSM1: Fundamentals of Engineering Mathematics	<ol style="list-style-type: none"> 1. Understand the Fundamental of Differential Equation and Matrix Algebra 2. Understand and apply Partial Derivatives 3. Understand the application of Matrix Algebra 4. Apply the knowledge of Diff. Calculus to solve the various problems in Engineering. 5. Solve simultaneous linear equations using various methods of Matrix Algebra. 	4	40	60
I	21UHSPY101	HSM2: Fundamentals of Engineering Physics	<ol style="list-style-type: none"> 1. Understand the Fundamental role of Optical Fiber, Acoustics, Semiconductor Physics and advanced engineering materials and their behavior under various system conditions. 2. Understand and Describe qualitative comparison between various diodes. 3. Identify the Various material testing technologies 4. Apply the knowledge of material science to use various advanced engineering materials to solve the problems in Engineering. 5. Solve the problem of bad acoustics in Auditorium or Cinema hall by using various acoustical solutions. 	4	40	60
I	21BTITIC101	IDC 1: Fundamentals of Electrical Engineering	<ol style="list-style-type: none"> 1. Apply fundamental electrical laws to electrical circuits. 2. Use Ohm's law, Kirchhoff's law and star-delta transformation for solving resistive series, parallel and series-parallel circuits. 3. Define electric field, lines of force, electric field intensity, electric flux, flux density and permittivity. 4. Analyze single phase and three phase AC circuits. 	4	40	60



I	21BTITIC102	IDC 2: Engineering Graphics and Computer Drafting	<ol style="list-style-type: none"> 1. Understand the conventions and construct basic as well as intermediate geometry along with method of engineering drawing. 2. Interpret engineering drawings using fundamental technical mathematics. 3. Construct basic and intermediate geometry by understanding of the theory of projection. 4. Improve their visualization skills in orthographic and isomeric projections so that they can apply these skills in developing new products. 5. Improve their technical communication skill in the form of communicative drawings. 	4	40	60
I	21BTITIC103	IDC Practical 1: Electronics Workshop	<ol style="list-style-type: none"> 1. Basic knowledge of electrical and electronics components and its standard symbols. 2. Knowledge of measuring voltage, current, frequency, phase difference, power, power factor for single and three-phase supply. 3. Knowledge of how to use different types of tools which is used in electrical and electronics field 4. Knowledge of Arduino and Decentralized solar PV system 5. Justify circuit design concept. 	1	100	-
I	21AESDG01	AECC 1 : Introduction to SDG (online course)	<ol style="list-style-type: none"> 1. Define and relate to concepts of sustainability and development 2. Identify and interpret the SDG's 3. Recognize and Classify the SDG's into 5 P's 4. Infer the importance of SDG as Development Index 5. Summarize the interdependence and interconnectedness of SDGs in three dimensions – Social, Economical and Environmental 	Audit course	Evaluated by remarks	Evaluated by remarks



I	21AEES02	AECC 2: Environmental Conservation and Sustainable Development	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources 2. Understand importance of natural resources and biological diversity 3. Understand the sectoral effects on the local, regional, and global environmental issues 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources 5. Learn about the major international treaties and our country's stand on and responses to the major international agreements. 	1	Evaluation at the end of Semester II	Evaluation at the end of Semester II
I	21AEHV202	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 	3	Evaluation at the end of Semester II	Evaluation at the end of Semester II



I	21AEFS501	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Remember the message coming through different communication channels 2. Understand the skills through digital literacy : Information, Media and Technology Literacy 3. Recall, Understand and Analyze Life Skills :Flexibility and Adaptability, Leadership and Responsibility 4. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions 	2	Cumulative evaluation at the end of Semester VII	Cumulative evaluation at the end of Semester VII
II	21UHSEN201	Technical communication	<ol style="list-style-type: none"> 1. Gain knowledge and use of the technical English 2. Apply the knowledge of presentation skills to make presentations in their academic and professional life. 3. Learn various aspects of Morphology of English 4. Use the basics of Syntax of English 5. Students will be able to enrich their language and life skills through studying literature. 	3	40	60
II	21BTITCC201	Core 1: Problem Solving techniques using C(F)	<ol style="list-style-type: none"> 1. Have basic knowledge of Computer, System applications and Programming Language. 2. Have knowledge in using C language for solving problems. 3. Have knowledge of the syntax and semantics of C programming language 4. Write algorithms and Flow chart for problems. 	4	40	60



II	21UHSMA201	HSM3: Multivariate calculus and differential equations	<ol style="list-style-type: none"> 1. Understand the Higher Order Differential Equations 2. Understand and apply the Laplace transforms for solving various differential equations 3. Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts. 4. Apply the knowledge to calculate double and triple integral using various integration techniques. 5. Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus 	4	40	60
II	21BTITIC201	IDC 3: Fundamentals of Civil Engineering	<ol style="list-style-type: none"> 1. Recognize the general terminology related to civil engineering while handling day to day problems of society. 2. Understand the different material & its properties. 3. Apply the fundamentals to find out the various levels, angles situated on the earth. 4. Understand the different parameters of mass transportation systems. 	4	40	60
II	21BTITIC202	IDC4: Fundamentals of Mechanical Engineering	<ol style="list-style-type: none"> 1. Classify various component design & general procedure of design. 2. Explain the fundamental laws of Thermodynamics and describe their application in thermal systems like air standard cycles of IC engines. 3. Apply the theoretical concepts of manufacturing process & their application in Industry. 4. Illustrate the Application of AR and VR, Cloud computing, Big Data Analytics, IOT, 3D Printing, Cyber Security in industry. 5. Explain Quality Control and Contemporary Management Concept like 5S, JIT, KAIZAN. 	4	40	60



II	21BTITIC203	IDC 5: Basic Electronics	<ol style="list-style-type: none"> 1. Understand Introductory concepts 2. Understand Semiconductor physics. 3. Define Diode applications. 4. Understand Bipolar Junction Transistor 5. Analyze Transistor Fundamentals 	4	40	60
II	21BTITCC202	Core Practical 1: Web Development (F)	<ol style="list-style-type: none"> 1. Understand some basic principles of Web Development practice. 2. Understand the difference between HTML, CSS. 3. Create a basic web page with HTML. 4. Insert content into a basic page and structure it according to best practice. 5. Apply styles to basic web page elements 6. Create, modify, and format content with basic CSS. 	1	100	-
II	21BTITIC204	IDC Practical 2: Mechanical Workshop	<ol style="list-style-type: none"> 1. Demonstrate and produce different types of fitting models and carpentry Models. 2. Apply the knowledge of development of sheet metal models with an understanding of their applications. 3. Understand the Basics of workshop practices. 4. Understand welding on metal with different welded joints 5. Demonstrate and produce different types of fitting models and carpentry Models. 	1	100	-
II	21AEES201	AECC 2: Environmental Conservation and Sustainable Development	<ol style="list-style-type: none"> 1. Define and relate to concepts of sustainability and development 2. Identify and interpret the SDG's 3. Recognize and Classify the SDG's into 5 P's 4. Infer the importance of SDG as Development Index 5. Summarize the interdependence and interconnectedness of SDGs in three dimensions – Social, Economical and Environmen 	2	100 Evalu ated by rema rks	100 Eval uated by rema rks



II	21AEHV202	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self-exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature 	3	100 Evaluated by remarks	100 Evaluated by remarks
II	21AEFS501	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Remember the message coming through different communication channels 2. Understand the skills through digital literacy : Information, Media and Technology Literacy 3. Recall, Understand and Analyze Life Skills :Flexibility and Adaptability, Leadership and Responsibility 4. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions 	-	Cumulative evaluation at the end of Semester VII	Cumulative evaluation at the end of Semester VII



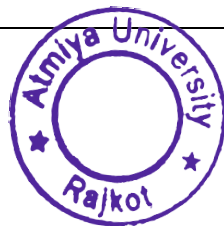
III	21BTITCC301	Core2: Database Management System (F)	<ol style="list-style-type: none"> 1. Demonstrate the basic elements of a relational database management system. 2. Design entity relationship & convert entity relationship diagrams into RDBMS & formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data. 3. Apply the concept of transaction, concurrency control and recovery in database. 4. Apply relational database theory and describe relational algebra expression, tuple and domain relation expression for queries. 5. Identify the basic concepts and various data model used in database design ER modeling concepts and architecture use and design queries using SQL. 	4	40	60
III	21BTITCC302	Core 3: Data Structure (F)	<ol style="list-style-type: none"> 1. Explain data structure algorithms 2. The student should be able to solve various data structures techniques. 3. Design various examples based on data structures algorithms. 4. Design various examples based on advanced data structures algorithms. 5. Design different strategies based on different data structure 	4	40	60
III	21BTITCC303	Core 4: Computer Organization (F)	<ol style="list-style-type: none"> 1. To apply knowledge of the processor's internal registers and operations by use of a PC based microprocessor simulator. 2. To write assembly language programs and download the machine code that will Provide solutions real-world control problems. 3. To eliminate or remove stall by altering order of instructions 4. To write programs using the capabilities of the stack, the program counter, the status register and show how these are used to execute a machine code progra. 5. Explain the functional units of a processor. 	3	30	70



III	21BTITCC304	Core 5: Object Oriented Programming using C++ (F)	<ol style="list-style-type: none"> 1. Write the programs of C++ implementing the concepts of object and class, Encapsulation, inheritance and polymorphism. 2. Use features of C++ like type conversion, I/O streams and files to develop programs for real life problems. 3. Use advance features like templates and exception to make programs supporting code reusability. 4. Learn standard template library for faster development. 5. Develop the applications using object-oriented programming with C++. 	4	40	60
III	21UHSMA301	HSM 4: Numerical Techniques for Engineers	<ol style="list-style-type: none"> 1. Apply the concepts and principles in basic numerical approximation in well-defined contexts beyond those in which they were first studied, showing the ability to evaluate critically the appropriateness of different tools and techniques. 2. Demonstrate the capability to use a range of established techniques and a reasonable level of skill in calculation and manipulation of the material to solve problems in the following areas: root finding, interpolation, numerical quadrature, finite differences, and initial-value problems for ODEs. 3. Compare the viability of different approaches to the numerical solution of problems arising in roots of solution of non-linear equations, interpolation and approximation, numerical differentiation and integration, solution of linear systems. 4. Demonstrate knowledge and critical understanding of the well-established principles within a wide range of basic numerical methods, including iterative methods 5. Develop and apply the appropriate numerical techniques for a given problem, interpret the results, and assess accuracy 	4	40	60



III	21BTITIC301	IDC 6: Digital Electronics	<ol style="list-style-type: none"> 1. Design register and counter using Jk FFs. 2. Implement sequential circuit using FFs 3. Understand how to convert one number system to another 4. Analyze different types of combinational circuit 5. Apply their knowledge to design combination circuit. 	4	40	60
IV	21BTITCC401	Core 6: Operating System (F)	<ol style="list-style-type: none"> 1. Understand and analyze the structure of OS and basic architectural components involved in OS design. 2. Compare and contrast various CPU scheduling algorithms 3. Evaluate the requirements for the process synchronization and co-ordination in contemporary operating system. 4. Understand and analyze various algorithms for memory management. 5. Understand and analyze various algorithms for I/O management. 	4	40	60
IV	21BTITCC402	Core 7: Computer Network (F)	<ol style="list-style-type: none"> 1. Importance of computer networks and various performance metrics. 2. Distinguish and relate various protocols in layered architecture of computer networks. 3. Explain various topological and routing strategies for IP based networks. 4. Compares Different routing protocols. 5. Identify the concepts of network security, Mobile and World Wide Web concepts. 	4	40	60
IV	21BTITCC403	Core 8: Object Oriented Programming using JAVA (F)	<ol style="list-style-type: none"> 1. Demonstrate the basic elements of JAVA. 2. Analyze and evaluate various JAVA OOPS problems 3. Compare and resolve Problem related to concurrency/Threading. 4. Identify and execute Problem related to Exception. 5. Evaluate and Implement Problem related to IO related problems. 	4	40	60



IV	21BTITCC404	Core 9: Web Programming(F)	<ol style="list-style-type: none"> 1. Have basic knowledge of Web programming language HTML and CSS. 2. Have knowledge in web programming for designing website 3. Have knowledge of the syntax and semantics of web programming language. 4. Learn all major concepts of java Script. 	3	40	60
IV	21UH SMA401	HSM5: Applied Discrete Mathematics and Statistics	<ol style="list-style-type: none"> 1. To develop a strategic approach to organizing data and calculate the measure of central tendency. 2. To identify the direction and strength of correlation and regression between two variables. 3. To calculate probabilities by applying probability laws and theoretical results. 4. Design different programs in computer using the concept of Group Theory. 5. Using the knowledge of Graph Theory students can able to analyze the Networking system 	4	40	60
IV	21UHSMG401	HSM6: Economics & Business Management	<ol style="list-style-type: none"> 1. To introduce economics, its types and its impact. 2. To learn production management and various laws associated with production. 3. To learn the fundamental principles of management. 4. To understand the functions of management. 5. To learn the types of management. 	2	40	60
IV		Core Enrichment 1: Concept to Practice Course	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and Solution. 2. Design an engineering solution to complex Problems. 3. Communicate with the community at large in Written and oral forms. 4. Demonstrate a sound technical knowledge of their Societal problems. 5. Demonstrate the knowledge, skills, values and Attitudes of professional graduates. 	-	20^	-



V	21BTITCC501	Core 10: Software Engineering (Ad)	<ol style="list-style-type: none"> 1. Prepare SRS (Software Requirement Specification) document and SPMP (Software Project Management Plan) document. 2. Apply the concept of Functional Oriented and Object Oriented Approach for Software Design. 3. Recognize how to ensure the quality of software product, different quality standards and software review techniques. 4. Apply various testing techniques and test plan in 5. Able to understand modern Agile Development of Industry. 	3	40	60
V	21BTITCC502	Core 11: Data Compression (F)	<ol style="list-style-type: none"> 1. Understand and apply various coding techniques for compression. 2. Differentiate between Lossy and Lossless compression. 3. Understand basic concept of information compression through dictionary techniques. 	2	40	60
V	21BTITCC503	Core 12: Cloud Computing (Ap)	<ol style="list-style-type: none"> 1. Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies. 2. Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing. 3. Implement different types of Virtualization technologies and Service Oriented Architecture systems. 4. Elucidate the concepts of NIST Cloud Computing architecture and its design challenges. 5. Installation and use of current cloud technologies 	3	40	60



V	21BTITCC504	Core 13: Python Programming (Ad)	<ol style="list-style-type: none"> 1. To develop proficiency in creating based applications using the Python Programming Language. 2. To be able to understand the various data structures available in Python programming language and apply them in solving computational problems. 3. To be able to do testing and debugging of code written in Python. 4. To be able to draw various kinds of plots using PyLab. 5. To be able to do text filtering with regular expressions in Python 	3	40	60
V	21BTITCC505	Core 14: Distributed Database Management System (F)	<ol style="list-style-type: none"> 1. Understand what is Distributed DBMS and various architectures of DDBMS. 2. Apply various fragmentation techniques given a problem and Understand the steps of distributed query processing. 3. How optimization techniques are applies to Distributed Database. 4. Understand Transaction Management & Compare various approaches to concurrency control in Distributed database. 5. Understand various algorithms and techniques for deadlock and recovery in Distributed database. 	3	30	70
V	21BTITCC506	Core 15: C#.NET (Ad)	<ol style="list-style-type: none"> 1. Understanding a functional hierarchical code organization 2. Use the features of Dot Net Framework along with the features of C# various models and services in cloud computing. 3. Evaluate user requirements for software functionality required to decide whether the programming language C # can meet user requirements. 4. Ability to define and manage data structures based on problem subject domain. 5. Develop software in C#. 	3	40	60



V	21BTITCC507	Core Practical 2: Computer Graphics (Ad)	<ol style="list-style-type: none"> 1. Improve computer penetration in various spheres of life 2. Get familiar with making basic animations using various animation tools. 3. Able to develop and enhanced good quality animations for corporate and professional usage. 4. Learn all major concepts of animation tools and able to publish their own desktop and web animation. 	1	100	-
V	21UFEDE502	DSE-1: Microcontroller and Interfacing	<ol style="list-style-type: none"> 1. Understand the architecture and various features of AVR controllers. 2. Write, debug and simulate embedded C language programs 3. Interface I/O peripheral devices with microcontroller 4. Understand Timer operation and generate time delays 5. Create square and rectangular waveforms using Waveform generator and PWM Programming 	3	40	60
V		Core Enrichment 1: Concept to Practice Course	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex Problems. 3. Communicate with the community at large in written and oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. 5. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 	-	20^	



V		Core Enrichment 2: Internship 1	<ol style="list-style-type: none"> 1. Increased Empathy: Understand social issues first hand, fostering empathy. 2. Cultural Appreciation: Respect diverse perspectives, transforming outlooks on culture and society. 3. Data Literacy: Develop skills in data collection, organization, and interpretation. 4. Critical Thinking: Enhance problem-solving abilities through critical analysis. 5. Interpersonal Skills: Cultivate social and professional etiquette, improving communication and teamwork 	1		
VI	21BTITCC601	Core 16: Internet of Things (Ad)	<ol style="list-style-type: none"> 1. Understand general concepts of Internet of Things (IoT) 2. Recognize various devices, sensors and applications 3. Apply design concept to IoT solutions 4. Evaluate design issues in IoT applications 5. Create simple IoT solutions using sensors, actuators and Devices 	3	40	60
VI	21BTITCC602	Core 17: Mobile Computing and Wireless Network (Ad)	<ol style="list-style-type: none"> 1. Understand mobile and wireless network systems such as 2G/3G/4G mobile telephony/data networks 2. Understand GSM and CDMA 3. Able to write simple GUI applications, use built-in widgets and components. 4. To be able to understand the various User interface tools available in Android Programming language and apply them in making Applications. 5. To be able to do testing and debugging of code written in Android 	2	40	60



VI	21BTITCC603	Core 18: Data Mining & Data Warehousing (Ad)	<ol style="list-style-type: none"> 1. Understand and Remember Data Mining and Data warehousing Basics 2. Understand and Apply Methods of Data mining to Business models 3. Develop/create a reasonably sophisticated data mining application 4. Understand the database architecture and technologies required for solving complex problems of data and information management, information retrieval, and knowledge discovery facing modern organizations. 5. Analyze Case studies of organizations using these technologies to support business intelligence gathering and decision making 	4	40	60
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VI	21BTITCL601/ 21BTITCL602/ 21BTITCL603	Core Elective-1: Advanced JAVA (AP)/ Advanced Web Programming(AP)/ Advanced .Net Programming (Ap)	<p>21BTITCL604</p> <ol style="list-style-type: none"> 1. Define key terms of JDBC Programming and Java Networking with Swing. 2. Describe the principal of java Servlet and Java Server Pages and apply same in programming concepts. 3. Apply the syntax and semantics of Java Server Faces (JSF). 4. Analyzed the concept of Hibernate and go through the same in programming. 5. Assess the knowledge of Spring MVC in framework. <p>21BTITCL605</p> <ol style="list-style-type: none"> 1. To provide foundation knowledge of Web-Development with Laravel framework in field of Information technology. 2. To develop the Web-Development skills in students, and to improve their proficiency in applying the basic knowledge of programming to solve problems related to their field of engineering. 3. Involves practical which is designed to give the student hands-on experience with the concepts. 4. To be able to train the student to the basic concepts of the PHP. <p>21BTITCL606</p> <ol style="list-style-type: none"> 1. Understanding a functional hierarchical code organization 2. Use the features of Dot Net Framework along with the features of C#various models and services in cloud computing 3. Evaluate user requirements for software functionality required to decide whether the programming language C # can meet user requirements 4. Ability to define and manage data structures based on problem subject domain 5. Develop software in C # 	3	40	60
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VI	21BTITCC604	Core Practical 3: Mobile Computing and Wireless Network (Ad)	<ol style="list-style-type: none"> 1. Understand mobile and wireless network systems such as 2G/3G/4G mobile telephony/data networks 2. Understand GSM and CDMA 3. Able to write simple GUI applications, use built-in widgets and components. 4. To be able to understand the various User interface tools available in Android Programming language and apply them in making Applications. 5. To be able to do testing and debugging of code written in Android 	1	60	40
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VI	21BTITCL604/ 21BTITCL605/ 21BTITCL606	Core Practical Elective-1: Advanced JAVA (AP) / Advanced Web Programming (AP)/ Advanced .Net Programming (AP)	<p>21BTITCL604</p> <ol style="list-style-type: none"> 1. Define key terms of JDBC Programming and Java Networking with Swing. 2. Describe the principal of java Servlet and Java Server Pages and apply same in programing concepts. 3. Apply the syntax and semantics of Java Server Faces (JSF). 4. Analyzed the concept of Hibernate and go through the same in programing. 5. Assess the knowledge of Spring MVC in framework. <p>21BTITCL605</p> <ol style="list-style-type: none"> 1. To provide foundation knowledge of Web-Development with Laravel framework in field of Information technology. 2. To develop the Web-Development skills in students, and to improve their proficiency in applying the basic knowledge of programming to solve problems related to their field of engineering. 3. Involves practical which is designed to give the student hands-on experience with the concepts. 4. To be able to train the student to the basic concepts of the PHP. <p>21BTITCL606</p> <ol style="list-style-type: none"> 1. Understanding a functional hierarchical code organization 2. Use the features of Dot Net Framework along with the features of C#various models and services in cloud computing 3. Evaluate user requirements for software functionality required to decide whether the programming language C # can meet user requirements 4. Ability to define and manage data structures based on problem subject domain 5. Develop software in C # 	1	40	60
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Faculty of Engineering & Technology
Department of Electrical Engineering: -
Program: Ph.D

Program Objective:

1. Demonstrate a thorough understanding of electrical and electronics engineering technology practices to support their employer's design, application, installation, production, operation, and maintenance needs,
2. Apply fundamental mathematical and scientific principles to solve technical problems in fields like as analogue and digital circuit analysis, microprocessors, programmable logic control, and electrical machines,
3. Utilize computers and software in a technical environment,
4. Demonstrate written and oral communication skills.
5. Work effectively as an individual and as a member of a multidisciplinary team.

Graduate Attributes:

1. Communicate effectively.
2. Design and supervise the construction of generation, transmission, and distribution systems.
3. Perform operation, control, and maintenance of power system equipment.
4. Perform review of supplier documentation for compliance with specifications and codes.
5. Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problems.
6. Design and conduct experiments as well as analyze and interpret data.
7. Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management.



8. Work effectively within multi-disciplinary teams.
9. Identify, formulate and solve fundamental engineering problems.
10. Display professional and ethical responsibilities; and contextual understanding.
11. Consider the impacts of engineering solutions on society & environment.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Preparation: to prepare students for designing products to meet social, economic and environmental demand by innovative ideas.
PEO2	:	Core Competence: to Excel in professional career and/or higher education by acquiring knowledge in mathematics and Basic Sciences, Basic Electrical Sciences, Power Systems, Power Electronics and Electrical Drives along with High Moral Values.
PEO3	:	Breadth: to make students investigate complex problems and take up research and development work in the allied fields.
PEO4	:	Professionalism: to Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends in technology by engaging in continuous professional development.
PEO5	:	Learning environment: to create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with due consideration for ethical, ecological and economic issues.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:	
PO1	Domain knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.



PO2	Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.



PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
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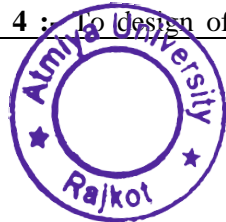
Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply knowledge of power system configuration, electrical equipment and protection practices to the design and specification of electrical generation, transmission, distribution and utilization systems.
PSO2	:	Design, analyze, test and evaluate the performance of the electrical machines and transformers.
PSO3	:	Develop the expertise in efficient conversion and control of electrical power by power electronics from available form to the required form.
PSO4	:	Utilize statistics & probability, discrete mathematics, applied differential equations and transform methods to analyze the electrical/electronic systems.
PSO5	:	Get awareness about the impact of electrical engineering solutions in societal, environmental context and professional ethics in light of human values.

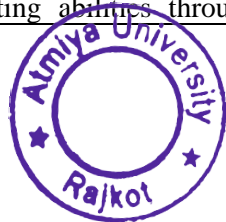


Course Outcomes (COs):

Semester	Course Code	Course Title	Course Outcomes	Credit	CIA	SEE
I	23PHID101	Course I Research Methodology	<ul style="list-style-type: none"> • CO 1:- Proficiency in selecting appropriate research designs and methods. • CO 2:- Competence in data collection techniques and ethical considerations. • CO 3:- Mastery of data analysis methods for drawing meaningful conclusions. • CO 4:- Critical thinking skills for evaluating literature and formulating research questions. • CO 5:- Effective communication of research findings through various mediums. 	4	30	70
I	23PHID101	Course II Seminar Presentation (Recent Trends in Electrical Engineering)	<ul style="list-style-type: none"> • CO 1:- Understanding of cutting-edge technologies and advancements in electrical engineering. • CO 2:- Ability to critically analyze and discuss recent research and developments in the field. • CO 3:- Proficiency in presenting complex technical concepts clearly and effectively. • CO 4:- Engagement with interdisciplinary aspects and emerging trends shaping the future of electrical engineering. • CO 5:- Application of knowledge to propose innovative solutions and directions for further research. 	1	50	-
II	23PHEE201	Course III - Core Elective Power Electronic Converters	<ul style="list-style-type: none"> • CO 1 :- To analyze the characteristics of Power electronics devices • CO 2 :- To determine the suitable device for a particular application • CO 3 :- To analyze and operate DC-DC converters, phase controlled converters, inverters and ACAC converters. • CO 4 :- To design of driver, protection and control 	4	30	70



			<p>circuits for power electronic devices</p> <ul style="list-style-type: none"> • CO 5 :- To understand the application of all the converters 			
II	23PHEE202	Course III - Core Elective Non Conventional Energy Sources	<ul style="list-style-type: none"> • CO 1:- Demonstrate the importance of renewable energy source and various applications of solar and wind systems • CO 2:- Do the preliminary analysis related to wind energy systems • CO 3:- Do the preliminary analysis and design of solar PV and solar thermal system • CO 4:- Identify the power electronic converters for solar PV and wind energy systems • CO 5:- Describe the issues related to the renewable energy in the electrical utility network. 	4	30	70
II	23PHEE203	Course III - Core Elective Energy Management & Audit for Energy Conservation	<ul style="list-style-type: none"> • CO 1 :- Understand the Energy scenario & Role of energy manager & energy management • CO 2 :- Understand concept of energy audit & energy conservation techniques in different sectors. • CO 3 :- Get familiar with energy variable speed drives, & analyze PF improvement techniques. • CO 4 :- Understand concept of cogeneration and waste heat recovery, HVAC system. • CO 5 :- Analyze techniques for economic evaluation of proposed system. 	4	30	70
II	23PHEE204	Course IV Seminar Presentation (Review of Literature)	<ul style="list-style-type: none"> • CO 1:- Mastery in identifying relevant literature sources across diverse disciplines. • CO 2:- Proficiency in critically analyzing and synthesizing existing research. • CO 3:- Ability to articulate key findings and gaps in the literature effectively. • CO 4:- Development of skills in structuring and organizing a comprehensive literature review. • CO 5:- Enhancement of critical thinking and scholarly writing abilities through rigorous engagement with 	1	50	-



			existing literature.			
II	23PHEE205	Course V Research and Professional Ethics	<ul style="list-style-type: none"> • CO 1:- Understanding of ethical principles and guidelines governing research conduct. • CO 2:- Application of ethical considerations in the design and implementation of research projects. • CO 3:- Recognition of ethical dilemmas and development of strategies for ethical decision-making. • CO 4:- Ability to identify and mitigate potential conflicts of interest and bias in research. • CO 5:- Cultivation of ethical responsibility and integrity in professional practice. 	1	50	-



Faculty of Engineering & Technology
Department of Electrical Engineering
Program: M. Tech. (Power Electronics & Electrical Drives)

Program Objective:

1. Demonstrate a thorough understanding of electrical and electronics engineering technology practices to support their employer's design, application, installation, production, operation, and maintenance needs,
2. Apply fundamental mathematical and scientific principles to solve technical problems in fields like as analogue and digital circuit analysis, microprocessors, programmable logic control, and electrical machines,
3. Utilize computers and software in a technical environment,
4. Demonstrate written and oral communication skills.
5. Work effectively as an individual and as a member of a multidisciplinary team.

Graduate Attributes:

1. Communicate effectively.
2. Design and supervise the construction of generation, transmission, and distribution systems.
3. Perform operation, control, and maintenance of power system equipment.
4. Perform review of supplier documentation for compliance with specifications and codes.
5. Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problems.
6. Design and conduct experiments as well as analyze and interpret data.
7. Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management.



8. Work effectively within multi-disciplinary teams.
9. Identify, formulate and solve fundamental engineering problems.
10. Display professional and ethical responsibilities; and contextual understanding.
11. Consider the impacts of engineering solutions on society & environment.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Preparation: to prepare students for designing products to meet social, economic and environmental demand by innovative ideas.
PEO2	:	Core Competence: to Excel in professional career and/or higher education by acquiring knowledge in mathematics and Basic Sciences, Basic Electrical Sciences, Power Systems, Power Electronics and Electrical Drives along with High Moral Values.
PEO3	:	Breadth: to make students investigate complex problems and take up research and development work in the allied fields.
PEO4	:	Professionalism: to Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends in technology by engaging in continuous professional development.
PEO5	:	Learning environment: to create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with due consideration for ethical, ecological and economic issues.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:	
PO1	Domain knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.



PO2	Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.



PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
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Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply knowledge of power system configuration, electrical equipment and protection practices to the design and specification of electrical generation, transmission, distribution and utilization systems.
PSO2	:	Design, analyze, test and evaluate the performance of the electrical machines and transformers.
PSO3	:	Develop the expertise in efficient conversion and control of electrical power by power electronics from available form to the required form.
PSO4	:	Utilize statistics & probability, discrete mathematics, applied differential equations and transform methods to analyze the electrical/electronic systems.
PSO5	:	Get awareness about the impact of electrical engineering solutions in societal, environmental context and professional ethics in light of human values.



Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credit	CIA	SEE
I	21CEWE01	CEC I- Wisdom & Ethics for Success in Life (WESL)	<ul style="list-style-type: none"> • CO 1:- Differentiate the career success, academic success and life success. • CO 2:- Identify the correct priority order in life and illustrate the human goal. • CO 3:- Understand that the relationships are definite. • CO 4:- Understand the Interconnectedness between all the orders in existence. 	2	100	
I	21MEEPC C101	CORE-1: Power Electronics-I	<ul style="list-style-type: none"> • CO 1:- Utilize the basic concepts of power semiconductor devices and its switching characteristics for selecting device which is best suited for specific application. • CO 2:- Design magnetic components required in power converter. • CO 3:- Compare the performance of different topologies of DC-DC converters. • CO 4:- Understand the working and use of AC-DC and DC-DC converters. • CO 5:- Understand operation of various power electronic converters • CO 6:- Know various control techniques for power electronic converters • CO 7:- Develop power electronic converter based systems 	4	30	70
I	21MEEPC C102	CORE-2: Solid State DC Drive	<ul style="list-style-type: none"> • CO 1:- Describe the Electric Drive, Torque Equation, Load Torque components and their classification. • CO 2:- Analyze 1Φ and 3Φ Converter Fed Drives. • CO 3:- Analyze the Two Quadrant and Four Quadrant Control of DC Motor Drive. • CO 4:- Analyze the Speed Control of Chopper Fed Drives. • CO 5:- Simulate the Speed Control of DC Motor Drives. 	3	30	70



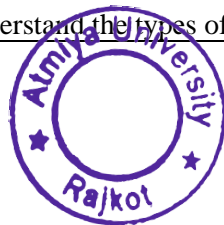
I	21MEEPC C103	CORE-3: Industrial Automation and Control	<ul style="list-style-type: none"> • CO 1:- Understand various automation components and systems • CO 2:- Draw block diagram of industrial automation and control system • CO 3:- Explain architecture of industrial automation system • CO 4:- Explain fundamentals of process control • CO 5:- List basic devices used in automated systems • CO 6:- Use programmable logic controllers for industrial automation 	3	30	70
I	21MEEPC C104	Core Practical 1: Power Electronics (F)	<ul style="list-style-type: none"> • CO 1:- Develop power electronic converter based systems. • CO 2:- Utilize the basic concepts of power semiconductor devices and its switching characteristics for selecting device which is best suited for specific application. • CO 3:- Design magnetic components required in power converter. • CO 4:- Compare the performance of different topologies of DC-DC converters. 	1	20	30
I	21MEEPC C105	Core Practical 2: Solid State DC Drives (Ap)	<ul style="list-style-type: none"> • CO 1:- Describe the Electric Drive, Torque Equation, Load Torque components and their classification. • CO 2:- Analyze 1Φ and 3Φ Converter Fed Drives, Two Quadrant and Four Quadrant Control of DC Motor Drives • CO 3:- Simulate the Speed Control of DC Motor Drives • CO 4:- Analyze the Speed Control of Chopper Fed Drives 	1	20	30
I	21MEEPCC106	Industrial Automation & Control	<ul style="list-style-type: none"> • CO 1:- Understand various automation components and systems • CO 2:- Draw block diagram of industrial automation and control system • CO 3:- Explain architecture of industrial automation system • CO 4:- Explain fundamentals of process control • CO 5:- List basic devices used in automated systems • CO 6:- Use programmable logic controllers for industrial automation 	1	20	30
I	21MEEPCC107	Core Practical 4: Research Methodology	<ul style="list-style-type: none"> • CO 1:- Conduct a quality literature review and find the research gap • CO 2:- Identify an original and relevant problem and identify methods to find its solution • CO 3:- Validate the model • CO 4:- Present and defend the solution obtained in an effective manner in written or spoken form. 	1	20	30



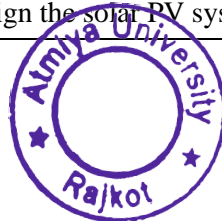
I	21PHSMA103	DSE-Allied 1: Numerical Methods & Optimization Techniques for Electrical Engineering	<ul style="list-style-type: none"> • CO 1:- Numerical Problem Solving: Learn To Solve Electrical Engineering Problems Using Numbers. • CO 2:- Efficiency Optimization: Optimize Electrical Systems For Better Performance. • CO 3:- Algorithm Application: Apply Algorithms To Solve Engineering Tasks. • CO 4:- Error Handling: Identify And Reduce Errors In Calculations. • CO 5:- Practical Problem Solving: Use Numerical Methods To Solve Real-World Electrical Engineering Challenges. 	3	30	70
I	21MEEPID10 3	DSE-ID 1: Alternate Energy Sources	<ul style="list-style-type: none"> • CO 1:- Understanding Renewable Tech: Learn about different renewable energy technologies. • CO 2:- Designing Green Systems: Design eco-friendly energy systems. • CO 3:- Policy Awareness: Understand energy-related policies. • CO 4:- Environmental Impact Awareness: Recognize environmental effects of energy choices. • CO 5:- Implementing Sustainable Solutions: Put green energy solutions into practice. 	3	30	70



I	21MEEPID10 7	DSE-ID Practical 1: Alternate Energy Sources	<ul style="list-style-type: none"> • CO 1:- Understanding Renewable Tech: Learn about different renewable energy technologies. • CO 2:- Designing Green Systems: Design eco-friendly energy systems. • CO 3:- Policy Awareness: Understand energy-related policies. • CO 4:- Environmental Impact Awareness: Recognize environmental effects of energy choices. • CO 5:- Implementing Sustainable Solutions: Put green energy solutions into practice. 	3	40	60
II		DSE ID 2: Renewable Energy Sources	<ul style="list-style-type: none"> • CO 1:- Understand the Indian energy scenario. • CO 2:- Understand the basic concept of renewable energy sources. • CO 3:- Understand the solar energy generation and solar PV system. • CO 4:- Analyze the IV and PV characteristic of solar PV cell. • CO 5:- Identify various components of Wind Energy Conversion system. • CO 6:- Understand the types of wind energy conversion system. • CO 7:- Understand the operation of Fuel Cell. • CO 8:- Understand the biomass energy generation process. • CO 9:- Evaluate renewable energy related system for a particular application. 	3	30	70
II		DSE ID 2: Renewable Energy Sources	<ul style="list-style-type: none"> • CO 1:- Understand the Indian energy scenario. • CO 2:- Understand the basic concept of renewable energy sources. • CO 3:- Understand the solar energy generation and solar PV system. • CO 4:- Analyze the IV and PV characteristic of solar PV cell. • CO 5:- Identify various components of Wind Energy Conversion system. • CO 6:- Understand the types of wind energy conversion system. 	1	20	30



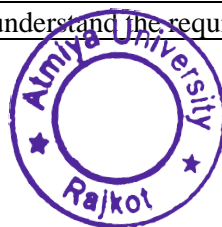
			<ul style="list-style-type: none"> • CO 7:- Understand the operation of Fuel Cell. • CO 8:- Understand the biomass energy generation process. • CO 9:- Evaluate renewable energy related system for a particular application. 			
II	21MEEPC C201	CORE-4: Advanced Power Electronics	<ul style="list-style-type: none"> • CO 1:- Analyze the performance of different types of AC voltage controllers • CO 2:- Understand operation of various power electronic converters • CO 3:- Compare the different PWM techniques for Operation of Inverter. • CO 4:- Understand the working and use of DC-AC and AC-AC converters. • CO 5:- Develop power electronic converter based systems 	3	30	70
II	21MEEPC C202	CORE-5: Solid State AC Drives	<ul style="list-style-type: none"> • CO 1:- Analyze the speed control methods of Induction motor and synchronous motor. • CO 2:- Understand definition, scope, objectives, and limitation of electric drives, power transistor and SCR. • CO 3:- Analyze the construction, characteristics and application of three phase induction motor and synchronous motor. • CO 4:- Analyze the industrial applications of AC drives. • CO 5:- Analyze the construction, characteristics and application of sensor, transducer and switches. 	3	30	70
II	21MEEPC C203	CORE-5: Advanced Electrical Machines	<ul style="list-style-type: none"> • CO 1:- Understand working principle and characteristics of special motors used for specific applications. • CO 2:- Analyze different strategies adopted for speed control, torque production by governing motor parameters. • CO 3:- Simulate a typical feedback based control model for normal and transient operation of the motors. 	3	30	70
II	21MEEPC C204	CORE-7: Application of Power Electronics for Renewable Energy Conversion	<ul style="list-style-type: none"> • CO 1:- Understand the solar PV energy generation. • CO 2:- Analyze the IV and PV characteristic of solar PV cell. • CO 3:- Analyze the operation of power electronics converter for PV system. • CO 4:- Understand the control of PV system. • CO 5:- Design the solar PV system. 	3	50	100



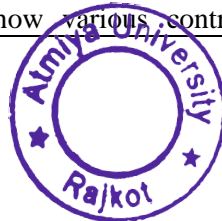
			<ul style="list-style-type: none"> • CO 6:- Understand the impact of high PV penetration on grid. • CO 7:- Identify various components of Wind Energy Conversion system. • CO 8:- Understand the types of wind energy conversion system. • CO 9:- Analyze the power electronics control for wind energy conversion system. • CO 10:- Understand the operation and control of DFIG. • CO 11:- Understand the operation of Fuel Cell. • CO 12:- Understand the basic of microgrid. 			
II	21MEEPC C205	Core Practical 5: Advanced Power Electronics	<ul style="list-style-type: none"> • CO 1:- Analyze the performance of different types of AC voltage controllers • CO 2:- Understand operation of various power electronic converters • CO 3:- Compare the different PWM techniques for Operation of Inverter. • CO 4:- Understand the working and use of DC-AC and AC-AC converters. • CO 5:- Develop power electronic converter based systems 	1	20	30
II	21MEEPC C206	Core Practical 6: Solid State AC Drives	<ul style="list-style-type: none"> • CO 1:- Control AC drives using hardware controllers • CO 2:- Examine the characteristics of power electronic devices • CO 3:- Analyze the performance of different power electronic converters and drives using various hardware modules 	1	20	30
II	21MEEPC C207	Core Practical 7: Application of Power Electronics in Renewable Energy Conversion	<ul style="list-style-type: none"> • CO 1:- Understand the solar PV energy generation. • CO 2:- Analyze the IV and PV characteristic of solar PV cell. • CO 3:- Analyze the operation of power electronics converter for PV system. • CO 4:- Understand the control of PV system. • CO 5:- Design the solar PV system. • CO 6:- Understand the impact of high PV penetration on grid. • CO 7:- Identify various components of Wind Energy Conversion system. • CO 8:- Understand the types of wind energy conversion system. • CO 9:- Analyze the power electronics control for wind energy 	1	20	30



			<p>conversion system.</p> <ul style="list-style-type: none"> • CO 10:- Understand the operation and control of DFIG. • CO 11:- Understand the operation of Fuel Cell. • CO 12:- Understand the basic of microgrid. 			
II		Core Practical 8: Advanced Electrical Machine	<ul style="list-style-type: none"> • CO 1:- Understand working principle and characteristics of special motors used for specific applications. • CO 2:- Analyze different strategies adopted for speed control, torque production by governing motor parameters. • CO 3:- Simulate a typical feedback based control model for normal and transient operation of the motors. 	1	20	30
II	21MEEPID 207	DSE-ID Practical 2: Quality Engineering	<ul style="list-style-type: none"> • CO 1:- Quality Standards Understanding: Understand various quality standards and their application in engineering processes. • CO 2:- Quality Control Techniques: Learn practical techniques to control and maintain quality in engineering projects and products. • CO 3:- Statistical Analysis Skills: Develop skills in using statistical methods to analyze and improve quality in engineering processes. • CO 4:- Problem-solving Abilities: Enhance problem-solving abilities to identify and resolve quality issues efficiently. • CO 5:- Continuous Improvement Knowledge: Gain knowledge of continuous improvement methodologies like Six Sigma and Lean to enhance overall quality performance. 	1	40	60
II	21CEWE20 1	WISDOM & ETHICS FOR SUCCESS IN LIFE	<ul style="list-style-type: none"> • CO 1:- Ethical Decision Making: Develop skills to make ethical decisions in personal and professional life. • CO 2:- Values Alignment: Align personal values with ethical principles for a fulfilling life. • CO 3:- Critical Thinking: Enhance critical thinking abilities to navigate complex ethical dilemmas. • CO 4:- Character Development: Foster personal growth and character development through ethical reflection. • CO 5:- Life Strategies: Learn practical strategies for success and fulfillment based on wisdom and ethical principles. 			
III	21MEEPC	Core 8: Power	<ul style="list-style-type: none"> • CO 1:- To understand the requirement of quality power. 	3	30	70



	C301	Quality Management (Self Study)	<ul style="list-style-type: none"> • CO 2:- Understand for the electric utility to concern about power quality issues. • CO 3:- To make the students aware about the various issues affecting the power quality as well as techniques available to improve the quality of power. • CO 4:- Apply and analyze/compare techniques available to mitigate power quality problems. 			
III	21MEEPD C301	DSE Core 1: Power Electronics Application in Power System	<ul style="list-style-type: none"> • CO 1:- Explain operating principles and control methods of FACTS controllers which are representatives of power converters for electric power systems. • CO 2:- Understand the basic concepts of Harmonics. • CO 3:- Understand the fundamental concept of HVDC system, its Control and Application. • CO 4:- Understand how to model power converters, and able to model power converters for electric power systems. 	3	30	70
III	21MEEPD C302	DSE Core 1: Hybrid AC-DC Converter	<ul style="list-style-type: none"> • CO 1:- Understand operation of various power electronic converters. • CO 2:- Know various control techniques for power electronic converters • CO 3:- Develop power electronic converter based systems • CO 4:- Design and operate power electronic converter control architecture. 	3	30	70
III	21MEEPD C303	DSE Core 1: Embedded control of Electrical Drives	<ul style="list-style-type: none"> • CO 1:- Implement algorithms for control of electric drive. • CO 2:- Interface microcontroller with power electronics converters. • CO 3:- Develop closed loop controller with STM32F4 	3	30	70
III	21MEEPDC304	DSE Core Practical 1: Power Electronics Application in Power System	<ul style="list-style-type: none"> • CO 1:- Explain operating principles and control methods of FACTS controllers which are representatives of power converters for electric power systems. • CO 2:- Understand the basic concepts of Harmonics. • CO 3:- Understand the fundamental concept of HVDC system, its Control and Application. • CO 4:- Understand how to model power converters, and able to model power converters for electric power systems. 	1	40	-
III	21MEEPDC305	DSE Core Practical 1:	<ul style="list-style-type: none"> • CO 1:- Understand operation of various power electronic converters. • CO 2:- Know various control techniques for power electronic 	1	40	-



		Hybrid AC-DC Converter	<p>converters</p> <ul style="list-style-type: none"> • CO 3:- Develop power electronic converter based systems • CO 4:- Design and operate power electronic converter control architecture. 			
III	21MEEPDC306	DSE Core Practical 1: Embedded Control of Electrical Drives	<ul style="list-style-type: none"> • CO 1:- Implement algorithms for control of electric drive. • CO 2:- Interface microcontroller with power electronics converters. • CO 3:- Develop closed loop controller with STM32F4 	1	40	-
III	21MEEPCC302	CORE PRACTICAL 8: DISSERTATION PHASE -I	<ul style="list-style-type: none"> • CO 1:- Research Proposal Development: Develop A Clear And Focused Research Proposal Outlining The Dissertation Objectives, Methodology, And Significance. • CO 2:- Literature Review: Conduct A Comprehensive Literature Review To Identify Existing Research Gaps And Establish The Theoretical Framework For The Dissertation. • CO 3:- Research Design: Design An Appropriate Research Methodology, Including Data Collection Methods And Analysis Techniques, Aligned With The Research Objectives. • CO 4:- Ethical Considerations: Address Ethical Considerations Related To The Research, Ensuring Integrity And Compliance With Ethical Standards. • CO 5:- Timeline And Planning: Create A Realistic Timeline And Plan For The Dissertation Project, Including Milestones And Deadlines For Each Phase Of The Research Process. 		30	70
IV	21MEEPDC401	DSE-Core 2: Hybrid Electric Vehicles	<ul style="list-style-type: none"> • CO 1:- Understand working of Electric Vehicles and recent trends • CO 2:- Analyze different power converter topology used for electric vehicle application • CO 3:- Develop the electric propulsion unit and its control for application of electric vehicles • CO 4:- Design and operate power electronic converter control architecture for Electrical Vehicle. 	3	30	70
IV	21MEEPDC402	DSE-Core 2: Electromagneti	<ul style="list-style-type: none"> • CO 1:- Understand the fundamental concepts of EMI/EMC. • CO 2:- Understand the basic concepts of Harmonics. 	3	30	70



		c Compatibility in Power Electronics	<ul style="list-style-type: none"> • CO 3:- Understand Testing and measurement of EMI. • CO 4:- Understand EMI Filter circuits and its design. 			
IV	21MEEPDC403	Practical DSE-Core-2: Hybrid Electric Vehicle	<ul style="list-style-type: none"> • CO 1:- Understand working of Electric Vehicles and recent trends • CO 2:- Analyze different power converter topology used for electric vehicle application • CO 3:- Develop the electric propulsion unit and its control for application of electric vehicles • CO 4:- Design and operate power electronic converter control architecture for Electrical Vehicle. 	1	30	-
IV		Electromagnetic Compatibility in Power Electronics	<ul style="list-style-type: none"> • CO 1:- Understand the fundamental concepts of EMI/EMC. • CO 2:- Understand the basic concepts of Harmonics. • CO 3:- Understand Testing and measurement of EMI. • CO 4:- Understand EMI Filter circuits and its design. 	1	30	-
IV	21MEEPCC401	Core Practical 9: Mid Semester Dissertation	<ul style="list-style-type: none"> • CO 1:- Research Progress Evaluation: Evaluate The Progress Made In Research Activities, Including Literature Review, Data Collection, And Analysis. • CO 2:- Methodological Refinement: Refine The Research Methodology Based On Insights Gained From The Initial Phase, Ensuring Its Appropriateness And Effectiveness For The Study. • CO 3:- Preliminary Findings: Present Preliminary Findings Or Results Obtained Thus Far, Providing Insights Into The Direction Of The Research And Potential Implications. • CO 4:- Feedback Incorporation: Incorporate Feedback Received From Peers, Instructors, Or Advisors To Enhance The Quality And Rigor Of The Dissertation Project. • CO 5:- Adjustment Of Timeline: Adjust The Timeline And Schedule If Necessary To Accommodate Any Unexpected Challenges Or Delays Encountered During The Mid-Semester Phase. 		30	70
IV	21MEEPCC402	Core Practical 10: Dissertation Phase -II	<ul style="list-style-type: none"> • CO 1:- Data Collection And Analysis: Complete Data Collection And Perform Thorough Analysis Using Appropriate Methods And Tools. • CO 2:- Results Interpretation: Interpret Research Findings And Analyze Their Significance In Relation To The Dissertation 		30	70



			<p>Objectives And Research Questions.</p> <ul style="list-style-type: none"> • CO 3:- Discussion And Conclusion: Formulate A Comprehensive Discussion Section, Synthesizing Research Findings With Existing Literature And Drawing Conclusions. • CO 4:- Recommendations: Provide Practical Recommendations Based On Research Findings, Addressing Potential Implications For Practice, Policy, Or Further Research. • CO 5:- Finalization And Editing: Finalize The Dissertation Document, Ensuring Clarity, Coherence, And Adherence To Academic Standards, Including Proper Referencing And Citation. 			
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Name of Department: Electrical Engineering

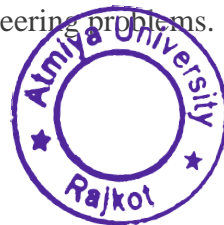
Name of Program: B. Tech.

Program Objective:

1. Demonstrate a thorough understanding of electrical and electronics engineering technology practices to support their employer's design, application, installation, production, operation, and maintenance needs,
2. Apply fundamental mathematical and scientific principles to solve technical problems in fields like as analogue and digital circuit analysis, microprocessors, programmable logic control, and electrical machines,
3. Utilize computers and software in a technical environment,
4. Demonstrate written and oral communication skills.
5. Work effectively as an individual and as a member of a multidisciplinary team.

Graduate Attributes:

1. Communicate effectively.
2. Design and supervise the construction of generation, transmission, and distribution systems.
3. Perform operation, control, and maintenance of power system equipment.
4. Perform review of supplier documentation for compliance with specifications and codes.
5. Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problems.
6. Design and conduct experiments as well as analyze and interpret data.
7. Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management.
8. Work effectively within multi-disciplinary teams.
9. Identify, formulate and solve fundamental engineering problems.



10. Display professional and ethical responsibilities; and contextual understanding.
11. Consider the impacts of engineering solutions on society & environment.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Preparation: to prepare students for designing products to meet social, economic and environmental demand by innovative ideas.
PEO2	:	Core Competence: to Excel in professional career and/or higher education by acquiring knowledge in mathematics and Basic Sciences, Basic Electrical Sciences, Power Systems, Power Electronics and Electrical Drives along with High Moral Values.
PEO3	:	Breadth: to make students investigate complex problems and take up research and development work in the allied fields.
PEO4	:	Professionalism: to Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends in technology by engaging in continuous professional development.
PEO5	:	Learning environment: to create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with due consideration for ethical, ecological and economic issues.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:	
PO1	Domain knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.



PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply knowledge of power system configuration, electrical equipment and protection practices to the design and specification of electrical generation, transmission, distribution and utilization systems.
PSO2	:	Design, analyze, test and evaluate the performance of the electrical machines and transformers.
PSO3	:	Develop the expertise in efficient conversion and control of electrical power by power electronics from available form to the required form.
PSO4	:	Utilize statistics & probability, discrete mathematics, applied differential equations and transform methods to analyze the electrical/electronic systems.
PSO5	:	Get awareness about the impact of electrical engineering solutions in societal, environmental context and professional ethics in light of human values.

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGSH101	Fundamentals of Engineering Mathematics	<ul style="list-style-type: none"> • CO1:- Solve simultaneous linear equations using various methods of Matrix Algebra. • CO2:- Calculate Fourier series of a function • CO3:- Evaluate partial derivatives and can implement to estimate maxima and minima of a function • CO4:- Apply the knowledge of Differential Calculus to solve the 	4	50	50



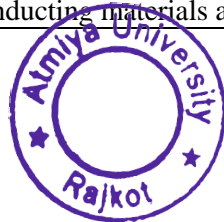
			<p>various problems in Engineering</p> <ul style="list-style-type: none"> • CO5:- Apply Beta and Gamma functions in solving various mathematical problems 			
I	23UGSH140	Effective Communication Skills	<ul style="list-style-type: none"> • CO1:- To listen and comprehend complex academic texts • CO2:- To read and infer the denotative and connotative meanings of technical texts • CO3:- To write definitions, descriptions, narrations and essays on various topics • CO4:- To speak fluently and accurately in formal and informal communicative contexts • CO5:- To express their opinions effectively in both oral and written medium of communication. 	2	50	50
I	23UGCI070	Environmental Conservation & Sustainable Development	<ul style="list-style-type: none"> • CO1:- Gain insights into the international efforts to safeguard the Earth's environment and resources. • CO2:- Understand importance of natural resources and biological diversity. • CO3:- Understand the sectoral effects on the local, regional, and global environmental issues. • CO4:- Correlate the exploitation and utilization of conventional and non-conventional energy resources. • CO5:- Learn about the major international treaties and our country's stand on and responses to the major international agreements. 	2	Evaluation by Remarks based on CIA	
I	23UGCI101	Fundamentals of Civil Engineering	<ul style="list-style-type: none"> • CO1:- Recognize the general terminology related to civil engineering while handling day to day problems of society. • CO2:- Apply the fundamentals to find out the various levels, angles situated on the earth. • CO3:- Recognize the general terminology related to applied mechanics. • CO4:- Understand principles of statics to calculate the various forces. • CO5:- Understand the fundamentals of support reactions in beams. 	4	90	60
I	23UGCE101	Fundamentals of Computer	<ul style="list-style-type: none"> • CO1:- Have basic knowledge of Computer, System applications and Programming Language 	2	100	-



		Programming	<ul style="list-style-type: none"> • CO2:- Have knowledge in using C language for solving problems • CO3:- Have knowledge of the syntax and semantics of C programming language • CO4:- Write algorithms and Flow chart for problems • CO5:- Code a given logic of control structure, arrays and string in C language • CO6:- Code a given logic of advanced concept like structure, pointer and union C language 			
I	23UGEC101	Fundamentals of Electronics	<ul style="list-style-type: none"> • CO1:- Explain characteristic and working of basic semiconductor devices like diode, transistor, logic gates and operational amplifier • CO2:- Perform analysis of different electronics circuits based on devices covered in the course and compare their operations. • CO3:- Build and test electronic circuits based on devices covered in the course • CO4:- Explain basic concepts of electronics communication systems. 	3	90	60
I	23UGME102	Engineering Drawing	<ul style="list-style-type: none"> • CO1:- Understand engineering curves with proficiency in tracing the paths of simple machine components. • CO2:- Illustrate the projection of points, lines and planes with different conditions. • CO3:- Develop proficiency in drawing the projections of various solids. • CO4:- Improve the visualization and technical skills for given orthographic views and can apply it in developing new products. • CO5:- Improve the visualization and technical skills in isomeric projections and can apply it in developing new products. 	2	50	50
I	23UGEC102	Tinkering Lab	<ul style="list-style-type: none"> • CO1:- Understanding of the fundamental principles of automation, including microcontroller, development boards, sensors, actuators, embedded systems, logic building and feedback mechanisms. • CO2:- Apply the fundamental principles to illustrate the real world problems • CO3:- Select, Interface, Integrate, and troubleshoot different 	1	100	-



			<p>sensors and actuators with the development board.</p> <ul style="list-style-type: none"> • CO4:- Identify the real world problem and design solution • CO5:- Think creatively and find innovative solutions to automation challenges. 			
II	23UGSH201	Calculus & Higher Order Differential Equation	<ul style="list-style-type: none"> • CO1:- Understand the Higher Order Differential Equations • CO2:- Understand and apply the Laplace transforms for solving various differential equations • CO3:- Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts • CO4:- Apply the knowledge of Calculate double and triple integral using various integration techniques. • CO5:- Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus 	4	50	50
II	23UGSH240	Technical Communication Skills	<ul style="list-style-type: none"> • CO1:- To listen and comprehend complex academic text. • CO2:- To read and infer the denotative and connotative meanings of technical texts. • CO3:- To write definitions, descriptions, narrations, and essays on various topics. • CO4:- To speak fluently and accurately in formal and informal communicative contexts. • CO5:- To express their opinions effectively in both oral and written medium of communication. 	2	50	50
II	23UGUH070	Human Values for Holistic Living	<ul style="list-style-type: none"> • CO1:- Recall basic guidelines of value education and understand the basic aspirations. • CO2:- Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. • CO3:- Identify the relations between human-human and they have the ability to fulfil the expectations in relations. • CO4:- Understand required skills to understand the laws of nature. 	3	Evaluation by Remarks based on CIA	
II	23UGSH102	Engineering Science	<ul style="list-style-type: none"> • CO1:- The student will demonstrate the understanding of basic principles properties and its applications associated with semiconducting materials and specifically LASER. 	4	90	60



			<ul style="list-style-type: none"> • CO2:- The student will gain knowledge of basic theoretical and practical concept of optical fiber structure and their applications towards telecommunications. (U, A cognitive level) • CO3:- The student will demonstrate the understanding of basic principles properties and its applications associated with electromagnetic waves. (U, A cognitive level) • CO4:- The student will demonstrate understanding of basic theory, properties and applications of batteries, fuel cells and solar cell (U, A cognitive level) • CO5:- The student will gain knowledge of various corrosions and their preventions and the different preparation techniques to characterize various advance engineering materials and their properties. (U, A cognitive level) 			
II	23UGEE101	Fundamentals of Electrical Engineering	<ul style="list-style-type: none"> • CO1:- Apply fundamental electrical laws to electrical circuits. • CO2:- Analyze single phase and three phase AC circuits. • CO3:- Describe operating principle and applications of static and rotating electrical machines. 	4	90	60
II	23UGME101	Fundamentals of Mechanical Engineering	<ul style="list-style-type: none"> • CO1:- Infer the scope & application of mechanical engineering & significance of thermodynamic process • CO2:- Understand the vapour power cycle used in thermal power plant. • CO3:- Analyze various heat engine cycles and understand Construction & working of Internal Combustion Engine • CO4:- Identify and select various power transmissions & motion & their application in Industry. • CO5:- Explain Quality Control and Contemporary Management Concept like 5S, JIT, KAIZAN. 	4	90	60
II	23UGME103	Engineering Workshop	<ul style="list-style-type: none"> • CO1:- Understand the Basics of workshop practices. • CO2:- Demonstrate and produce different types of fitting models, carpentry Models and Tin smithy. • CO3:- Understand welding on metal with different welded joints. • CO4:- Identify the different materials for construction projects. • CO5:- Understand the safety measures and apply for construction work. 	1	100	-



II	23UGLI050	Information & Digital Literacy	<ul style="list-style-type: none"> • CO1:- Navigate libraries, conduct proper referencing, and apply APA style. • CO2:- Enroll in MOOCs, understand FOSS, and differentiate between MOOC platforms. • CO3:- Apply note-taking and prewriting strategies, create effective search formulas, and build basic websites. • CO4:- Identify and access scholarly resources, avoid plagiarism, and utilize referencing styles. • CO5:- Demonstrate digital literacy, understand internet safety, and gain introductory knowledge of AI and app development. 	1	100	-
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Name of Department: Electrical Engineering

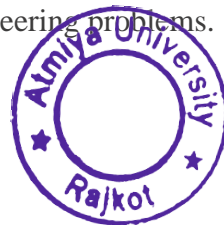
Name of Program: B. Tech.

Program Objective:

1. Demonstrate a thorough understanding of electrical and electronics engineering technology practices to support their employer's design, application, installation, production, operation, and maintenance needs,
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3. Utilize computers and software in a technical environment,
4. Demonstrate written and oral communication skills.
5. Work effectively as an individual and as a member of a multidisciplinary team.

Graduate Attributes:

1. Communicate effectively.
2. Design and supervise the construction of generation, transmission, and distribution systems.
3. Perform operation, control, and maintenance of power system equipment.
4. Perform review of supplier documentation for compliance with specifications and codes.
5. Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problems.
6. Design and conduct experiments as well as analyze and interpret data.
7. Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management.
8. Work effectively within multi-disciplinary teams.
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Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
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PEO3	:	Breadth: to make students investigate complex problems and take up research and development work in the allied fields.
PEO4	:	Professionalism: to Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends in technology by engaging in continuous professional development.
PEO5	:	Learning environment: to create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with due consideration for ethical, ecological and economic issues.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:	
PO1	Domain knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.



PO3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply knowledge of power system configuration, electrical equipment and protection practices to the design and specification of electrical generation, transmission, distribution and utilization systems.
PSO2	:	Design, analyze, test and evaluate the performance of the electrical machines and transformers.
PSO3	:	Develop the expertise in efficient conversion and control of electrical power by power electronics from available form to the required form.
PSO4	:	Utilize statistics & probability, discrete mathematics, applied differential equations and transform methods to analyze the electrical/electronic systems.
PSO5	:	Get awareness about the impact of electrical engineering solutions in societal, environmental context and professional ethics in light of human values.

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credit	CIA	SEE
I	21UHSEN101	Communicative English	<ul style="list-style-type: none"> • CO1:- Grasp the basic tools of communication. • CO2:- Understand the role of non-verbal elements of communication. • CO3:- Exchange their ideas and views precisely and clearly. • CO4:- Learn the fundamental components of English Grammar and vocabulary. 	3	40	60



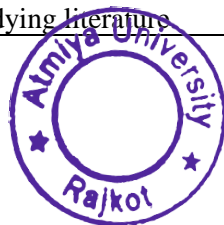
			<ul style="list-style-type: none"> • CO5:- Inculcate human values through studying literature. 			
I	21BTMECC101	IDC 1: Fundamentals of Mechanical Engineering (F)	<ul style="list-style-type: none"> • CO1:- Classify various component design & general procedure of design. • CO2:- Explain the fundamental laws of Thermodynamics and describe their application in thermal systems like air standard cycles of IC engines. • CO3:- Apply the theoretical concepts of manufacturing process & their application in Industry. • CO4:- Illustrate the Application of AR and VR, Cloud computing, Big Data Analytics, IOT, 3D Printing, Cyber Security in industry. • CO5:- Explain Quality Control and Contemporary Management Concept like 5S,JIT, KAIZAN. 	4	40	60
I	21UHSM101	HSM 1: Fundamentals of Mathematics	<ul style="list-style-type: none"> • CO1:- Understand the Fundamental of Differential Equation and Matrix Algebra • CO2:- Understand and apply Partial Derivatives • CO3:- Understand the application of Matrix Algebra • CO4:- Apply the knowledge of Diff. Calculus to solve the various problems in Engineering. • CO5:- Solve simultaneous linear equations using various methods of Matrix Algebra. 	4	40	60
I	21BTMEIC101	IDC 2: Problem Solving using Programming	<ul style="list-style-type: none"> • CO1:- Understand how to draw flowchart and write an algorithm for any problem. • CO2:- Memorize different conditional and loop statement. • CO3:- Apply knowledge and programmatically approach to solve a particular problem. 	4	40	60



			<ul style="list-style-type: none"> • CO4:- Explain C Programs using the concept of Function and Array. • CO5:- Solve C programs using pointers and structure. 			
I	21BTMEIC102	IDC 3: Fundamentals of Civil Engineering	<ul style="list-style-type: none"> • CO1:- Recognize the general terminology related to civil engineering while handling day to day problems of society. • CO2:- Understand the different material & its properties. • CO3:- Apply the fundamentals to find out the various levels, angles situated on the earth. • CO4:- Understand the different parameters of mass transportation systems. • CO5:- Remember & apply the recent technological tools for the harmony of society 	4	40	60
I	21BTMECC102	IDC Practical 1: Mechanical Workshop (F)	<ul style="list-style-type: none"> • CO1:- Demonstrate and produce different types of fitting models and carpentry Models. • CO2:- Apply the knowledge of development of sheet metal models with an understanding of their applications. • CO3:- Understand the Basics of workshop practices. • CO4:- Understand welding on metal with different welded joints. • CO5:- Demonstrate and produce different types of fitting models and carpentry Models. 	1	100	-
I	21AEES01	AECC 2: Environmental Conservation and Sustainable Development	<ul style="list-style-type: none"> • CO1:- Gain insights into the international efforts to safeguard the Earth's environment and resources. • CO2:- Understand importance of natural resources and biological diversity. • CO3:- Understand the sectoral effects on the local, regional, and global environmental issues. • CO4:- Correlate the exploitation and utilization of conventional and non-conventional energy 	-	Evaluation at the end of Semester II	



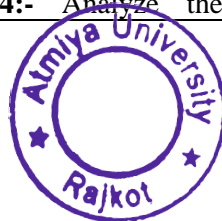
			resources. <ul style="list-style-type: none"> • CO5:- Learn about the major international treaties and our country's stand on and responses to the major international agreements. 			
I	21AEHV202	AECC 3: Human Values for Holistic Living	<ul style="list-style-type: none"> • CO1:- Recall basic guidelines of value education and understand the basic aspirations. • CO2:- Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. • CO3:- Identify the relations between human-human and they have the ability to fulfill the expectations in relations. • CO4:- Understand required skills to understand the laws of nature. 	Evaluation at the end of Semester II		
I	21AEFS101	FS 3: Career Acceleration Program	<ul style="list-style-type: none"> • CO1:- Remember the message coming through different communication channels. • CO2:- Understand the message coming through different communication channels to think critically, logically and creatively. • CO3:- Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others. • CO4:- Develop personality & right attitude through communication skills. 	-	-	-
II	21UHSEN201	Technical Communication	<ul style="list-style-type: none"> • CO1:- Gain knowledge and use of the technical English • CO2:- Apply the knowledge of presentation skills to make presentations in their academic and professional life. • CO3:- Learn various aspects of Morphology of English • CO4:- Use the basics of Syntax of English • CO5:- Enrich their language and life skills through studying literature 	3	40	60



II	21BTMECC201	IDC 4: Engineering Graphics and Computer Drafting (F)	<ul style="list-style-type: none"> • CO1:- Understand the conventions and construct basic as well as intermediate geometry along with method of engineering drawing. • CO2:- Interpret engineering drawings using fundamental technical mathematics. • CO3:- Construct basic and intermediate geometry by understanding the theory of projection. • CO4:- Improve their visualization skills in orthographic and isometric projections so that they can apply these skills in developing new products. • CO5:- Improve their technical communication skill in the form of communicative drawings. 	4	40	60
II	21UH SMA201	HSM 2: Multivariate calculus and differential equations	<ul style="list-style-type: none"> • CO1:- Understand the Higher Order Differential Equations • CO2:- Understand and apply the Laplace transforms for solving various differential equations • CO3:- Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts. • CO4:- Apply the knowledge to calculate double and triple integral using various integration techniques. • CO5:- Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus. 	4	40	60
II	21UHSPY201	HSM 3 : Fundamentals of Engineering Physics	<ul style="list-style-type: none"> • CO1:- Understand the Fundamental role of Optical Fiber, Acoustics, Semiconductor Physics and advanced engineering materials and their behavior under various system conditions. • CO2:- Understand and Describe qualitative comparison between various diodes. • CO3:- Identify the Various material testing technologies • CO4:- Apply the knowledge of material science to 	4	40	60



			<p>use various advanced engineering materials to solve the problems in Engineering.</p> <ul style="list-style-type: none"> • CO5:- Solve the problem of bad acoustics in Auditorium or Cinema hall by using various acoustical solutions. 			
II	21BTMEIC201	Core: Fundamentals of Electrical Engineering	<ul style="list-style-type: none"> • CO1:- Apply fundamental electrical laws to electrical circuits. • CO2:- Use Ohm's law, Kirchhoff's law and star-delta transformation for solving resistive series, parallel and series-parallel circuits. • CO3:- Define electric field, lines of force, electric field intensity, electric flux, flux density and permittivity. • CO4:- Analyze single phase and three phase AC circuits. 	4	40	60
II	21BTMEIC202	Core Practical 1: Electronics Workshop	<ul style="list-style-type: none"> • CO1:- Basic knowledge of electrical and electronics components and its standard symbols. • CO2:- Knowledge of measuring voltage, current, frequency, phase difference, power, power factor for single and three-phase supply. • CO3:- Knowledge of how to use different types of tools which is used in electrical and electronics field. • CO4:- Knowledge of Arduino and Decentralized solar PV system. • CO5:- Justify circuit design concept. 	1	100	-
II	21AEES02	AECC 2: Environmental Conservation and Sustainable Development	<ul style="list-style-type: none"> • CO1:- Recall the Sustainable Development Goals and their targets. • CO2:- Explain the concept of sustainable development and the importance of the SDGs in addressing global challenges. • CO3:- Apply knowledge of the SDGs to analyze real-world issues and propose solutions. • CO4:- Analyze the interconnections between 	2	Evaluation by Remarks	



			<p>different SDGs and their impact on various communities and regions.</p> <ul style="list-style-type: none"> • CO5:- Evaluate the progress made towards achieving the SDGs and the challenges faced in implementation. 			
II	21AEHV03	AECC 3: Human Values for Holistic Living	<ul style="list-style-type: none"> • CO1:- Recall basic guidelines of value education and understand the basic aspirations. • CO2:- Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. • CO3:- Identify the relations between human-human and they have the ability to fulfill the expectations in relations. • CO4:- Understand required skills to understand the laws of nature. 	3	Evaluation by Remarks	
II	21AEFS201	FS 3: Career Acceleration Program	<ul style="list-style-type: none"> • CO1:- Recognize the message coming through different channels. • CO2:- Understand the given situation to think critically, logically and creatively and deal accordingly based on that. • CO3:- Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others. • CO4:- Reframe personality & right attitude through traditional Soft skills. 	-	Cumulative evaluation at the end of Semester VII	
III	21UHSM201	HSM 3: Multivariate Calculus and Differential Equations	<ul style="list-style-type: none"> • CO 1:- Understand the Higher Order Differential Equations • CO 2:- Understand and apply the Laplace transforms for solving various differential equations • CO 3:- Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts. 	4	40	60



			<ul style="list-style-type: none"> • CO 4:- Apply the knowledge to calculate double and triple integral using various integration techniques. • CO 5:- Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus 			
III	21UHSM301	HSM 4: Numerical Techniques for Engineers	<ul style="list-style-type: none"> • CO 1:- Apply the concepts and principles in basic numerical approximation in well-defined contexts beyond those in which they were first studied, showing the ability to evaluate critically the appropriateness of different tools and techniques. • CO 2:- Demonstrate the capability to use a range of established techniques and a reasonable level of skill in calculation and manipulation of the material to solve problems in the following areas: root finding, interpolation, numerical quadrature, finite differences, and initial-value problems for ODEs. • CO 3:- Compare the viability of different approaches to the numerical solution of problems arising in roots of solution of non-linear equations, interpolation and approximation, numerical differentiation and integration, solution of linear systems. • CO 4:- Demonstrate knowledge and critical understanding of the well-established principles within a wide range of basic numerical methods, including iterative methods • CO 5:- Develop and apply the appropriate numerical techniques for a given problem, interpret the results, and assess accuracy 	4	40	60
III	21BTEECC301	Core 2: DC Machine & Transformer	<ul style="list-style-type: none"> • CO1:- Understand how Electromagnetic torque is generated and the basic principle of DC machine. • CO2:- Analyze the performance of DC generator 	4	40	60



			<ul style="list-style-type: none"> and DC motor. CO3:- Analyze the performance of Single phase transformer. CO4:- Analyze the performance of poly phase transformer. 			
III	21BTEECC302	Core 3: Electrical & Electronic Measuring Instruments (F)	<ul style="list-style-type: none"> CO1:- Define measurement parameters and methods, standards, characteristics, errors. CO2:- Gain knowledge on different voltmeters, multimeter, wave analyzers CO3:- Utilization, operation and maintenance of various instruments for generation CO4:- Use various measuring electronics instruments and measurement methods in electronic systems. 	3	40	60
III	21BTEECC303	Core 4: Analog Electronics	<ul style="list-style-type: none"> CO1:- Understand the concept of semiconductor. CO2:- Understand the different configurations of transistor and amplifiers. CO3:- To test and design the circuits with op-amps and other electronics components for different applications. CO4:- To test and design circuit using different ICs. 	4	40	60
III	21BTEECC304	Core 5: Electrical Power Generation (F)	<ul style="list-style-type: none"> CO1:- An understanding of basic abstractions of electrical power generations from conventional and non-conventional sources of energy. CO2:- The capability to use abstractions to comprehend and analyze the impact of various system on environments and economics aspects of energy generation CO3:- Evaluate and understand power generation technology using non-conventional energy sources CO4:- The capability to incorporate the 	3	40	60



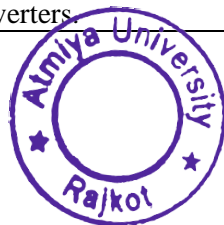
			knowledge of electrical power generation in other field of engineering & economics.			
III	21AECC019	Renewable Energy Sources	<ul style="list-style-type: none"> • CO1:- Understand of renewable and non-renewable sources of energy • CO2:- Gain knowledge about working principle of various solar energy systems • CO3:- Understand the application of wind energy and wind energy conversion system. • CO4:- Develop capability to do basic design of bio gas plant. • CO5:- Understand the applications of different renewable energy sources like ocean thermal, hydro, geothermal energy etc. 	2	40	60
IV	21UHSM402	HSM 5: Advanced Mathematics and Statistics for Electrical Engineering	<ul style="list-style-type: none"> • CO 1:- To develop a strategic approach to organizing data and calculate the measure of central tendency. • CO 2:- To identify the direction and strength of correlation and regression between two variables. • CO 3:- To calculate probabilities by applying probability laws and theoretical results. • CO 4:- Familiarize with the concepts of Fourier Transform and apply transform techniques to analyze continuous time and discrete time. • CO 5:- To understand the concept of network analysis in time and frequency domains. 	4	40	60
IV	21BTECC401	Core 6: Rotating AC Machines	<ul style="list-style-type: none"> • CO1:- Understand the working of three phase induction motor. • CO2:- Understand the principle of induction generator. • CO3:- Analyze the performance of three phase induction motor. • CO4:- Analyze the performance of 	4	40	60



			Synchronous machine.			
IV	21BTEECC402	Core 7: Digital Electronics & Microprocessor	<ul style="list-style-type: none"> • CO1:- Convert different type of codes and number systems which are used in digital communication and computer systems. • CO2:- Employ the codes and number systems converting circuits and compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency. • CO3:- Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods. • CO 4:- Design different types of with and without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints. 	4	40	60
IV	21BTEECC403	Core 8: Electromagnetic Theory	<ul style="list-style-type: none"> • CO 1:- Analyze the electromagnetic waves using divergence theorem and stock theorem. • CO 2:- Analyze the electromagnetic waves using Maxwell's equations, Poisson's and Laplace equations. • CO 3:- Determine skin effect, Hall Effect, pointing vector, and standing wave ratio of electromagnetic waves. • CO 4:- Describe and analyze electromagnetic wave propagation in free-space, dielectrics and conductors. 	4	40	60



IV	21BTEECC404	Core 9: Circuits and Networks	<ul style="list-style-type: none"> • CO 1:- Apply the basics of circuit analysis • CO 2:- Solve D.C. and A.C. circuits by using KVL and KCL • CO 3:- Apply theorems for finding the solutions of network problems • CO 4:- Understand the basic graph theory 	4	40	60
IV	21UTDE005	TDE 1: Energy Conservation	<ul style="list-style-type: none"> • CO 1:- Identify the green energy in Indian scenario. • CO 2:- Carry out green energy generation scheme of an industry/Organization. • CO 3:- Draw the energy flow diagram of an industry and identify the green energy. • CO 4:- Select appropriate green energy conservation method to reduce the wastage of energy • CO 5:- Evaluate the techno economic feasibility of the green energy technique adopted. 	1	100	-
IV	21UHSMG402	HSM 6: Engineering Economics and Management	<ul style="list-style-type: none"> • CO 1:- To introduce economics, its types and its impact. • CO 2:- To learn production management and various laws associated with production. • CO 3:- To learn the fundamental principles of management. • CO 4:- To understand the functions of management. • CO 5:- To learn the types of management. 	2	40	60
V	21BTEECC501	Core10: Power Electronics -I	<ul style="list-style-type: none"> • CO 1:- Explain the construction and characteristics of Power semiconductor devices and fundamental of thyristors and family. • CO 2:- Analyze, operate and design ac-to-dc converters. • CO 3:- Analyze, operate and design dc-to-dc converters. 	3	40	60



			<ul style="list-style-type: none"> • CO 4:- Simulate power electronic converters and their control scheme. 			
V	21BTEECC506	Core Practical 2: Power Electronics-I	<ul style="list-style-type: none"> • CO 1:- Explain the construction and characteristics of Power semiconductor devices and fundamental of thyristors and family. • CO 2:- Analyze, operate and design ac-to-dc converters. • CO 3:- Analyze, operate and design dc-to-dc converters. • CO 4:- Simulate power electronic converters and their control scheme. 	1	40	60
V	21BTEECC502	Core 11: Elements of Electrical Design	<ul style="list-style-type: none"> • CO 1:- Explain the basic principles of electrical machine design with relevant applications • CO 2:- Design the electrical equipment like small transformers, choke coils, starters and field regulators • CO 3:- Develop the winding diagrams for AC and DC machines as per specifications • CO 4:- Compute the cost of wiring for residential, commercial and industrial premises 	3	40	60
V	21BTEECC503	Core 12: Electrical Power System - I	<ul style="list-style-type: none"> • CO 1:- Understand Supply Systems • CO 2:- Explain mechanical design of transmission line • CO 3:- Analyze the representation of different power system components and loading capability of a generator • CO 4:- Calculation of line parameters (Resistance, inductance and capacitance) 	4	40	60
V	21BTEECC504	Core 13: Control System Engineering (F)	<ul style="list-style-type: none"> • CO 1:- Study the components and their representation of control systems. • CO 2:- Define and explain feedback and feed-forward control architecture and discuss the importance of performance, robustness and stability in control design 	4	40	60



			<ul style="list-style-type: none"> • CO 3:- Compute stability of linear systems using the Routh array test and use this to generate control design constraints • CO 4:- Compute gain and phase margins from Bode diagrams and Nyquist plots and understand their implications in terms of robust stability 			
V	21BTEECC505	Core 14: Utilization of Electrical Energy & Traction (Self Study)	<ul style="list-style-type: none"> • CO 1:- Understand the power electronics technology in efficient utilization of electrical power • CO 2:- Apply power electronics technology in efficient utilization of electrical power • CO 3:- Analyze effective utilization of Power Electronic Technologies in Electrical Traction. • CO 4:- Evaluate the use of Power Electronic Technologies in various process controls. 	3	40	60
VI	21BTEECC601	Core 15: Power Electronics-II (Ap)	<ul style="list-style-type: none"> • CO 1:- Analyze, operate and design dc-to-ac inverters. • CO 2:- Analyze, operate and design ac-to-ac converters with voltage control & frequency control. • CO 3:- Apply the knowledge of power electronic converter for speed control of AC motors. • CO 4:- Simulate power electronic converters and their control scheme. 	3	40	60
VI	21BTEECC604	Core Practical 3: Power Electronics-II (Ap)	<ul style="list-style-type: none"> • CO 1:- Analyze, operate and design dc-to-ac inverters. • CO 2:- Analyze, operate and design ac-to-ac converters with voltage control & frequency control. • CO 3:- Apply the knowledge of power electronic converter for speed control of AC motors. • CO 4:- Simulate power electronic converters and their control scheme. 	1	60	



VI	21BTEECC602	Core 16: Electrical Machine Design- I (Ap)	<ul style="list-style-type: none"> • CO 1:- To understand the fundamentals of electrical circuits and thermal circuits of cooling method • CO 2:- To understand electrical and magnetic loading, types and design of winding • CO 3:- To understand the concept of air-gap length design, MMF calculations, magnetizing components, etc • CO 4:- To understand the transformer design, output equation, design dimension of core and yoke. • CO 5:- To understand core loss, winding resistance and leakage reactance and parameters' effect on performance 	1	40	60
VI	21BTEECC605	Core Practical 4: Electrical Machine Design- I (Ap)	<ul style="list-style-type: none"> • CO 1:- To understand the fundamentals of electrical circuits and thermal circuits of cooling method • CO 2:- To understand electrical and magnetic loading, types and design of winding • CO 3:- To understand the concept of air-gap length design, MMF calculations, magnetizing components, etc • CO 4:- To understand the transformer design, output equation, design dimension of core and yoke. • CO 5:- To understand core loss, winding resistance and leakage reactance and parameters' effect on performance 	2	60	



VI	21BTEECL601	Core Elective 1 : Advance Electrical Machines (Ad)	<ul style="list-style-type: none"> • CO 1:- Analyze and apply the concept of steady state analysis and electrical transients in polyphase machines. • CO 2:- Examine the starting and running performance of single phase induction motor and revolving field theory. • CO 3:- Make use of various speed control system for AC motors. • CO 4:- Evaluate the basic operation and performance of special machines and can select special machines for different purpose. 	4	40	60
VI	21BTEECL602	Core Elective 1: Advance Micro-controllers (Ad)	<ul style="list-style-type: none"> • CO 1:- Proficiency In Advanced Microcontroller Programming Using Languages Like C/C++ And Assembly. • CO 2:- Understanding Internal Architecture, Memory Management, I/O Ports, Timers, Interrupts, And Communication Interfaces. • CO 3:- Design And Implementation Of Embedded Systems For Specific Applications. • CO 4:- Knowledge Of Real-Time Operating Systems (RTOS) For Microcontrollers. • CO 5:- Interfacing Microcontrollers With Peripherals And External Devices. 	4	60	
VI	21UFEDE603	DSE 2: Signals & Systems	<ul style="list-style-type: none"> • CO 1:- Understand various types of signals, classify, analyse, and perform various operations on them. • CO 2:- Understand about various types of systems, classify, analyse, and understand its response behaviour. • CO 3:- Appreciate use of transforms in analysis of signals and systems. • CO 4:- Carry simulation on signals and systems for observing the effects of applying various properties and operations. 	4	40	60



			<ul style="list-style-type: none"> • CO 5:- Design of the system from the available input signals and expected output signals of the industrial model. 			
VI	21BTEECC603	Core 17: Electrical Power System - II (Ap)	<ul style="list-style-type: none"> • CO 1:- Understand the performance of transmission line. • CO 5:- Understand the faults in a transmission line. • CO 3:- Analyze the RL series transient condition in a transmission line. • CO 4:- Analyze the fault in a transmission line. 	3	40	60



Faculty of Engineering & Technology
Department of Civil Engineering
Program: PhD Civil Engineering

Program Objective:

Department of Civil Engineering offered courses are designed such that students will have driving force towards the skill development part so far as application areas of the civil engineering are concerned. The students will be able to apply the fundamentals of civil engineering in the design and understanding of various civil engineering works and ethics.

The Program Objectives are that the students will be able to:

- To impart quality education and knowledge in contemporary science and technology to meet the challenges in the field of civil engineering.
- To apply acquired skills in developing safe, sustainable, economical and environmentally sound solutions to civil engineering problems either within the profession or in other activities.
- To inculcate the sense of ethics, morality, creativity, leadership, professionalism, self-confidence and independent thinking.
- To promote lifelong self-learning abilities for gaining multidisciplinary knowledge through projects and industrial training which adheres with the social needs.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgment about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Lifelong Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking\



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO 1	:	Core competency: will impart quality education and knowledge in contemporary science and technology to meet the challenges in the field of civil engineering.
PEO 2	:	Breadth of knowledge: will develop futuristic problem-solving thinking with advance tools and can apply as a multi-disciplinary approach in the field of civil engineering and other domains.
PEO 3	:	Preparedness: will apply acquired skills in developing safe, sustainable, economical and environmentally sound solutions to civil engineering problems either within the profession or in other activities.
PEO 4	:	Professionalism: will inculcate the sense of ethics, morality, creativity, leadership, professionalism, self-confidence and independent thinking.
PEO 5	:	Learning environment: will promote lifelong self-learning abilities for gaining multidisciplinary knowledge through projects and industrial training to meet the social needs.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO 1	:	Domain knowledge: Demonstrate competence with engineering fundamentals and specialized engineering knowledge appropriate to the program.
PO 2	:	Problem analysis: Identify and analyze experiments, as well as to evaluate and understand data in Civil Engineering to solve complex engineering problems in order to reach substantiated conclusions.
PO 3	:	Design/development of solutions: Design solutions for complex, open-ended engineering problems and to design



		systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
PO 4	:	Conduct investigations of complex problems: Investigate of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.
PO 5	:	Modern tool usage: Use the techniques, skills, and modern engineering tools necessary for engineering practice.
PO 6	:	The Civil Engineering Professional and society: Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts.
PO 7	:	Environment and sustainability: To analyze social and environmental aspects of engineering activities that includes an understanding of the interactions with the economic, social, health, safety, legal, and cultural aspects of society.
PO 8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices.
PO 9	:	Individual and team work: To work effectively as a member and leader in teams, preferably in a multi-disciplinary environment.
PO 10	:	Communication: To communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
PO 11	:	Project management and finance: To use project and finance management tools to control and execute various projects.



PO 12	:	Life-long learning: Recognition of the need for, and an ability to engage in life-long learning.
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Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO 1	:	Proficient with engineering fundamentals and specialized engineering knowledge appropriate to the program.
PSO 2	:	Identify and analyze experiments, as well as to evaluate and investigate data in Civil Engineering to solve complex engineering problems in order to reach substantiated conclusions.
PSO 3	:	Design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
PSO 4	:	Use the advance techniques, skills, and modern engineering tools necessary for trans-disciplinary engineering practice.
PSO 5	:	Establish leadership quality to set up multidisciplinary ventures & research-based projects through lifelong learning.

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
II	19PCIDC201 19PCIDC202 19PCIDC203 19PCIDC204 21PCIDC201	DSE-Core I Design of RC Structure II – Pavement Design & Maintenance III – Water Supply &	<ol style="list-style-type: none"> Understand various design philosophy to be used in the design of structural elements and understanding of Indian Standards. Design various structural elements. Design of Foundation of RC structures. To get exposed to the design of structures and structural elements using various codes of practice. 	4	30	70



		<p>Sanitary System IV – Disaster Planning & Mitigation V- Concrete Technology</p>	<p>5. Design & detail RC structures like Retaining Walls.</p> <ol style="list-style-type: none"> 1. Understand basic knowledge of pavement. 2. Identify and check various highway materials and its properties. 3. Design the flexible pavement and its structure. 4. Analysis and design the rigid pavement and its joint. 5. Know pavement distresses, failures, and mitigation measures. <ol style="list-style-type: none"> 1. Get acquainted with different components of Water Supply Scheme. 2. Determine various water and Wastewater quality and different parameters. 3. Design drainage network for buildings and towns. 4. Design different units of Water and Wastewater Treatment Plant. <ol style="list-style-type: none"> 1. Understand disasters, disaster preparedness and mitigation measures 2. Understand role of IT, remote sensing, GIS and GPS in risk reduction 3. Understand disaster management acts and guidelines along with role of various stack-holders during disasters <ol style="list-style-type: none"> 1. Determine the properties of raw material of concrete 2. Determine the properties of fresh and hardened concrete. 3. Design the concrete mix using IS code methods 4. Design special concretes and their specific applications for special market requirements. 5. Test all the concrete materials as per IS code. 			
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Department of Civil Engineering
M. Tech Civil Engineering

Program Objective:

Courses offered in this program are designed such that students will have driving force towards the skill development part so far as application areas of the civil engineering are concerned. The students will be able to apply the fundamentals of civil engineering in the design and understanding of various Transportation engineering works and ethics.

The Program Objectives are that the students will be able to:

- To impart quality education and knowledge in contemporary science and technology to meet the challenges in the field of Transportation Engineering.
- Develop an understanding of the multidisciplinary approach and an ability to relate engineering issues to broader social and human context, in which their engineering contributions will be utilized.
- Communicate their ideas to be effective in collaboration with other members of civil engineering teams.
- Excel in professional career in rapidly changing world of transportation engineering due to advances in the technologies and/or higher education by acquiring knowledge in area of Civil engineering.

Graduate Attributes:

- **Core Competence:** Possess discipline-relevant knowledge and competencies and able to link them to local, national and global issues to seek positive and sustainable solutions
- **Transferable global & impactful societal skills:** Ability to create knowledge through research and innovations by social immersions and transferring them to impact through problem solving at local and global levels.



- **Adaptability and Resilience:** Demonstrate resilience, perseverance and positivity in unfamiliar situations and adapt their skills and knowledge to excel in new environment
- **Sense of purpose & curiosity:** Possess intellectual curiosity to apply the knowledge to generate, develop and realize new ideas
- **Ethics & lifelong immersive learning:** Adhered to highest standards of ethics and always amenable to new ideas and actively seek out new ways of learning

Program Educational Objectives (PEOs):

Our programme will produce Post Graduates who:		
PEO1	:	Depth and breadth of knowledge: will be capable to creatively apply the knowledge of transportation engineering as well as other related discipline for their professional and research career.
PEO2	:	Practice, Operation and usage of modern tools and technology: will impart quality education and knowledge in contemporary science and technology to meet the challenges in the field of Transportation Engineering.
PEO3	:	Professional capacity and passion of learning: are flexible and adaptable in different work environments, prepared to acquire, develop, employ and integrate new technologies and exhibit leadership and team work quality.
PEO4	:	Research, numeracy, scholarship and data literacy: will exhibit ethical behaviour consistent with academic honesty and use of appropriate guidelines and procedures with responsible conduct of research.
PEO5	:	Global, moral and aesthetic sustainability: will have love for learning in pursuance of excellence in all domains of life.



Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO 1	:	Domain knowledge: Acquire in-depth theoretical and technical competence in transportation engineering discipline
PO 2	:	Problem analysis: Identify and analyze experiments, as well as to evaluate and understand data in transportation engineering to solve complex field problems in order to reach substantiated conclusions
PO 3	:	Conduct investigations of complex problems: To develop ability as a practice of transportation engineer using up-to-date techniques, skills, and tools as a result of life-long learning ability to design and conduct experiments, as well as to analyze and interpret data.
PO 4	:	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern tools for research or production purpose with an understanding of the limitations.
PO 5	:	Environment and sustainability: Analyse global environmental problems and critically evaluate evidence to formulate and organize sustainable strategies.
PO 6	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the transportation engineering practice.
PO 7	:	Individual and team work: Exhibit leadership qualities with ability to function effectively as an individual and in a team.
PO 8	:	Communication: Ability to present transportation engineering research results to a technically literate audience by means of an oral presentation, scientific poster or a written report.
PO 9	:	Life-long learning: Able to integrate and appraise information/knowledge from a variety of sources throughout the life



Programme Specific Outcome (PSOs):

After completion of the programme the Post graduate will:		
PSO 1	:	Design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
PSO 2	:	Be able to apply the acquired knowledge to provide cost-effective and sustainable solutions in transportation engineering.
PSO 3	:	Use the advance techniques, skills, and modern engineering tools necessary for trans-disciplinary engineering practice.
PSO 4	:	Establish leadership quality to set up multidisciplinary ventures & research-based projects through lifelong learning.

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21MCITCC101	Core 1: Urban Transportation Planning	<ol style="list-style-type: none"> 1. Basic understanding of urban transportation planning and its theoretical backgrounds and applications. 2. Enhance Skill for collecting data about travel behavior and analyzing the data for use in transport planning. 3. Carry out trip generation and trip distribution forecasting. 4. Conducted modal split and route assignment analysis. 5. Understand the important concepts about public transport system. 	4	30	70
I	21MCITCC102	Core 2: Pavement Material & Construction	<ol style="list-style-type: none"> 1. Understanding of physical and structural characteristics of soil subgrade in road construction. 2. Identify and understanding the quality and gradation of material used in construction. 	3	30	70



			<ol style="list-style-type: none"> Understanding the importance of bitumen material, bituminous mix and its quality required in road construction. Designing the cement concrete mix, its properties, quality and its properties required in road construction. Imparts the knowledge of futuristic pavement materials and types of road construction. 			
I	21MCITCC103	Core 3: Road Safety System	<ol style="list-style-type: none"> To impart basic knowledge in technical areas of road safety engineering, traffic engineering and road design To create a road safety audit team and how to conduct a road safety audit Discuss how to collect data to assess the performance of roads. To give an idea/ a solution for mitigation measures for improving traffic safety and environment. Understand how technology can be utilized to enhance operations and safety of roads. 	4	30	70
I	21MCITCC104	Practical Core 1: Pavement Material & Construction	<ol style="list-style-type: none"> Understanding of physical and structural characteristics of soil subgrade in road construction. Identify and understanding the quality and gradation of aggregate material used in road construction. Understanding the importance of bitumen material, bituminous mix and its quality required in road construction. Designing the cement concrete mix, its properties, quality and its properties required in road construction. Imparts the knowledge of futuristic pavement materials and different types of road pavement construction. 	1	20	30
I	21MCITCC105	Practical Core 2: Research Methodology	<ol style="list-style-type: none"> Design a quality literature review and find the research gap. Identify an original and relevant problem and identify methods to find its solution Understanding the problem formulation, modelling by analytical method or experimental set up, validating the model 	1	20	30



			<ol style="list-style-type: none"> 4. Recognize the solution obtained in an effective manner in written or spoken form also justify the problem solution. 5. Apply skill for technical writing with facts, rules, ideas and concepts. 			
II	21MCITCC201	Core 4: Traffic Engineering & Modelling(Adv)	<ol style="list-style-type: none"> 1. To provide detailed knowledge of traffic flow characteristics, measurement techniques and analysis. 2. To train the students, how to find the highway capacity and level of service. 3. To make aware of traffic planning, design and management techniques and impacts of traffic. 4. To impart the concepts of design of traffic control devices and traffic infrastructures. 5. Impart the knowledge of different technique regarding to improve safety, comfort & Economy. 	4	30	70
II	21MCITCC202	Core 5: Pavement Analysis & Design (Adv)	<ol style="list-style-type: none"> 1. Understanding basic pavement types and loading pattern. 2. Carry out the flexible pavement design. 3. Carry out the rigid pavement design and joint of rigid pavement. 4. Apply the knowledge on pavement evaluation techniques and distress measurement techniques. 5. Designing the overlay of pavement methods. 	4	30	70
II	21MCITCC203	Core 6: Transport Economics(Adv)	<ol style="list-style-type: none"> 1. Understanding of economic aspects of cost-benefit analysis and examines how an economic analysis fits into a complete cost-benefit analysis. 2. Estimation of vehicular operation cost, Travel time saving to check the viability of projects. 3. To understand the different concepts, and principles of transport economics for effective decision making. 4. To make the students conversant with economic and financial analysis of transportation projects. 5. To evaluate and apply appropriate analytic techniques and methods in transport utility. 	4	30	70
II	21MCITCC204	Core 7: Environment Impact	<ol style="list-style-type: none"> 1. Understanding basic environment science & components 	4	30	70



		Assessment(Ap)	<ol style="list-style-type: none"> Identify and assessment of Impact on Air Environment Identify and assessment of Impact on noise Environment Understand and carry out the EIA process. Imparts the knowledge on EA process 			
III	21MCITCC301	Core 8 : Signal Designing and Roadway Capacity (Self-Study) (Ap)	<ol style="list-style-type: none"> Imparts the knowledge of traffic signal and importance of it. Identify and evaluate the data requirement of signal design. Design of road traffic signal. Impart the concepts of traffic flow estimation. Estimation the Level of service for urban road. 	3	30	70
III	21MCITDC301/ 21MCITDC302	DSE Core 1: Waterway Transport System-Planning & Design / Rail Transport System-Planning & Design (Adv)	<ol style="list-style-type: none"> Enhance the knowledge of Docks and Harbour Engineering for the water transportation in the context of regional and intercontinental transportation. Understand an impact of various natural phenomena on component of harbour infrastructures. Know techniques of planning and designing the infrastructures required for Harbour and Port area. Know importance of docks, locks and port amenities at harbour. Be aware of the navigation aids & harbour maintenance. Imparts knowledge on railway system and design of railway gauge, railway alignment and track components. Understanding and design the geometric of railway track. Understanding and design of railway points, crossings, signaling & interlocking. Understanding and planning of railway Station, Yard and Maintenance. Identify the railway accident and design safety measure to prevent railway accident. 	4	30	70
IV	21MCITDC401/ 21MCITDC402	DSE Core 2: Airport System-Planning &	<ol style="list-style-type: none"> Understanding the development and organization of aviation system and aircraft components. 	4	30	70



		Design/ Mass Transit System	<ol style="list-style-type: none"> 2. Planning the airport master plan and regional plan. 3. Design the runway orientation, runway length and runway geometric. 4. Design the taxiway orientation, fillets, exit taxiway orientation, holding apron and geometrics of taxiway. 5. Planning the terminal building and area, airport layout and air traffic control unit in the airport. <ol style="list-style-type: none"> 1. Learn about the fundamental of mass transit system. 2. Impart the techniques for demographic and employment forecasting models. 3. Be familiar with problems and solution of transit routing and networking. 4. Imparts the knowledge of scheduling of mass transit system. 5. Conversant with mass transit terminal facilities. 			
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Department of Civil Engineering
Program: B. Tech Civil Engineering

Program Objective:

Department of Civil Engineering offered courses are designed such that students will have driving force towards the skill development part so far as application areas of the civil engineering are concerned. The students will be able to apply the fundamentals of civil engineering in the design and understanding of various civil engineering works and ethics.

The Program Objectives are that the students will be able to:

- To impart quality education and knowledge in contemporary science and technology to meet the challenges in the field of civil engineering.
- To apply acquired skills in developing safe, sustainable, economical and environmentally sound solutions to civil engineering problems either within the profession or in other activities.
- To inculcate the sense of ethics, morality, creativity, leadership, professionalism, self-confidence and independent thinking.
- To promote lifelong self-learning abilities for gaining multidisciplinary knowledge through projects and industrial training which adheres with the social needs.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgment about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Lifelong Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking\



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO 1	:	Core competency: will impart quality education and knowledge in contemporary science and technology to meet the challenges in the field of civil engineering.
PEO 2	:	Breadth of knowledge: will develop futuristic problem-solving thinking with advance tools and can apply as a multi-disciplinary approach in the field of civil engineering and other domains.
PEO 3	:	Preparedness: will apply acquired skills in developing safe, sustainable, economical and environmentally sound solutions to civil engineering problems either within the profession or in other activities.
PEO 4	:	Professionalism: will inculcate the sense of ethics, morality, creativity, leadership, professionalism, self-confidence and independent thinking.
PEO 5	:	Learning environment: will promote lifelong self-learning abilities for gaining multidisciplinary knowledge through projects and industrial training to meet the social needs.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO 1	:	Domain knowledge: Demonstrate competence with engineering fundamentals and specialized engineering knowledge appropriate to the program.
PO 2	:	Problem analysis: Identify and analyze experiments, as well as to evaluate and understand data in Civil Engineering to solve complex engineering problems in order to reach substantiated conclusions.
PO 3	:	Design/development of solutions: Design solutions for complex, open-ended engineering problems and to design



		systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
PO 4	:	Conduct investigations of complex problems: Investigate of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.
PO 5	:	Modern tool usage: Use the techniques, skills, and modern engineering tools necessary for engineering practice.
PO 6	:	The Civil Engineering Professional and society: Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts.
PO 7	:	Environment and sustainability: To analyze social and environmental aspects of engineering activities that includes an understanding of the interactions with the economic, social, health, safety, legal, and cultural aspects of society.
PO 8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices.
PO 9	:	Individual and team work: To work effectively as a member and leader in teams, preferably in a multi-disciplinary environment.
PO 10	:	Communication: To communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.
PO 11	:	Project management and finance: To use project and finance management tools to control and execute various projects.



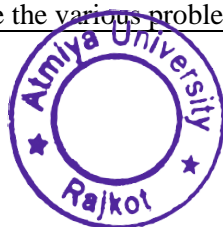
PO 12	:	Life-long learning: Recognition of the need for, and an ability to engage in life-long learning.
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Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO 1	:	Proficient with engineering fundamentals and specialized engineering knowledge appropriate to the program.
PSO 2	:	Identify and analyze experiments, as well as to evaluate and investigate data in Civil Engineering to solve complex engineering problems in order to reach substantiated conclusions.
PSO 3	:	Design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.
PSO 4	:	Use the advance techniques, skills, and modern engineering tools necessary for trans-disciplinary engineering practice.
PSO 5	:	Establish leadership quality to set up multidisciplinary ventures & research based projects through lifelong learning.

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGSH101	Fundamentals of Engineering Mathematics	<ol style="list-style-type: none"> 1. Solve simultaneous linear equations using various methods of Matrix Algebra. 2. Calculate Fourier series of a function 3. Evaluate partial derivatives and can implement to estimate maxima and minima of a function 4. Apply the knowledge of Differential Calculus to solve the various problems in Engineering 	4	50	50



			5. Apply Beta and Gamma functions in solving various mathematical problems			
I	23UGSH140	Effective Communication Skills	<ol style="list-style-type: none"> 1. To listen and comprehend complex academic texts 2. To read and infer the denotative and connotative meanings of technical texts 3. To write definitions, descriptions, narrations and essays on various topics 4. To speak fluently and accurately in formal and informal communicative contexts 5. To express their opinions effectively in both oral and written medium of communication. 	2	50	50
I	23UGCI070	Environmental Conservation & Sustainable Development	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources. 2. Understand importance of natural resources and biological diversity. 3. Understand the sectoral effects on the local, regional, and global environmental issues. 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources. 5. Learn about the major international treaties and our country's stand on and responses to the major international agreements. 	2	Evaluation by Remarks based on CIA	
I	23UGCI101	Applied Civil Engineering	<ol style="list-style-type: none"> 1. Recognize the general terminology related to civil engineering while handling day to day problems of society 2. Apply the fundamentals to find out the various levels, angles situated on the earth 3. Recognize the general terminology related to applied mechanics 4. Understand principles of statics to calculate the various forces 5. Understand the fundamentals of support reactions in beams 	4	90	60
I	23UGCE101	Fundamentals of Computer Programming	1. Have basic knowledge of Computer, System applications and Programming Language	2	100	-



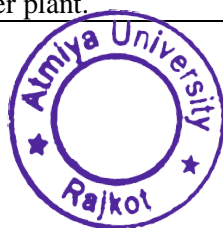
			<ol style="list-style-type: none"> 2. Have knowledge in using C language for solving problems 3. Have knowledge of the syntax and semantics of C programming language 4. Write algorithms and Flow chart for problems 5. Code a given logic of control structure, arrays and string in C language 6. Code a given logic of advanced concept like structure, pointer and union C language 			
I	23UGEC101	Fundamentals of Electronics	<ol style="list-style-type: none"> 1. Explain characteristic and working of basic semiconductor devices like diode, transistor, logic gates and operational amplifier 2. Perform analysis of different electronics circuits based on devices covered in the course and compare their operations. 3. Build and test electronic circuits based on devices covered in the course 4. Explain basic concepts of electronics communication systems. 	3	90	60
I	23UGME102	Engineering Drawing	<ol style="list-style-type: none"> 1. Understand engineering curves with proficiency in tracing the paths of simple machine components. 2. Illustrate the projection of points, lines and planes with different conditions. 3. Develop proficiency in drawing the projections of various solids. 4. Improve the visualization and technical skills for given orthographic views and can apply it in developing new products. 5. Improve the visualization and technical skills in isomeric projections and can apply it in developing new products. 	2	50	50
I	23UGEC102	Tinkering Lab	<ol style="list-style-type: none"> 1. Understanding of the fundamental principles of automation, including microcontroller, development boards, sensors, actuators, embedded systems, logic building and feedback mechanisms. 	1	100	-



			<ol style="list-style-type: none"> 2. Apply the fundamental principles to illustrate the real world problems 3. Select, Interface, Integrate, and troubleshoot different sensors and actuators with the development board. 4. Identify the real world problem and design solution 5. Think creatively and find innovative solutions to automation challenges. 			
II	23UGSH201	Calculus & Higher Order Differential Equation	<ol style="list-style-type: none"> 1. Understand the Higher Order Differential Equations 2. Understand and apply the Laplace transforms for solving various differential equations 3. Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts 4. Apply the knowledge of Calculate double and triple integral using various integration techniques. 5. Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus 	4	50	50
II	23UGSH240	Technical Communication Skills	<ol style="list-style-type: none"> 1. To listen and comprehend complex academic text. 2. To read and infer the denotative and connotative meanings of technical texts. 3. To write definitions, descriptions, narrations, and essays on various topics. 4. To speak fluently and accurately in formal and informal communicative contexts. 5. To express their opinions effectively in both oral and written medium of communication. 	2	50	50
II	23UGUH070	Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self-exploration. 	3	Evaluation by Remarks based on CIA	



			<ol style="list-style-type: none"> 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 			
II	23UGSH102	Engineering Science	<ol style="list-style-type: none"> 1. The student will demonstrate the understanding of basic principles properties and its applications associated with semiconducting materials and specifically LASER. 2. The student will gain knowledge of basic theoretical and practical concept of optical fibre structure and their applications towards telecommunications. (U, A cognitive level) 3. The student will demonstrate the understanding of basic principles properties and its applications associated with electromagnetic waves. (U, A cognitive level) 4. The student will demonstrate understanding of basic theory, properties and applications of batteries, fuel cells and solar cell (U, A cognitive level) 5. The student will gain knowledge of various corrosions and their preventions and the different preparation techniques to characterize various advance engineering materials and their properties. (U, A cognitive level) 	4	90	60
II	23UGEE101	Fundamentals of Electrical Engineering	<ol style="list-style-type: none"> 1. Apply fundamental electrical laws to electrical circuits. 2. Analyze single phase and three phase AC circuits. 3. Describe operating principle and applications of static and rotating electrical machines. 	4	90	60
II	23UGME101	Fundamentals of Mechanical Engineering	<ol style="list-style-type: none"> 1. Infer the scope & application of mechanical engineering & significance of thermodynamic process 2. Understand the vapour power cycle used in thermal power plant. 	4	90	60



			<ol style="list-style-type: none"> 3. Analyze various heat engine cycles and understand Construction & working of Internal Combustion Engine 4. Identify and select various power transmission & motion & their application in Industry. 5. Explain Quality Control and Contemporary Management Concept like 5S,JIT,KAIZAN. 			
II	23UGME103	Engineering Workshop	<ol style="list-style-type: none"> 1. Identify the different materials for construction projects 2. Apply & conduct the various tests on materials. 3. Understand the safety measures and apply for construction work. 4. Understand the basic concepts of building construction as per various code provisions. 5. Optimize the utilization of natural resources towards sustainable development 	1	100	-
II	23UGLI050	Information & Digital Literacy	<ol style="list-style-type: none"> 1. Navigate libraries, conduct proper referencing, and apply APA style. 2. Enroll in MOOCs, understand FOSS, and differentiate between MOOC platforms. 3. Apply note-taking and prewriting strategies, create effective search formulas, and build basic websites. 4. Identify and access scholarly resources, avoid plagiarism, and utilize referencing styles. 5. Demonstrate digital literacy, understand internet safety, and gain introductory knowledge of AI and app development. 	1	100	-



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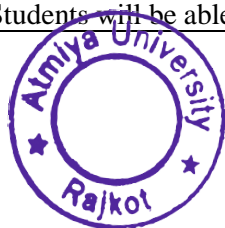
PO 12	:	Life-long learning: Recognition of the need for, and an ability to engage in life-long learning.
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Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
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Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
1	21UHSEN101	Communicative English	<ol style="list-style-type: none"> Students will be able to grasp the basic tools of communication. Students will be able to understand the role of non-verbal elements of communication. Students will be able to exchange their ideas and views precisely and clearly. Students will be able to learn the fundamental 	3	40	60



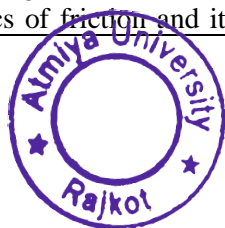
			<p>components of English Grammar and vocabulary.</p> <p>5. Students will be able to inculcate human values through studying literature.</p>			
I	21BTCICC101	Core 1: Fundamentals of Civil Engineering (F)	<p>1. Recognize the general terminology related to civil engineering while handling day to day problems of society</p> <p>2. Understand the different material & its properties</p> <p>3. Apply the fundamentals to find out the various levels, angles situated on the earth</p> <p>4. Understand the different parameters of mass transportation systems.</p> <p>5. Remember & apply the recent technological tools for the harmony of society</p>	4	40	60
I	21UH SMA101	HSM 1: Fundamentals of Mathematics	<p>1. Understand the Fundamental of Differential Equation and Matrix Algebra</p> <p>2. Understand and apply Partial Derivatives</p> <p>3. Understand the application of Matrix Algebra</p> <p>4. Apply the knowledge of Diff. Calculus to solve the various problems in Engineering.</p> <p>5. Solve simultaneous linear equations using various methods of Matrix Algebra.</p>	4	40	60
I	21BTMEIC101	IDC 1: Problem Solving using Programming	<p>1. Understand how to draw flowchart and write an algorithm for any problem.</p> <p>2. Memorize different conditional and loop statement.</p> <p>3. Apply knowledge and programmatically approach to solve a particular problem.</p> <p>4. Explain C Programs using the concept of Function and Array.</p> <p>5. Solve C programs using pointers and structure.</p>	4	40	60
I	21BTCICC102	IDC 2: Fundamentals of Mechanical Engineering	<p>1. Classify various component design & general procedure of design.</p> <p>2. Explain the fundamental laws of Thermodynamics and describe their application in thermal systems like air standard cycles of IC</p>	4	40	60



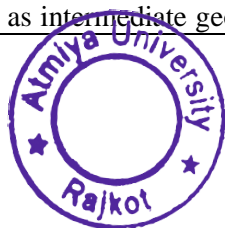
			<p>engines.</p> <ol style="list-style-type: none"> 3. Apply the theoretical concepts of manufacturing process & their application in Industry. 4. Illustrate the Application of AR and VR, Cloud computing, Big Data Analytics, IOT, 3D Printing, Cyber Security in industry. 5. Explain Quality Control and Contemporary Management Concept like 5S,JIT, KAIZAN. 			
I	21BTCICC102	Core Practical 1: Civil Workshop	<ol style="list-style-type: none"> 1. Identify the different materials for construction projects 2. Apply & conduct the various test on materials. 3. Understand the safety measures and apply for construction work. 4. Understand the basic concepts of building construction as per various code provisions. 5. Optimize the utilization of natural resources towards sustainable development 	1	100	-
I	21AESDG01	AECC 1 : Introduction to SDG (online course)		Audit course	Evaluation by Remarks	
I	21AEES01	AECC 2: Environmental Conservation and Sustainable Development	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources. 2. Understand importance of natural resources and biological diversity. 3. Understand the sectoral effects on the local, regional, and global environmental issues. 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources. 5. Learn about the major international treaties and our country's stand on and responses to the major international agreements. 	-	Evaluation at the end of Semester II	
I	21AEHV202	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using 	Evaluation at the end of Semester II		



			<p>self-exploration.</p> <ol style="list-style-type: none"> Identify the relations between human-human and they have the ability to fulfil the expectations in relations. Understand required skills to understand the laws of nature. 			
I	21AEFS101	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> Remember the message coming through different communication channels. Understand the message coming through different communication channels to think critically, logically and creatively. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others. Develop personality & right attitude through communication skills. 	-	-	-
II	21UHSEN201	Technical Communication	<ol style="list-style-type: none"> Gain knowledge and use of the technical English Apply the knowledge of presentation skills to make presentations in their academic and professional life. Learn various aspects of Morphology of English Use the basics of Syntax of English Enrich their language and life skills through studying literature. 	3	40	60
II	21BTCICCC201	Core 2: Basics of Structures	<ol style="list-style-type: none"> Recognize the general terminology related to structural members Understand principles of statics to determine reactions Determine centroid and moment of inertia of a different geometrical shape and able to understand its importance. Apply principles of statics to determine reactions & internal forces in statically determinate beams. Understand the different types of stresses and strains developed in the member subjected to axial, bending, shear, torsion & thermal loads and know basics of friction and its importance through simple 	4	40	60



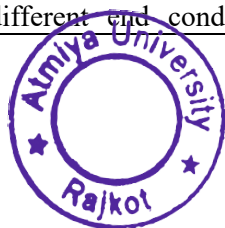
			applications.			
II	21UHSMA201	HSM 2: Multivariate calculus and differential equations	<ol style="list-style-type: none"> 1. Understand the Higher Order Differential Equations 2. Understand and apply the Laplace transforms for solving various differential equations 3. Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts. 4. Apply the knowledge to calculate double and triple integral using various integration techniques. 5. Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus. 	4	40	60
II	21UHSPY201	HSM 3 : Fundamentals of Engineering Physics	<ol style="list-style-type: none"> 1. Understand the Fundamental role of Optical Fiber, Acoustics, Semiconductor Physics and advanced engineering materials and their behavior under various system conditions. 2. Understand and Describe qualitative comparison between various diodes. 3. Identify the Various material testing technologies 4. Apply the knowledge of material science to use various advanced engineering materials to solve the problems in Engineering. 5. Solve the problem of bad acoustics in Auditorium or Cinema hall by using various acoustical solutions. 	4	40	60
II	21BTMEIC201	IDC 3: Fundamentals of Electrical Engineering	<ol style="list-style-type: none"> 1. Apply fundamental electrical laws to electrical circuits. 2. Use Ohm's law, Kirchoff's law and star-delta transformation for solving resistive series, parallel and series-parallel circuits. 3. Define electric field, lines of force, electric field intensity, electric flux, flux density and permittivity. 4. Analyze single phase and three phase AC circuits. 	4	40	60
II	21BTCIC202	IDC 4: Engineering	<ol style="list-style-type: none"> 1. Understand the conventions and construct basic as well as intermediate geometry along with method of 	4	40	60



		Graphics and Computer Drafting	<p>engineering drawing.</p> <ol style="list-style-type: none"> 2. Interpret engineering drawings using fundamental technical mathematics. 3. Construct basic and intermediate geometry by understanding the theory of projection. 4. Improve their visualization skills in orthographic and isometric projections so that they can apply these skills in developing new products. 5. Improve their technical communication skill in the form of communicative drawings. 		
II	21AEES201	AECC 2: Environmental Conservation and Sustainable Development	<ol style="list-style-type: none"> 1. Recall the Sustainable Development Goals and their targets. 2. Explain the concept of sustainable development and the importance of the SDGs in addressing global challenges. 3. Apply knowledge of the SDGs to analyze real-world issues and propose solutions. 4. Analyze the interconnections between different SDGs and their impact on various communities and regions. 5. Evaluate the progress made towards achieving the SDGs and the challenges faced in implementation. 	2	Evaluation by Remarks
II	21AEHV202	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 	3	Evaluation by Remarks
II		FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Recognize the message coming through different channels. 2. Understand the given situation to think critically, logically and creatively and deal accordingly based 	-	Cumulative evaluation at the end of Semester VII



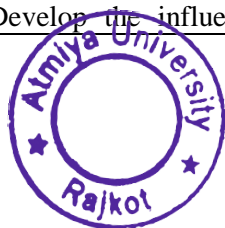
			<p>on that.</p> <p>3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others.</p> <p>4. Reframe personality & right attitude through traditional Soft skills.</p>			
III	21BTCICC301	Core 3: Surveying	<ol style="list-style-type: none"> 1. Identify suitable method for measurement and apply the same depends on the situation in the field 2. Conduct theodolite traverse surveys at any Site 3. Apply knowledge of trigonometric levelling on field 4. Compute area and volume of any surface for planning, plotting and Mapping 5. Understand various types of curves for various field application 	2	40	60
III	21BTCICC302	Core 4: Building Construction	<ol style="list-style-type: none"> 1. To develop the conceptual knowledge in building construction. 2. To select appropriate material in given field situation. 3. To understand basic knowledge about building component 4. To gain various practical knowledge of temporary work and its application. 5. To develop knowledge regarding structural and non-structural components of buildings. 	3	40	60
III	21BTCICC303	Core 5: Mechanics of Structure	<ol style="list-style-type: none"> 1. Understanding behavior of statically determinate and Indeterminate structural elements and apply analysis methods. 2. determine different types of stresses in the Member subjected torsion 3. Understand the mechanism of slope and deflection in beam element. 4. To compute buckling load for long columns with different end conditions using Rankine's and 	4	40	60



			Euler's theory 5. To Compute Forces in Arches and Cable with different End Conditions			
III	21BTCICC304	Core 6: Concrete Technology	<ol style="list-style-type: none"> 1. Determine the properties of raw material of concrete 2. Determine the properties of fresh and hardened concrete. 3. Design the concrete mix using IS code methods 4. Design special concretes and their specific applications for special market requirements. 5. Test all the concrete materials as per IS code. 	4	40	60
III	21BTCICC305	Core Practical 2: Surveying	<ol style="list-style-type: none"> 1. Identify suitable method for measurement and apply the same depends on the situation in the field 2. Conduct theodolite traverse surveys at any Site 3. Apply knowledge of trigonometric levelling on field 4. Compute area and volume of any surface for planning, plotting and Mapping 5. Understand various types of curves for various field application 	2	40	60
III	21UH SMA301	HSM 4: Numerical Techniques for Engineers (Ap)	<ol style="list-style-type: none"> 1. Apply the concepts and principles in basic numerical approximation in well-defined contexts beyond those in which they were first studied, showing the ability to evaluate critically the appropriateness of different tools and techniques. 2. Demonstrate the capability to use a range of established techniques and a reasonable level of skill in calculation and manipulation of the material to solve problems in the following areas: root finding, interpolation, numerical quadrature, finite differences, and initial-value problems for ODEs. 3. Compare the viability of different approaches to the numerical solution of problems arising in roots of solution of non-linear equations, interpolation and approximation numerical differentiation and 	4	40	60



			<p>integration, solution of linear systems.</p> <ol style="list-style-type: none"> 4. Demonstrate knowledge and critical understanding of the well-established principles within a wide range of basic numerical methods, including iterative methods 5. Develop and apply the appropriate numerical techniques for a given problem, interpret the results, and assess accuracy 			
III	21BTCICC306	Core Enrichment 1: Concept to Practice	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written and oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. 5. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 	1	20	-
III		FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Understand the need of 21st century skills, Understand and Analyze the skills through Learning: Critical Thinking, Creativity & Innovation. 2. Understand the leading skills through edge of: Communication, Collaboration and Networking. 3. Understand the skills through digital literacy: Information, Media and Technology Literacy 4. Recall, Understand and Analyze Life Skills : Flexibility and Adaptability, Leadership and Responsibility. 5. Recall, Understand and Analyze Life Skills :Productivity and Accountability, Social and Cross-Cultural Interaction 	-	Cumulative evaluation at the end of Semester VII	
IV	21BTCICC401	Core 7: Structural Analysis	<ol style="list-style-type: none"> 1. Evaluate end actions of indeterminate structures by using Moment distribution method.. 2. Analyze structural element by plastic method 3. Develop the influence lines for indeterminate 	4	40	60



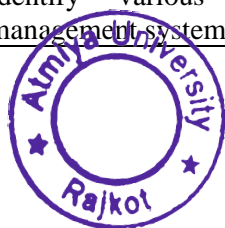
			<p>beams that helps in evaluating end reactions and shear force, bending moment at a particular point for moving loads.</p> <ol style="list-style-type: none"> Determine end reactions using matrix method Evaluate end actions of indeterminate structures by using Energy principle method. 			
IV	21BTCICC402	Core 8: Geotechnical Engineering	<ol style="list-style-type: none"> Classify the soil and will be able to understand its behaviour and will be able to compute/estimate index parameters. Interpret soil behaviour through learning soil compaction, consolidation, and analyse various theories and calculate parameters needed in design. To understand the importance of slope stability and gain knowledge to find factors of/against slope stability. To know different method of sub surface soil Exploration and its application in the field. To know and understand bearing capacity of soil and find out the same for different foundations 	3	40	60
IV	21BTCICC403	Core 9: Transportation Engineering	<ol style="list-style-type: none"> Understanding the importance, scope and mode of transportation engineering. Imparts the knowledge of highway development in India, significant and steps of highway planning, various types of road and patterns. Understanding the importance of highway alignment and various factors and engineering survey involved in the planning of highway alignment. Designing the various geometrics of highway as per standard guideline. Imparts the knowledge of road side development. 	3	40	60
IV	21BTCICC404	Core 10: Geomatics in Surveying	<ol style="list-style-type: none"> Conduct Tacheometry survey in field Apply knowledge of geodetic survey in civil engineering problems. Analyze various mathematical aspect of errors 	3	40	60



			<p>and its resolving techniques</p> <ol style="list-style-type: none"> Use photogrammetric toll for large survey area Apply knowledge of GIS, GPS and remote sensing with modern survey instrument in solving engineering problems. 			
IV	21BTCICC405	Core 11: Advanced Construction Techniques	<ol style="list-style-type: none"> Understand the deferent types of Piles and its application at various places Understand the uses of caisson for different construction sites Understand different condition where coffer dams are require. Execute various conditions where water levels upto the excavation and remedial measure to prevent such conditions. Execute the operations of Demolition of structures with safety false work and form work for Heavy structures. 	3	40	60
IV	21BTCICC406	Core Practical 3: Geotechnical Engineering	<ol style="list-style-type: none"> To know importance of soil properties and methods to determine the properties of Soil. Classification of soil based on various soil properties. To know compression of soil, types of compression and Methods to determine Compaction and Compression of soil. To know about tests to find various soil properties like permeability, Shear strength etc. and perform the same in the laboratory. To know different method of sub surface soil Exploration, its application in the field and its test procedure. 	1	40	60
IV	21UHSMG401	HSM 6: Economics & Business Management	<ol style="list-style-type: none"> To introduce economics, its types and its impact. To learn production management and various laws associated with production. To learn the fundamental principles of management. To understand the functions of management. 	2	40	60



			5. To learn the types of management.			
IV		Core Enrichment 1: Concept to Practice	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written and oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. 5. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 	-	20	
V	21BTCICC501	Core 12: Hydrology and Water Resources Engineering	<ol style="list-style-type: none"> 1. Explain fundamentals of hydrology and water resources engineering 2. Discuss and Identify various precipitation forms with hydrological parameters 3. Explain hydrographs and stream flow measurements 4. Classify reservoirs and its routing techniques 5. Examine and identify ground water hydrology and its parameters 	4	40	60
V	21BTCICC502	Core 13: Pavement Design and Maintenance	<ol style="list-style-type: none"> 1. Interpret the basic knowledge of pavement. 2. Analyse various pavement's material and its properties. 3. Design the flexible pavement and its structure. 4. Design of rigid pavement and its joint. 5. Construct a pavement and evaluate pavement distresses. 	3	40	60
V	21BTCICC503	Core 14: Environment Engineering	<ol style="list-style-type: none"> 1. Understand different types of Pollution Control rules and regulations 2. Evaluate various water and air quality parameters. 3. Understand different quality and different parameters of Wastewater. 4. Identify various parameters solid waste management system 	2	40	60



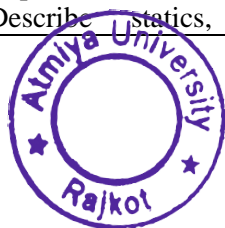
			5. Summarize with various noise pollution prevention techniques.			
V	21BTCICC504	Core 15: Building Planning & Regulation	<ol style="list-style-type: none"> 1. Understand the concept of building and planning methodology. 2. Comprehend local building bye-laws and provisions of National Building Code in respect of building. 3. Discuss various aspects of principles of planning and architecture in planning building and mass composition. 4. Explain the principles of planning and design considerations to construct earthquake resistant building. 5. Understand and able to draw prospective drawing of plan. 	3	40	60
V	21BTCICL501	Core-Elective 1: Repair and Rehabilitation of Structures	<ol style="list-style-type: none"> 1. Explain deterioration of concrete in structures 2. Analyze the maintenance and diagnosis of failure 3. Evaluate various distress and damages to concrete and masonry structures 4. Knowing about different types of special materials used for repair techniques 5. Identifying different types of strengthening techniques used for existing structures 	3	40	60
V	21BTCICL502	Core-Elective 1: Foundation Engineering	<ol style="list-style-type: none"> 1. Select appropriate soil investigation/testing technique/method and get true sub soil parameters used for selection of type of foundation as personal guidelines. 2. Select and design appropriate (Shallow/ Deep) foundation system for different structures, that satisfy the allowable bearing capacity and settlement requirements based on soil properties 3. Design vertical piles and pile groups for various types of loading, soil conditions and settlement requirements. 4. Explain engineering behaviour of expansive soils and selection of suitable foundation type for such 	3	40	60



			<p>soils, suggest suitable type of geosynthetics for various foundation issues and its proper implications.</p> <p>5. Design and analyse retaining walls, sheet piles and diaphragm walls under static loads.</p>			
V	21BTCICL503	Core-Elective 1: Advanced Structural Analysis	<p>1. Evaluate end actions of curved structures</p> <p>2. Analyse and evaluate various dome reaction and behaviour</p> <p>3. Analyse and evaluate on thin cylinder for reaction and behaviour</p> <p>4. Develop the influence lines for indeterminate beams that helps in evaluating end reactions and shear force, bending moment at a particular point for moving loads.</p> <p>5. Understanding of prestressed concrete.</p>	3	40	60
V	21UFEDE501	DSE 1: Disaster Planning & Mitigation	<p>1. Recall the definitions, concepts, and principles related to disaster planning and mitigation.</p> <p>2. Explain the causes, impacts, and types of natural and man-made disasters, as well as the roles and responsibilities of stakeholders in disaster management.</p> <p>3. Apply the principles and practices of disaster management to design and implement effective strategies for preparing for, responding to, and recovering from disasters.</p> <p>4. Analyse the risks and vulnerabilities associated with different types of disasters and use this information to inform decision-making in disaster planning and mitigation.</p> <p>5. Evaluate the effectiveness of different disaster management strategies and make recommendations for improvement.</p>	4	40	60
V	21BTCICC508	Core Practical 4: Environment Engineering	<p>1. Understand different types of equipment used in Environmental Engineering Laboratory for testing of different parameters like air, water noise.</p>	1	40	60



			<ol style="list-style-type: none"> 2. Evaluate various characteristics of drinking water and domestic wastewater and the methods to determine these characteristics. 3. Evaluate the impurities in water. 4. Evaluate different types of air pollutants. 5. Summarize with various noise pollution prevention techniques. 			
V		FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Understand the basic concepts of quantitative ability. 2. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc. 	-	Cumulative evaluation at the end of Semester VII	
VI	21BTCICC601	Core 16: Design of RC Elements	<ol style="list-style-type: none"> 1. Understand various design philosophy to be used in the design of structural elements and understanding of Indian Standards. 2. Design various structural elements. 3. Design of Foundation of RC structures. 4. To get exposed to the design of structures and structural elements using various codes of practice. 5. Design & detail RC structures like Retaining Walls. 	4	40	60
VI	21BTCICC602	Core 17: Water Supply & Sanitary System	<ol style="list-style-type: none"> 1. To understand the function of various units of water supply scheme and apply the knowledge in planning and design of water supply system. 2. To learn designs of various components of water supply scheme. 3. To know about the collection system of sewage. 4. To understand house drainage plans and sewer plans for cities. 5. To understand various methods used for water treatment 	3	40	60
VI	21BTCICC603	Core 18: Mechanics of Fluid	<ol style="list-style-type: none"> 1. Explain the basic concept of fluid mechanics. 2. Describe statics, dynamics and various 	2	40	60



			<p>approaches to fluid mechanics.</p> <ol style="list-style-type: none"> Clarify fundamentals of flow through pipes Demonstrate fundamentals of fluid mechanics with various mechanical systems 			
VI	21BTCICC604	Core 19: Urban Transportation System	<ol style="list-style-type: none"> To Know about urban transportation system planning process. To Know about different types of transportation surveys. Identify and apply suitable techniques for urban transportation modelling. Know about different types of urban mass transit system operation. Analyze problems and recommend suitable urban transportation system plan. 	3	40	60
VI	21BTCICC605	Core 20: Basics of Seismology (Self Study)	<ol style="list-style-type: none"> Acquire basic knowledge of engineering seismology Recognize the theoretical and practical aspects of earthquake engineering along with the planning, design and detailing aspect. Understanding of causes and types of damages to civil engineering structures during different earthquake scenarios Identify structural behavior of brick and stone masonry Identify structural behavior of RC Structures 	4	40	60
VI	21BTCICL601	Core-Elective 2: Building Material	<ol style="list-style-type: none"> Recognize the general terminology related to civil engineering Understand the different material & its properties Apply the fundamentals to find out for the ease of various utilities in building Understand the different parameters of material calculation and systems. Remember & apply the recent technological tools for the harmony of society 	3	40	60
VI	21BTCICL602	Core-Elective 2: Engineering Geology	<ol style="list-style-type: none"> To know and understand the internal and outer structure of earth 	3	40	60



			<ol style="list-style-type: none"> 2. To know about geological changes occurring on land, river, sea, glacier, etc. done by the environment. 3. To know about various minerals, their differing properties and also the structure, thereby gaining the knowledge for identifying minerals. 4. To know various technologies used for searching minerals and different geological maps consisting geological disturbances. 5. To gain knowledge about drilling techniques for the extraction of minerals 			
VI	21BTCICL603	Core-Elective 2: Disaster Management	<ol style="list-style-type: none"> 1. Recall the definitions, concepts, and principles related to disaster planning and mitigation. 2. Explain the causes, impacts, and types of natural and man-made disasters, as well as the roles and responsibilities of stakeholders in disaster management. 3. Apply the principles and practices of disaster management to design and implement effective strategies for preparing for, responding to, and recovering from disasters. 4. Analyze the risks and vulnerabilities associated with different types of disasters, and use this information to inform decision-making in disaster planning and mitigation. 5. Evaluate the effectiveness of different disaster management strategies and make recommendations for improvement. 	3	40	60
VI	21BTCICC606	Core Practical 5: Mechanics of Fluid	<ol style="list-style-type: none"> 1. Explain the basic concept of fluid mechanics. 2. Describe statics, dynamics and various approaches to fluid mechanics. 3. Clarify fundamentals of flow through pipes 4. Demonstrate fundamentals of fluid mechanics with various mechanical systems 	1	20	30
VI		Core Enrichment 1: Concept to Practice	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 	1	40	-



			<ol style="list-style-type: none"> 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written or oral form. 4. Demonstrate a sound technical knowledge of their societal problems. 5. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 			
VI		FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Understand the given situation to think critically, logically and creatively and deal accordingly based on that. 2. Apply the knowledge, skills and judgment around human communication that facilitate employability skills. 3. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions. 4. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc. 	-	Cumulative evaluation at the end of Semester VII	



Faculty of Engineering & Technology

Department of Mechanical Engineering

Program: PhD. Mechanical Engineering

Program Objective:

Courses offered in this program are designed such that students will have driving force towards the skill development part so far as application areas of the mechanical engineering are concerned. The students will be able to apply the fundamentals of mechanical engineering in the design and understanding of various machines and manufacturing systems in their modern form. The students will be able to make their way to the society demonstrating ethical and social awareness while making professional decisions with proper scientific and technical knowledge in mechanical engineering. They can able to work in design and analysis of mechanical systems with strong fundamentals and methods of synthesis. They can excel in career by their ability to work and communicate effectively as a team member and/or leader to complete the task with minimal resources, meeting deadlines.

Graduate Attributes:

- **Core Competence:** Possess discipline-relevant knowledge and competencies and able to link them to local, national and global issues to seek positive and sustainable solutions.
- **Transferable global & impactful societal skills:** Ability to create knowledge through research and innovations by social immersions and transferring them to impact through problem solving at local and global levels.
- **Adaptability and Resilience:** Demonstrate resilience, perseverance and positivity in unfamiliar situations and adapt their skills and knowledge to excel in new environment.
- **Sense of purpose & curiosity:** Possess intellectual curiosity to apply the knowledge to generate, develop and realize new ideas.
- **Ethics & lifelong immersive learning:** Adhered to highest standards of ethics and always amenable to new ideas and actively seek out new ways of learning.



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Depth and breadth of knowledge: will be capable to creatively apply the knowledge of production engineering as well as other related discipline for his professional and research career.
PEO2	:	Practice, Operation and usage of modern tools and technology: will contribute in the field of design, health and industries in designing, developing and providing solutions for product/processes/technology development.
PEO3	:	Professional capacity and passion of learning: are flexible and adaptable in different work environments, prepared to acquire, develop, employ and integrate new technologies and exhibit leadership and team work quality.
PEO4	:	Research, numeracy, scholarship and data literacy: will exhibit ethical behaviour consistent with academic honesty and use of appropriate guidelines and procedures with responsible conduct of research.
PEO5	:	Global, moral and aesthetic sustainability: will have love for learning in pursuance of excellence in all domains of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain knowledge: Demonstrate the knowledge of concepts, principles and applications of mechanical engineering in various fields
PO2	:	Problem analysis: Acquire critical thinking skills to understand and solve contemporary problems with mechanical engineering domain knowledge and skills
PO3	:	Conduct investigations of complex problems: Gain ability to design, conduct experiments, analyze and interpret data for investigating problems in mechanical engineering and allied sectors



PO4	:	Modern tool usage: Understand standard operating procedures and acquire in-depth technical competence to handle the basic laboratory instruments of mechanical engineering.
PO5	:	Environment and sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development
PO6	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO7	:	Individual and team work: Able to function effectively as individual and as a member in multidisciplinary settings.
PO8	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large.
PO9	:	Life-long learning: Able to recognize the need to undertake life-long learning and acquire the capacity to do so.

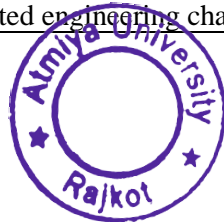
Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply knowledge of Production engineering and related discipline in designing strategies to provide sustainable solutions.
PSO2	:	Analyze the manufacturing processes, tooling, material and the machine tools for quality manufacturing of the products using conventional and advanced techniques.
PSO3	:	Apply productivity improvement methods in organization for optimized resource utilisation.
PSO4	:	Able to gain hands on experience in welding, casting, machining which will make them ready to work in industries and research laboratory.

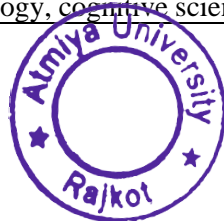


Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credit	CIA	SEE
I	21DPMECC101	Course I - Research Methodology	<ol style="list-style-type: none"> 1. Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling. 2. Develop skills to search online and offline sources to carry out research in mechanical engineering studies. 3. Determine a suitable research area and formulate research questions/problems accordingly, by describing the rationale and research design and apply appropriate statistical tools. Analyze the data collected and conduct research in a more appropriate manner. 4. Interpretation of research based on work carried out and develop skills in thesis writing. 5. Distinguish between various aspects of quantitative, qualitative, and mixed-methods research in mechanical engineering. 	4	30	70
I	21DPMECC102	Course II - Seminar Presentation (Recent Trends in Mechanical Engineering)	<ol style="list-style-type: none"> 1. Understanding of the latest technologies shaping the field of mechanical engineering, such as Industry 4.0 concepts, robotics, automation, additive manufacturing, and advanced materials. 2. Analyze how these trends are reshaping traditional industries like manufacturing, energy, transportation, and healthcare, leading to new opportunities and challenges. 3. Apply advanced software tools and simulation techniques relevant to modern mechanical engineering practices, such as CAD/CAM software, finite element analysis (FEA), computational fluid dynamics (CFD), and machine learning algorithms. 4. Develop skills in problem-solving within complex systems, considering interdisciplinary factors like sustainability, energy efficiency, safety standards, and regulatory compliance. 5. Learn to work effectively in interdisciplinary teams, collaborating with professionals from diverse backgrounds such as electrical engineering, computer science, and materials science to tackle multifaceted engineering challenges. 	1	50	-



II	21DPMEDC201	Course III - Core Elective I – Advancement in Manufacturing Engineering	<ol style="list-style-type: none"> 1. Understand the basics of metal cutting and working of different types of machine tools. 2. Acquire knowledge of different types of non-traditional machining processes. 3. Analyze and access the importance of welding processes in manufacturing. 4. Analyze and access the use of die casting processes in manufacturing and understand the working of various casting processes. 5. Explain the conventional and advanced metal forming processes and composite fabrication. 	4	30	70
II	21DPMEDC202	II – Advancement in Thermal Engineering	<ol style="list-style-type: none"> 1. Evaluate the effectiveness of different heat transfer mechanisms in specific contexts and propose optimized solutions. 2. Analyze the performance of refrigeration and air conditioning systems, considering factors such as energy efficiency, capacity, and refrigerant selection. 3. Utilize numerical methods or computational fluid dynamics (CFD) software to analyze complex gas dynamic phenomena and predict flow behavior. 4. Analyze the factors affecting engine efficiency and emissions, including combustion characteristics, heat transfer losses, and exhaust gas composition. 5. Evaluate the economic feasibility of solar thermal projects, considering factors such as capital costs, operating expenses, and payback periods. 	4	30	70
II	21DPMEDC203	III – Advance Theories of Design	<ol style="list-style-type: none"> 1. Develop the ability to critically analyze various design theories, including their historical context, philosophical underpinnings, and practical implications. 2. Explore and evaluate different theoretical frameworks in design, such as semiotics, structuralism, post-structuralism, phenomenology, and critical theory, and understand how these frameworks inform design practice. 3. Examine design theories from interdisciplinary perspectives, integrating insights from fields such as psychology, sociology, anthropology, cognitive science, and cultural studies. 	4	30	70



			<ol style="list-style-type: none"> 4. Explore their understanding of design thinking processes and methodologies, including divergent and convergent thinking, empathic design, prototyping, and iterative design. 5. Investigate ethical considerations and sustainability principles in design, including social responsibility, environmental impact, cultural sensitivity, and the role of designers as agents of positive change. 			
II	21DPMECC201	Course II - Seminar Presentation (Review of Literature)	<ol style="list-style-type: none"> 1. Identify, access, and evaluate relevant academic literature in their field of study. This includes understanding different types of sources, such as peer-reviewed journals, books, conference papers, and gray literature. 2. Learn to critically analyze and synthesize information from multiple sources, identifying key themes, arguments, methodologies, and gaps in existing research. 3. Identify gaps in the current body of literature and formulate research questions that address these gaps, contributing to the advancement of knowledge in their field. 4. Gain an understanding of various research methodologies used in their discipline, such as qualitative, quantitative, mixed-methods, systematic reviews, and meta-analyses, and how these methodologies are applied in literature reviews. 5. Learn how to effectively present their literature review findings orally or in written form to peers, instructors, or other stakeholders, using appropriate visual aids and communication techniques. 	1	50	-



Department of Mechanical Engineering
Program: M.Tech. Mechanical Engineering (Production)

Program Objective:

Courses offered in this program are designed such that students will have driving force towards the skill development part so far as application areas of the mechanical engineering are concerned. The students will be able to apply the fundamentals of mechanical engineering in the design and understanding of various machines and manufacturing systems in their modern form. The students will be able to make their way to the society demonstrating ethical and social awareness while making professional decisions with proper scientific and technical knowledge in mechanical engineering. They can able to work in design and analysis of mechanical systems with strong fundamentals and methods of synthesis. They can excel in career by their ability to work and communicate effectively as a team member and/or leader to complete the task with minimal resources, meeting deadlines.

Graduate Attributes:

- **Core Competence:** Possess discipline-relevant knowledge and competencies and able to link them to local, national and global issues to seek positive and sustainable solutions.
- **Transferable global & impactful societal skills:** Ability to create knowledge through research and innovations by social immersions and transferring them to impact through problem solving at local and global levels.
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Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Depth and breadth of knowledge: will be capable to creatively apply the knowledge of production engineering as well as other related discipline for his professional and research career.
PEO2	:	Practice, Operation and usage of modern tools and technology: will contribute in the field of design, health and industries in designing, developing and providing solutions for product/processes/technology development.
PEO3	:	Professional capacity and passion of learning: are flexible and adaptable in different work environments, prepared to acquire, develop, employ and integrate new technologies and exhibit leadership and team work quality.
PEO4	:	Research, numeracy, scholarship and data literacy: will exhibit ethical behaviour consistent with academic honesty and use of appropriate guidelines and procedures with responsible conduct of research.
PEO5	:	Global, moral and aesthetic sustainability: will have love for learning in pursuance of excellence in all domains of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain knowledge: Demonstrate the knowledge of concepts, principles and applications of mechanical engineering in various fields
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PO3	:	Conduct investigations of complex problems: Gain ability to design, conduct experiments, analyze and interpret data for investigating problems in mechanical engineering and allied sectors



PO4	:	Modern tool usage: Understand standard operating procedures and acquire in-depth technical competence to handle the basic laboratory instruments of mechanical engineering.
PO5	:	Environment and sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development
PO6	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO7	:	Individual and team work: Able to function effectively as individual and as a member in multidisciplinary settings.
PO8	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large.
PO9	:	Life-long learning: Able to recognize the need to undertake life-long learning and acquire the capacity to do so.

Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Apply knowledge of Production engineering and related discipline in designing strategies to provide sustainable solutions.
PSO2	:	Analyze the manufacturing processes, tooling, material and the machine tools for quality manufacturing of the products using conventional and advanced techniques.
PSO3	:	Apply productivity improvement methods in organization for optimized resource utilisation.
PSO4	:	Able to gain hands on experience in welding, casting, machining which will make them ready to work in industries and research laboratory.



Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credit	CIA	SEE
I	21MMEPCC101	Core 1: CNC Technology & Programming (Ad)	<ol style="list-style-type: none"> 1. Demonstrate the fundamentals of CNC Machine system and their constructional detail. 2. Develop part programming of different components on lathe and milling. 3. Develop part programming of different components on drilling. 4. Explain fundamentals of machine maintenance. 5. Explain the fundamentals of tooling of CNC machines. 	3	40	60
I	21MMEPCC102	Core 2: Advanced Casting Technology(Ad)	<ol style="list-style-type: none"> 1. Explain the casting systems fundamentally and integrate the knowledge of other domains including heat transfer, fluid mechanics and higher engineering mathematics. 2. Inspect and Test for Different Castings. 3. Develop process friendly design. 4. Analyze the casting design with metallurgical aspects of the solidified metals. 5. Apply the statistical quality control tools to develop the quality parts. 	3	40	60
I	21MEEPID103, 21MCITID103	IDC 1: Alternate Energy Sources (Ap)	<ol style="list-style-type: none"> 1. Develop an understanding of different types of renewable and alternative energy sources. 2. Understand the basic principles of the renewable energy techniques. 3. Apply renewable techniques to improve energy products. 4. Carry out preliminary economic analysis of renewable energy systems. 	3	30	70



I	21MMEPCC103	Core Practical 1: CNC Technology & Programming(Ap)	<ol style="list-style-type: none"> 1. Demonstrate the fundamentals of CNC Machine system and their constructional detail. 2. Develop part programming of different components on lathe and milling. 3. Develop part programming of different components on drilling. 4. Explain fundamentals of machine maintenance. 5. Explain the fundamentals of tooling of CNC machines. 	1	40	60
I	21MMEPCC104	Core Practical 2: Advanced Casting Technology(Ap)	<ol style="list-style-type: none"> 1. Explain the casting systems fundamentally and integrate the knowledge of other domains including heat transfer, fluid mechanics and higher engineering mathematics. 2. Inspect and Test for Different Castings. 3. Develop process friendly design. 4. Analyze the casting design with metallurgical aspects of the solidified metals. 5. Apply the statistical quality control tools to develop the quality parts. 	1	40	60
I	21MMEPCC105	Core Practical 3: Research Methodology(Ad)	<ol style="list-style-type: none"> 1. Summarize a quality literature review and find the research gap. 2. Identify an original and relevant problem and identify methods to find its solution. 3. Develop the theory and linkages to interpretation of experimental and analytical results. 4. Explain the solution obtained in an effective manner in written or spoken form. 5. Apply the statistical tool to solve the engineering problems. 	1	40	60
I	21MEEPID103, 21MCITID103	IDC Practical 1: Alternate Energy Sources (Ap)	<ol style="list-style-type: none"> 1. Develop an understanding of different types of renewable and alternative energy sources. 2. Understand the basic principles of the renewable energy techniques. 3. Apply renewable techniques to improve energy products. 4. Carry out preliminary economic analysis of renewable energy systems. 	1	30	70



II	21MMEPCC201	Core 3: Engineering Material Technology(Ad)	<ol style="list-style-type: none"> 1. Explain the elastic and plastic behavior of the material for which it is utilized. 2. Relate all kind of Industrial material like ceramics, polymers & composites. 3. Distinguish between oxidation and reduction electrochemical reactions. 4. Identify the factors over which an engineer has control that affect the cost of a product. 5. Apply the knowledge of corrosion rate to develop the engineering product. 	4	40	60
II	21MMEPCC202	Core 4: Advanced Welding Technology(Ad)	<ol style="list-style-type: none"> 1. Explain the physics involved in welding. 2. Illustrate welding machine characteristics and predict weld ability of Cast Iron, Plain Carbon Steel, Low Alloy Steel, Aluminium and Stainless Steel. 3. Identify pre heat temperature, residual stress and distortion to enhance weld quality. 4. Analyze fracture and fatigue welded joint fracture. 5. Apply the knowledge of welding automation and applications of modern welding technologies. 	3	40	60
II	21MMEPCC203	Core 5: Product Design & Reliability(Ad)	<ol style="list-style-type: none"> 1. Identify the latest materials for different applications. 2. Analyze relationships between material and its properties. 3. Explain different design philosophy used in industry. 4. Explain the concept of value engineering. 5. Analyze the design parameters related to reliability and its importance. 	4	40	60
II	21MMEPCC204	Core 6: Principles of Management(Ap)	<ol style="list-style-type: none"> 1. Interpret how the managerial tasks and behavior can be executed in a variety of circumstances. 2. Explain the most effective action to take for planning and organizing in specific situations. 3. Identify the global context for taking managerial actions of directing and controlling. 4. Analyze the relationship between logistics decisions and the performance of a given firm to identify malpractices prevalent in supply chain management. 	3	40	60



			5. Develop the managerial practices and choices relative to ethical principles and standards aligned with various management tools.			
II	21MEEPID203, 21MCITID203	IDC 2: Quality Engineering (Ap)	<ol style="list-style-type: none"> 1. Understand the basic concept of Quality and related terms. 2. Describe the concept of Total Quality Management & Quality Design. 3. Understand and apply control charts for analysis of observational data. 4. Describe the new concept in Quality. 5. Explore the knowledge in Six sigma concept and design of experiment methods. 	3	30	70
II	21MMEPCC205	Core Practical 4: Advanced Welding Technology(Ap)	<ol style="list-style-type: none"> 1. Select welding consumable based on welding physics phenomenon and identify metal transfer mode. 2. Categorized welding machine characteristics for weldability of Cast Iron, Plain Carbon Steel, Low Alloy Steel, Aluminium and Stainless Steel. 3. Analyze weld heat treatment, weld temperatures, residual stress and distortion for quality weld. 4. Apply the knowledge of welding automation in applications of modern welding technologies. 5. Examine WPS for different welding processes as per ASME section IX. 	2	40	60
II	21MEEPID207, 21MCITID207	IDC Practical 2: Quality Engineering (Ap)	<ol style="list-style-type: none"> 1. Understand the basic concept of Quality and related terms. 2. Describe the concept of Total Quality Management & Quality Design. 3. Understand and apply control charts for analysis of observational data. 4. Describe the new concept in Quality. 5. Explore the knowledge in Six sigma concept and design of experiment methods. 	1	30	70



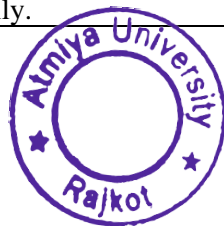
II	21CEWE01	SEC 1: Wisdom & Ethics for Success in Life (WESL)	<ol style="list-style-type: none"> 1. Differentiate the career success, academic success and life success 2. Differentiate the career success, academic success and life success 3. Understand that the relationships are definite. 4. Understand the Interconnectedness between all the orders in existence. 	2	-	-
III	21MMEPCC301	Core - 7 Industry 5.0(Ad)	<ol style="list-style-type: none"> 1. Describe the meaning of the Internet of things (IoT). 2. Apply knowledge about the smart manufacturing and automation used in industry. 3. Apply the concepts of additive manufacturing systems in various domain industries. 4. Understand the application of Artificial Intelligence and Machine learning in mechanical sectors. 5. Describe the concept of digital twin technology in day to day life. 	4	40	60
III	21MMEPCC302	Core 8: Sustainability through green manufacturing system (Self Study) Ad)	<ol style="list-style-type: none"> 1. Describe the concept of sustainability. 2. Compare the conventional manufacturing and green manufacturing system. 3. Analyse the life cycle assessment of different product. 4. Explain the different methods of optimization. 5. Explain Modern approaches for Sustainable Manufacturing. 	3	40	60
III	21MMEPDC301	Core Elective 1: Design of Experiments Ap)	<ol style="list-style-type: none"> 1. Understand the potential practical problems in its implementation. 2. Describe how the analysis of the data from the experiment should be carried out. 3. Interpret the advantages and disadvantages of a design for a particular experiment. 4. Construct optimal or good designs for a range of practical experiments. 5. Analyze the data received from experiment, software and analytically. 	4	40	60



III	21MMEPDC302	Core Elective 1: Finite Element Analysis(Ap)	<ol style="list-style-type: none"> 1. Explain the basics of Finite Element Analysis, its principles and its importance in engineering analysis and design. 2. Develop element stiffness matrix & solve the problems of bars, trusses, beams. 3. Develop element stiffness matrix & solve the problems of trusses and beams under different loading conditions. 4. Develop FE characteristic equations for two dimensional elements and analyze plain stress, plain strain problems. 5. Explain the application and utilization of FEA in different areas of manufacturing industry. 	4	40	60
III	21MMEPCC303	Core Practical 5: Seminar - 1(Ad)	<ol style="list-style-type: none"> 1. Explain the different manufacturing process. 2. Analyze the different manufacturing facilities associated with any product. 3. Interpret the product drawing and details associated with it. 4. Develop writing, presentation, data gathering skills. 5. Demonstrate use of appropriate methodologies, show insight into a topic, and clarity of purpose. 	1	40	60
III	21MMEPCC304	Core Practical 6: Dissertation Phase – (Ap)	<ol style="list-style-type: none"> 1. Describe different methodology of research. 2. Apply the statistical tool to analyze the research data. 3. Interpret the data collected from experimentally or analytically. 4. Compare the experimental data with analytical data. 5. Evaluate the parameters affecting to the specific process. 	6	40	60
III	21MMEPGE01	Generic Elective MS	<ol style="list-style-type: none"> 1. Understand fundamental knowledge about maintenance in the engineering field especially with the new technologies and advancements. 2. Understand the concept of wear, corrosion and its prevention. 3. Understand periodic and preventive maintenance of various mechanical and electrical systems. 4. Aware of industrial safety requirement, causes and preventive steps. 5. Understand need of recovery, reconditioning and 	2	100	0



			retrofitting.			
IV	21MMEPDC401	Core Elective 2: Non Destructive Examination (Ap)	<ol style="list-style-type: none"> 1. Select an appropriate NDE technique as per requirement for better evaluation of various discontinuities. 2. Relatethe various codes and standards for different NDE techniques which enables to carry out various inspection. 3. Make use of standard testing procedure and acceptance criteria documentation as per ASME codes and standards. Examine the materials using different NDE techniques to evaluate internal flaws and take measures to minimize them. 4. Develop insights in the field of advanced techniques for NDE. 	3	40	60
IV	21MMEPDC402	Core Elective 2: Process Equipment Design (Ap)	<ol style="list-style-type: none"> 1. Build a bridge between theoretical and practical concepts used for designing the equipment in any process industry. 2. Explain design process of a pressure vessel used in the process industry. 3. Review the importance of API design concepts in process industry. 4. Explain design process of a heat exchanger used in the process industry. 5. Explain about the various Process Hazards and Safety Measures in Equipment Design. 	3	40	60
IV	21MMEPCC401	Core Practical 7: Mid Semester Dissertation (Ap)	<ol style="list-style-type: none"> 1. Describe different methodology of research. 2. Apply the statistical tool to analyze the research data. 3. Interpret the data collected from experimentally or analytically. 4. Compare the experimental data with analytical data. 5. Evaluate the parameters affecting to the specific process. 	6	40	60
IV	21MMEPCC402	Core Practical 8: Dissertation Phase – 2 (Ap)	<ol style="list-style-type: none"> 6. Describe different methodology of research. 7. Apply the statistical tool to analyze the research data. 8. Interpret the data collected from experimentally or analytically. 	8	40	60



			<p>9. Compare the experimental data with analytical data.</p> <p>10. Evaluate the parameters affecting to the specific process.</p>			
IV	21MMEPDC403	<p>Core Elective Practical 1: Non Destructive Examination(Ap)</p>	<p>11. Apply knowledge of surface NDE techniques which enables to carry out various inspection in accordance with the codes and standards</p> <p>12. Differentiate various defect types and select the appropriate NDT methods for better evaluation.</p> <p>13. Analyze the liquid penetrant testing, magnetic particle testing, eddy current testing, ultrasonic testing and radiographic testing procedure which enable to perform inspection of samples.</p> <p>14. Prepare documentation of the testing and evaluation of the results for further analysis.</p> <p>15. Provide insights in the field of advanced techniques for NDE.</p>	1	40	60
IV	21MMEPDC404	<p>Core Elective Practical 1: Process Equipment Design (Ap)</p>	<p>1. Build a bridge between theoretical and practical concepts used for designing the equipment in any process industry.</p> <p>2. Explain design process of a pressure vessel used in the process industry.</p> <p>3. Review the importance of API design concepts in process industry.</p> <p>4. Explain design process of a heat exchanger used in the process industry.</p> <p>5. Explain about the various Process Hazards and Safety Measures in Equipment Design.</p>	1	40	60



Department of Mechanical Engineering
Program: M. Tech. Mechanical Engineering (CAD/CAM)

Program Objective:

Courses offered in this program are designed such that students will have driving force towards the skill development part so far as application areas of the mechanical engineering are concerned. The students will be able to apply the fundamentals of mechanical engineering in the design and understanding of various machines and manufacturing systems in their modern form. The students will be able to make their way to the society demonstrating ethical and social awareness while making professional decisions with proper scientific and technical knowledge in mechanical engineering. They can able to work in design and analysis of mechanical systems with strong fundamentals and methods of synthesis. They can excel in career by their ability to work and communicate effectively as a team member and/or leader to complete the task with minimal resources, meeting deadlines.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgment about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking.



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Depth and breadth of knowledge: will be capable to creatively apply the knowledge of production engineering as well as other related discipline for his professional and research career.
PEO2	:	Practice, Operation and usage of modern tools and technology: will contribute in the field of design, health and industries in designing, developing and providing solutions for product/processes/technology development.
PEO3	:	Professional capacity and passion of learning: are flexible and adaptable in different work environments, prepared to acquire, develop, employ and integrate new technologies and exhibit leadership and team work quality.
PEO4	:	Research, numeracy, scholarship and data literacy: will exhibit ethical behaviour consistent with academic honesty and use of appropriate guidelines and procedures with responsible conduct of research.
PEO5	:	Global, moral and aesthetic sustainability: will have love for learning in pursuance of excellence in all domains of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain knowledge: Demonstrate the knowledge of concepts, principles and applications of mechanical engineering in various fields
PO2	:	Problem analysis: Acquire critical thinking skills to understand and solve contemporary problems with mechanical engineering domain knowledge and skills
PO3	:	Conduct investigations of complex problems: Gain ability to design, conduct experiments, analyse and interpret data for investigating problems in mechanical engineering and allied sectors



PO4	:	Modern tool usage: Understand standard operating procedures and acquire in-depth technical competence to handle the basic laboratory instruments of mechanical engineering.
PO5	:	Environment and sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development.
PO6	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO7	:	Individual and team work: Function effectively as individual and as a member in multidisciplinary settings.
PO8	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large.
PO9	:	Life-long learning: Recognize the need to undertake life-long learning and acquire the capacity to do so.

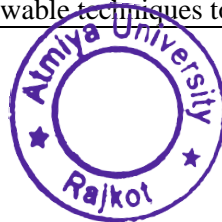
Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Obtain the knowledge of CAD-CAM engineering and be able to differentiate, evaluate, analyze and integrate existing and new knowledge.
PSO2	:	Develop practice of individual critical thinking in analyzing a complex problem in the computer aided designing, manufacturing and optimization.
PSO3	:	Design a system, components, or process and achieve specific objectives by considering economical aspects, availability and selection of materials and manufacturability with increased life.
PSO4	:	Develop and implement ingenuity in product design with the help of modern CAD/CAM tools.
PSO5	:	autonomously carry out research / investigation to solve practical problems and write / present a consequential technical report/document.



Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credit	CIA	SEE
I	21MMECCC101	Core-1 Advance Machine Design(Ad)	<ol style="list-style-type: none"> 1. Explain how to analyze products to improve their manufacturability and lower the cost. 2. Distinguish different design criteria and their procedure to carry out the required design steps for designing mechanical components subjected to static loads. 3. Develop machine components which are subjected to fluctuating loads. 4. Explain the types of surface failures and apply methods to avoid failure of components in engineering applications. 5. Explain how a crack affects an engineering structure and describe the state of stress and strain that may arise in the vicinity of a crack in different materials. 	4	40	60
I	21MMECCC102	Core-2 Computer Aided Modeling & Design(Ap)	<ol style="list-style-type: none"> 1. Explain concepts in design, analysis and can visualize the models through the graphics standards. 2. Make use of various transformations on geometric models for manipulation. 3. Explain the mathematical formulation in the technique of representation of curves and surfaces. 4. Construct 3D solid models & assembly of mechanical parts using various CAD software. 5. Apply various advanced modeling concepts for mass property calculation and check the interference between mating objects using feature based modeling. 	3	40	60
I	21MEEPID103, 21MCITID103	IDC 1: Alternate Energy Sources (Ap)	<ol style="list-style-type: none"> 1. Develop an understanding of different types of renewable and alternative energy sources. 2. Understand the basic principles of the renewable energy techniques. 3. Apply renewable techniques to improve energy products. 	3	30	70



			4. Carry out preliminary economic analysis of renewable energy systems.			
I	21MMECDA101	HSM 1: Advanced Mathematics for Mechanical Engineering (Ad)	<ol style="list-style-type: none"> 1. Measure an error using various methodology. 2. Solve mathematical equations by various methods. 3. Find best curve fitting for given data. 4. Solve differential equations. 5. Apply the concept of Laplace and Fourier Transform to solve the engineering problems. 	3	40	60
I	21MMECCC103	Core Practical 1: Computer Aided Modeling & Design(Ad)	<ol style="list-style-type: none"> 1. Explain concepts in design, analysis and can visualize the models through the graphics standards. 2. Make use of various transformations on geometric models for manipulation. 3. Explain the mathematical formulation in the technique of representation of curves and surfaces. 4. Construct 3D solid models & assembly of mechanical parts using various CAD software. 5. Apply various advanced modeling concepts for mass property calculation and check the interference between mating objects using feature based modeling. 	1	40	60
I	21MMECCC104	Core Practical 2: Research Methodology (Ap)	<ol style="list-style-type: none"> 1. Summarize a quality literature review and find the research gap. 2. Identify an original and relevant problem and identify methods to find its solution. 3. Develop the theory and linkages for interpretation of experimental and analytical results. 4. Explain the solution obtained in an effective manner in written or spoken form. 5. Apply the statistical tool to solve the engineering problems. 	1	40	60



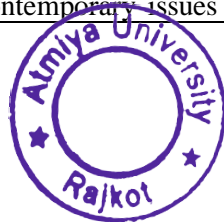
I	21MEEPID103, 21MCITID103	IDC Practical 1: Alternate Energy Sources (Ap)	<ol style="list-style-type: none"> 1. Develop an understanding of different types of renewable and alternative energy sources. 2. Understand the basic principles of the renewable energy techniques. 3. Apply renewable techniques to improve energy products. 4. Carry out preliminary economic analysis of renewable energy systems. 	1	30	70
II	21MMECCC201	Core 3: Finite Element Methods(Ad)	<ol style="list-style-type: none"> 1. Explain the basics of FEM, its principles and its importance in engineering analysis and design. 2. Develop Element stiffness matrix & Solve the problems of bars, trusses, beams. 3. Develop 2-D FE formulations involving triangular, quadrilateral elements and higher order elements to solve problems. 4. Analyze different methods to solve the 1D & 2D dynamic problems. 5. Explain the concept of Non – linearity in FEM. 	3	40	60
II	21MMECCC202	Core 4: Computer Aided Manufacturing (Ap)	<ol style="list-style-type: none"> 1. Illustrate the fundamentals of CNC Machine system and their constructional detail. 2. Develop part programming of different components on lathe and milling. 3. Develop Automatic part programming of different components. 4. Explain fundamentals of feature based manufacturing. 5. Model the CNC programme by using APT. 	3	40	60
II	21MMECCC203	Core 5: Advanced Engineering Materials(Ad)	<ol style="list-style-type: none"> 1. Explain the latest materials for different applications. 2. Analyze relationships between material and its properties. 3. Identify different material codes and standards. 4. Analyze the problems of material selection. 5. Analyze the design parameters related to material selection. 	3	40	60
II	21MMECCC204	Core 6: Principles of Management (Ap)	<ol style="list-style-type: none"> 1. Interpret how the managerial tasks and behavior can be executed in a variety of circumstances. 2. Explain the most effective action to take for planning and organizing in specific situations. 3. Identify the global context for taking managerial actions of 	3	40	60



			<p>directing and controlling.</p> <ol style="list-style-type: none"> Analyze the relationship between logistics decisions and the performance of a given firm to identify malpractices prevalent in supply chain management. Develop the managerial practices and choices relative to ethical principles and standards aligned with various management tools. 			
II	21MEEPID203, 21MCITID203	IDC 2: Quality Engineering (Ap)	<ol style="list-style-type: none"> Understand the basic concept of Quality and related terms. Describe the concept of Total Quality Management & Quality Design. Understand and apply control charts for analysis of observational data. Describe the new concept in Quality. Explore the knowledge in Six sigma concept and design of experiment methods. 	3	30	70
II	21MMECCC205	Core Practical 3: Computer Aided Manufacturing (Ap)	<ol style="list-style-type: none"> Illustrate the fundamentals of CNC Machine system and their constructional detail. Develop part programming of different components on lathe and milling. Develop Automatic part programming of different components. Explain fundamentals of feature based manufacturing. Model the CNC programme by using APT. 	2	40	60
II	21MEEPID207, 21MCITID207	IDC Practical 2: Quality Engineering (Ap)	<ol style="list-style-type: none"> Understand the basic concept of Quality and related terms. Describe the concept of Total Quality Management & Quality Design. Understand and apply control charts for analysis of observational data. Describe the new concept in Quality. Explore the knowledge in Six sigma concept and design of experiment methods. 	1	30	70
II	21CEWE01	SEC 1: Wisdom & Ethics for Success in Life	<ol style="list-style-type: none"> Differentiate the career success, academic success and life success Differentiate the career success, academic success and life success 	2	-	-



		(WESL)	<ol style="list-style-type: none"> Understand that the relationships are definite. Understand the Interconnectedness between all the orders in existence. 			
III	21MMECCC301	Core 7: Non Destructive Examination(Ap)	<ol style="list-style-type: none"> Select an appropriate NDE technique as per requirement for better evaluation of various discontinuities. Relate the various codes and standards for different NDE techniques which enables to carry out various inspection. Make use of standard testing procedure and acceptance criteria documentation as per ASME codes and standards. Examine the materials using different NDE techniques to evaluate internal flaws and take measures to minimize them. Develop insights in the field of advanced techniques for NDE. 	3	40	60
III	21MMECCC302	Core 8: Flexible Manufacturing Systems (Self Study) (Ap)	<ol style="list-style-type: none"> Apply the concepts of PPC and GT to the development of FMS. Explain the planning and scheduling methods used in manufacturing systems. Explain various workstations, system support equipments. Identify hardware and software components of FMS. Apply the concepts of modern manufacturing such as JIT, supply chain management and lean manufacturing etc. 	3	40	60
III	21MMECDC301	Core Elective 1: Product Design and Life Cycle Management (Ap)	<ol style="list-style-type: none"> Recall the stages of a product life cycle (PLC): introduction, growth, maturity, decline. Describe the environmental, economic, and social aspects considered in a comprehensive LCA. Analyze and interpret LCA results to identify opportunities for improving a product's sustainability. Explain the concept of life cycle assessment (LCA) and its importance in sustainable product design. Apply LCA methodologies to evaluate the environmental performance of a specific product. 	4	40	60
III	21MMECDC302	Core Elective 1: Design for Manufacture &	<ol style="list-style-type: none"> Explain the design principles for manufacturability. Apply knowledge influencing factors on design. Apply knowledge on Machining consideration while design. Identify contemporary issues and their impact on design for 	4	40	60



		Assembly (Ap)	manufacturing and assembly. 5. Explain environment consideration while design.			
III	21MMECCC303	Core Practical 4: Non Destructive Examination (Ap)	<ol style="list-style-type: none"> 1. Select an appropriate NDE technique as per requirement for better evaluation of various discontinuities. 2. Relate the various codes and standards for different NDE techniques which enables to carry out various inspection. 3. Make use of standard testing procedure and acceptance criteria documentation as per ASME codes and standards. 4. Examine the materials using different NDE techniques to evaluate internal flaws and take measures to minimize them. 5. Develop insights in the field of advanced techniques for NDE. 	1	40	60
III	21MMECCC304	Core Practical 5: Seminar - 1	<ol style="list-style-type: none"> 1. Explain the different manufacturing process. 2. Analyze the different manufacturing facilities associated with any product. 3. Interpret the product drawing and details associated with it. 4. Develop writing, presentation, data gathering skills. 5. Demonstrate use of appropriate methodologies, show insight into a topic, and clarity of purpose. 	1	40	60
III	21MMECCC305	Core Practical 6: Dissertation Phase - 1	<ol style="list-style-type: none"> 1. Explain different methodology of research. 2. Apply the statistical tool to analyze the research data. 3. Interpret the data collected from experimentally or analytically. 4. Compare the experimental data with analytical data. 5. Evaluate the parameters affecting to the specific process. 	6	40	60
III	21MMECGE01	Generic Elective PMS	<ol style="list-style-type: none"> 1. Understand fundamental knowledge about maintenance in the engineering field especially with the new technologies and advancements. 2. Understand the concept of wear, corrosion and its prevention. 3. Understand periodic and preventive maintenance of various mechanical and electrical systems. 4. Aware of industrial safety requirement, causes and preventive steps. 5. Understand need of recovery, reconditioning and retrofitting. 	2	100	-



IV	21MMECDC401	Core Elective 2: Industry 5.0 (Ad)	<ol style="list-style-type: none"> 1. Describe the meaning of the Internet of things (IoT). 2. Apply knowledge about the smart manufacturing and automation used in industry. 3. Apply the concepts of additive manufacturing systems in various domain industries. 4. Understand the application of Artificial Intelligence and Machine learning in mechanical sectors. 5. Describe the concept of digital twin technology in day to day life. 	3	40	60
IV	21MMECDC402	Core Elective 2: Design of Material Handling Equipment(Ad)	<ol style="list-style-type: none"> 1. Compare and select material handling equipment for material transportation. 2. Analyze the design of belt conveyor, bucket and cage elevator. 3. Analyze the design and application of different types of hooks and brakes and different types of drive used in hoists. 4. Analyze the working and design of crane used in industrial applications. 5. Examine packaging and storage of bulk materials in industries. 	3	40	60
IV	21MMECCC401	Core Practical 7: Mid Semester Dissertation	<ol style="list-style-type: none"> 1. Explain different methodology of research. 2. Apply the statistical tool to analyze the research data. 3. Interpret the data collected from experimentally or analytically. 4. Compare the experimental data with analytical data. 5. Evaluate the parameters affecting to the specific process. 	6	40	60
IV	21MMECCC402	Core Practical 8: Dissertation Phase - 2	<ol style="list-style-type: none"> 1. Explain different methodology of research. 2. Apply the statistical tool to analyze the research data. 3. Interpret the data collected from experimentally or analytically. 4. Compare the experimental data with analytical data. 5. Evaluate the parameters affecting to the specific process. 	8	40	60
IV	21MMECDC403	Core Elective Practical 1: Industry 5.0 (Ad)	<ol style="list-style-type: none"> 1. Describe the meaning of the Internet of things (IoT). 2. Apply knowledge about the smart manufacturing and automation used in industry. 3. Apply the concepts of additive manufacturing systems in 	1	40	60



			<p>various domain industries.</p> <ol style="list-style-type: none"> 4. Understand the application of Artificial Intelligence and Machine learning in mechanical sectors. 5. Describe the concept of digital twin technology in day to day life. 			
IV	21MMECDC404	Core Elective Practical 1: Design of Material Handling Equipment(Ad)	<ol style="list-style-type: none"> 1. Understand the fundamentals different types of material handling equipment. 2. Understand basics design of wire rope, pulley, pulley systems, and different types of hook. 3. Understand and appreciate significance design of belt conveyors, screw conveyors and bucket elevators. 4. Solve the different material handling equipment problems. 5. Describe the different types of hoisting gear drives and brakes used in hoists. 	1	40	60



Department of Mechanical Engineering
Program: B.Tech. Mechanical Engineering

Program Objective:

Mechanical Engineering is an evergreen discipline as whatever field of engineering one wishes to pursue as a career, the basics of mechanical engineering come in handy in the effective design, development and optimization of equipment and devices used in any industrial activity. Being under the Private University Department has the flexibility to modify the syllabus as per the need of the industries. The department grooms a student to an extent that he/she can excel in the field of technology independently. Our students are well trained for latest industrial technology and have good knowledge in the subjects of their curriculum. The skills are inculcated into the students through hand on experience through experiments in labs.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core competency: will develop the competency to pursue higher education or successful professional career with synergistic combination of the knowledge and skills of mechanical engineering and allied branches.
PEO2	:	Breadth of knowledge: will show capabilities of independently designing, executing and interpreting small research problems by integrating the interdisciplinary knowledge of mechanical engineering and other domains.



PEO3	:	Preparedness: will reflect professional behaviour and have the potential to show preparedness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities.
PEO4	:	Professionalism: will reflect values and responsibilities in the character to make them fit to work in a multidisciplinary team and to become socio-ethically responsible citizen.
PEO5	:	Learning environment: will show attitude of self-learning abilities and keep themselves abreast with new development in all spheres of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain knowledge: Demonstrate the knowledge of concepts, principles and applications of mechanical engineering in various fields.
PO2	:	Problem analysis: Acquire critical thinking skills to understand and solve contemporary problems with mechanical engineering domain knowledge and skills.
PO3	:	Design/development of solutions: Understand the complex mechanical engineering problems and design structured mechanisms or processes that meet the specified needs.
PO4	:	Conduct investigations of complex problems: Gain ability to design, conduct experiments, analyse and interpret data for investigating problems in mechanical engineering and allied sectors.
PO5	:	Modern tool usage: Understand standard operating procedures and acquire in-depth technical competence to handle the basic laboratory instruments of mechanical engineering.
PO6	:	The engineer and society: Understand own's role in society and act in an honest and consistent manner based on a strong sense of self and personal values.
PO7	:	Environment and sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development.



PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	:	Individual and team work: Function effectively as individual and as a member in multidisciplinary settings.
PO10	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large.
PO11	:	Project management and finance: Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	:	Life-long learning: Recognize the need to undertake life-long learning and acquire the capacity to do so.

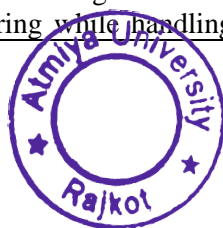
Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Attain the fundamentals knowledge of mechanical engineering which enables to understand the emerging and advanced engineering concepts.
PSO2	:	Be able to adapt and integrate current technologies in the manufacturing, design and thermal domain.
PSO3	:	Analyze and synthesize mechanical systems including allied engineering streams.
PSO4	:	Demonstrate the ability to develop methods, procedures and cost effective solutions in mechanical engineering.
PSO5	:	Prepare themselves for pursue higher education and research in reputed institutes at national and international level.

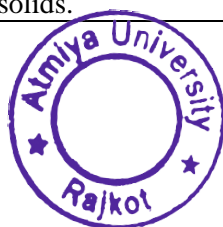


Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGSH101	Fundamentals of Engineering Mathematics	<ol style="list-style-type: none"> 1. Solve simultaneous linear equations using various methods of Matrix Algebra. 2. Calculate Fourier series of a function 3. Evaluate partial derivatives and can implement to estimate maxima and minima of a function 4. Apply the knowledge of Differential Calculus to solve the various problems in Engineering 5. Apply Beta and Gamma functions in solving various mathematical problems 	4	50	50
I	23UGSH140	Effective Communication Skills	<ol style="list-style-type: none"> 1. To listen and comprehend complex academic texts 2. To read and infer the denotative and connotative meanings of technical texts 3. To write definitions, descriptions, narrations and essays on various topics 4. To speak fluently and accurately in formal and informal communicative contexts 5. To express their opinions effectively in both oral and written medium of communication. 	2	50	50
I	23UGCI070	Environmental Conservation & Sustainable Development	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources. 2. Understand importance of natural resources and biological diversity. 3. Understand the sectoral effects on the local, regional, and global environmental issues. 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources. 5. Learn about the major international treaties and our country's stand on and responses to the major international agreements. 	2	Evaluation by Remarks based on CIA	
I	23UGCI101	Fundamentals of Civil Engineering	<ol style="list-style-type: none"> 1. Recognize the general terminology related to civil engineering while handling day to day problems of 	4	90	60



			<p>society</p> <ol style="list-style-type: none"> 2. Apply the fundamentals to find out the various levels, angles situated on the earth 3. Recognize the general terminology related to applied mechanics 4. Understand principles of statics to calculate the various forces 5. Understand the fundamentals of support reactions in beams 			
I	23UGCE101	Fundamentals of Computer Programming	<ol style="list-style-type: none"> 1. Have basic knowledge of Computer, System applications and Programming Language 2. Have knowledge in using C language for solving problems 3. Have knowledge of the syntax and semantics of C programming language 4. Write algorithms and Flow chart for problems 5. Code a given logic of control structure, arrays and string in C language 6. Code a given logic of advanced concept like structure, pointer and union C language 	2	100	-
I	23UGEC101	Fundamentals of Electronics	<ol style="list-style-type: none"> 1. Explain characteristic and working of basic semiconductor devices like diode, transistor, logic gates and operational amplifier 2. Perform analysis of different electronics circuits based on devices covered in the course and compare their operations. 3. Build and test electronic circuits based on devices covered in the course 4. Explain basic concepts of electronics communication systems. 	3	90	60
I	23UGME102	Engineering Drawing	<ol style="list-style-type: none"> 1. Understand engineering curves with proficiency in tracing the paths of simple machine components. 2. Illustrate the projection of points, lines and planes with different conditions. 3. Develop proficiency in drawing the projections of various solids. 	2	50	50



			<ol style="list-style-type: none"> 4. Improve the visualization and technical skills for given orthographic views and can apply it in developing new products. 5. Improve the visualization and technical skills in isomeric projections and can apply it in developing new products. 			
I	23UGEC102	Tinkering Lab	<ol style="list-style-type: none"> 1. Understanding of the fundamental principles of automation, including microcontroller, development boards, sensors, actuators, embedded systems, logic building and feedback mechanisms. 2. Apply the fundamental principles to illustrate the real world problems 3. Select, Interface, Integrate, and troubleshoot different sensors and actuators with the development board. 4. Identify the real world problem and design solution 5. Think creatively and find innovative solutions to automation challenges. 	1	100	-
II	23UGSH201	Calculus & Higher Order Differential Equation	<ol style="list-style-type: none"> 1. Understand the Higher Order Differential Equations 2. Understand and apply the Laplace transforms for solving various differential equations 3. Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts 4. Apply the knowledge of Calculate double and triple integral using various integration techniques. 5. Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus 	4	50	50
II	23UGSH240	Technical Communication Skills	<ol style="list-style-type: none"> 1. To listen and comprehend complex academic text. 2. To read and infer the denotative and connotative meanings of technical texts. 3. To write definitions, descriptions, narrations, and essays on various topics. 4. To speak fluently and accurately in formal and informal communicative contexts. 	2	50	50



			5. To express their opinions effectively in both oral and written medium of communication.			
II	23UGUH070	Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 	3	Evaluation by Remarks based on CIA	
II	23UGSH102	Engineering Science	<ol style="list-style-type: none"> 1. The student will demonstrate the understanding of basic principles properties and its applications associated with semiconducting materials and specifically LASER. 2. The student will gain knowledge of basic theoretical and practical concept of optical fibre structure and their applications towards telecommunications. (U, A cognitive level) 3. The student will demonstrate the understanding of basic principles properties and its applications associated with electromagnetic waves. (U, A cognitive level) 4. The student will demonstrate understanding of basic theory, properties and applications of batteries, fuel cells and solar cell (U, A cognitive level) 5. The student will gain knowledge of various corrosions and their preventions and the different preparation techniques to characterize various advance engineering materials and their properties. (U, A cognitive level) 	4	90	60
II	23UGEE101	Fundamentals of Electrical Engineering	<ol style="list-style-type: none"> 1. Apply fundamental electrical laws to electrical circuits. 2. Analyze single phase and three phase AC circuits. 3. Describe operating principle and applications of static and rotating electrical machines. 	4	90	60



II	23UGME101	Fundamentals of Mechanical Engineering	<ol style="list-style-type: none"> 1. Infer the scope & application of mechanical engineering & significance of thermodynamic process 2. Understand the vapour power cycle used in thermal power plant. 3. Analyze various heat engine cycles and understand Construction & working of Internal Combustion Engine 4. Identify and select various power transmission & motion & their application in Industry. 5. Explain Quality Control and Contemporary Management Concept like 5S,JIT,KAIZAN. 	4	90	60
II	23UGME103	Engineering Workshop	<ol style="list-style-type: none"> 1. Understand the Basics of workshop practices. 2. Demonstrate and produce different types of fitting models, carpentry Models and Tin smithy. 3. Understand welding on metal with different welded joints. 4. Identify the different materials for construction projects. 5. Understand the safety measures and apply for construction work. 	1	100	-
II	23UGLI050	Information & Digital Literacy	<ol style="list-style-type: none"> 1. Navigate libraries, conduct proper referencing, and apply APA style. 2. Enroll in MOOCs, understand FOSS, and differentiate between MOOC platforms. 3. Apply note-taking and prewriting strategies, create effective search formulas, and build basic websites. 4. Identify and access scholarly resources, avoid plagiarism, and utilize referencing styles. 5. Demonstrate digital literacy, understand internet safety, and gain introductory knowledge of AI and app development. 	1	100	-



Department of Mechanical Engineering
Program: B.Tech. Mechanical Engineering

Program Objective:

Mechanical Engineering is an evergreen discipline as whatever field of engineering one wishes to pursue as a career, the basics of mechanical engineering come in handy in the effective design, development and optimization of equipment and devices used in any industrial activity. Being under the Private University Department has the flexibility to modify the syllabus as per the need of the industries. The department grooms a student to an extent that he/she can excel in the field of technology independently. Our students are well trained for latest industrial technology and have good knowledge in the subjects of their curriculum. The skills are inculcated into the students through hand on experience through experiments in labs.

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Core competency: will develop the competency to pursue higher education or successful professional career with synergistic



		combination of the knowledge and skills of mechanical engineering and allied branches.
PEO2	:	Breadth of knowledge: will show capabilities of independently designing, executing and interpreting small research problems by integrating the interdisciplinary knowledge of mechanical engineering and other domains.
PEO3	:	Preparedness: will reflect professional behaviour and have the potential to show preparedness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities.
PEO4	:	Professionalism: will reflect values and responsibilities in the character to make them fit to work in a multidisciplinary team and to become socio-ethically responsible citizen.
PEO5	:	Learning environment: will show attitude of self-learning abilities and keep themselves abreast with new development in all spheres of life.

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After completion of the programme the Graduate will be able to:		
PO1	:	Domain knowledge: Demonstrate the knowledge of concepts, principles and applications of mechanical engineering in various fields
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PO5	:	Modern tool usage: Understand standard operating procedures and acquire in-depth technical competence to handle the basic laboratory instruments of mechanical engineering.
PO6	:	The engineer and society: Understand own's role in society and act in an honest and consistent manner based on a strong sense of self and personal values.
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PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.



PO9	:	Individual and team work: Function effectively as individual and as a member in multidisciplinary settings.
PO10	:	Communication: Communicate effectively using different modes (viz. written, verbal and digital) not only with scientific community but also with the society at large.
PO11	:	Project management and finance: Understand the principles of management of finance and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
PO12	:	Life-long learning: Recognize the need to undertake life-long learning and acquire the capacity to do so.

Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Attain the fundamentals knowledge of mechanical engineering which enables to understand the emerging and advanced engineering concepts.
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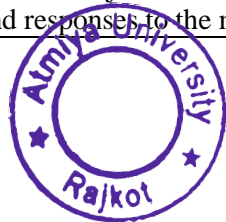


Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credit	CIA	SEE
I	21UHSEN101	Communicative English	<ol style="list-style-type: none"> 1. Grasp the basic tools of communication. 2. Understand the role of non-verbal elements of communication. 3. Exchange their ideas and views precisely and clearly. 4. Learn the fundamental components of English Grammar and vocabulary. 5. Inculcate human values through studying literature. 	3	40	60
I	21BTMECC101	Core 1: Fundamentals of Mechanical Engineering (F)	<ol style="list-style-type: none"> 1. Classify various component design & general procedure of design. 2. Explain the fundamental laws of Thermodynamics and describe their application in thermal systems like air standard cycles of IC engines. 3. Apply the theoretical concepts of manufacturing process & their application in Industry. 4. Illustrate the Application of AR and VR, Cloud computing, Big Data Analytics, IOT, 3D Printing, Cyber Security in industry. 5. Explain Quality Control and Contemporary Management Concept like 5S, JIT, KAIZAN. 	4	40	60
I	21UH SMA101	HSM 1: Fundamentals of Mathematics	<ol style="list-style-type: none"> 1. Understand the Fundamental of Differential Equation and Matrix Algebra 2. Understand and apply Partial Derivatives 3. Understand the application of Matrix Algebra 4. Apply the knowledge of Diff. Calculus to solve the various problems in Engineering. 5. Solve simultaneous linear equations using various methods of Matrix Algebra. 	4	40	60



I	21BTMEIC101	IDC 1: Problem Solving using Programming	<ol style="list-style-type: none"> 1. Understand how to draw flowchart and write an algorithm for any problem. 2. Memorize different conditional and loop statement. 3. Apply knowledge and programmatically approach to solve a particular problem. 4. Explain C Programs using the concept of Function and Array. 5. Solve C programs using pointers and structure. 	4	40	60
I	21BTMEIC102	IDC 2: Fundamentals of Civil Engineering	<ol style="list-style-type: none"> 1. Recognize the general terminology related to civil engineering while handling day to day problems of society. 2. Understand the different material & its properties. 3. Apply the fundamentals to find out the various levels, angles situated on the earth. 4. Understand the different parameters of mass transportation systems. 5. Remember & apply the recent technological tools for the harmony of society 	4	40	60
I	21BTMECC102	Core Practical 1: Mechanical Workshop (F)	<ol style="list-style-type: none"> 1. Demonstrate and produce different types of fitting models and carpentry Models. 2. Apply the knowledge of development of sheet metal models with an understanding of their applications. 3. Understand the Basics of workshop practices. 4. Understand welding on metal with different welded joints. 5. Demonstrate and produce different types of fitting models and carpentry Models. 	1	100	-
I	21AEES01	AECC 2: Environmental Conservation and Sustainable Development	<ol style="list-style-type: none"> 1. Gain insights into the international efforts to safeguard the Earth's environment and resources. 2. Understand importance of natural resources and biological diversity. 3. Understand the sectoral effects on the local, regional, and global environmental issues. 4. Correlate the exploitation and utilization of conventional and non-conventional energy resources. 5. Learn about the major international treaties and our country's stand on and responses to the major international agreements. 	-	Evaluation at the end of Semester II	



I	21AEHV202	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 	Evaluation at the end of Semester II		
I	21AEFS101	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Remember the message coming through different communication channels. 2. Understand the message coming through different communication channels to think critically, logically and creatively. 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others. 4. Develop personality & right attitude through communication skills. 	-	-	-
II	21UHSEN201	Technical Communication	<ol style="list-style-type: none"> 1. Gain knowledge and use of the technical English 2. Apply the knowledge of presentation skills to make presentations in their academic and professional life. 3. Learn various aspects of Morphology of English 4. Use the basics of Syntax of English 5. Enrich their language and life skills through studying literature. 	3	40	60
II	21BTMECC201	Core 2: Engineering Graphics and Computer Drafting (F)	<ol style="list-style-type: none"> 1. Understand the conventions and construct basic as well as intermediate geometry along with method of engineering drawing. 2. Interpret engineering drawings using fundamental technical mathematics. 3. Construct basic and intermediate geometry by understanding the theory of projection. 4. Improve their visualization skills in orthographic and isometric projections so that they can apply these skills in developing new products. 5. Improve their technical communication skill in the form of 	4	40	60



			communicative drawings.			
II	21UH SMA201	HSM 2: Multivariate calculus and differential equations	<ol style="list-style-type: none"> 1. Understand the Higher Order Differential Equations 2. Understand and apply the Laplace transforms for solving various differential equations 3. Apply the knowledge of vector calculus to solve some practical problems such as constrained optimization problems and other problems involving vector concepts. 4. Apply the knowledge to calculate double and triple integral using various integration techniques. 5. Solve problems regarding area and volume of different curves using concept of integration as well as vector calculus. 	4	40	60
II	21UHSPY201	HSM 3 : Fundamentals of Engineering Physics	<ol style="list-style-type: none"> 1. Understand the Fundamental role of Optical Fiber, Acoustics, Semiconductor Physics and advanced engineering materials and their behavior under various system conditions. 2. Understand and Describe qualitative comparison between various diodes. 3. Identify the Various material testing technologies 4. Apply the knowledge of material science to use various advanced engineering materials to solve the problems in Engineering. 5. Solve the problem of bad acoustics in Auditorium or Cinema hall by using various acoustical solutions. 	4	40	60
II	21BTMEIC201	IDC 3: Fundamentals of Electrical Engineering	<ol style="list-style-type: none"> 1. Apply fundamental electrical laws to electrical circuits. 2. Use Ohm's law, Kirchhoff's law and star-delta transformation for solving resistive series, parallel and series-parallel circuits. 3. Define electric field, lines of force, electric field intensity, electric flux, flux density and permittivity. 4. Analyze single phase and three phase AC circuits. 	4	40	60
II	21BTMEIC202	IDC Practical 1: Electronics Workshop	<ol style="list-style-type: none"> 1. Basic knowledge of electrical and electronics components and its standard symbols. 2. Knowledge of measuring voltage, current, frequency, phase difference, power, power factor for single and three-phase 	1	100	-



			<p>supply.</p> <ol style="list-style-type: none"> 3. Knowledge of how to use different types of tools which is used in electrical and electronics field. 4. Knowledge of Arduino and Decentralized solar PV system. 5. Justify circuit design concept. 			
II	21AEES02	AECC 2: Environmental Conservation and Sustainable Development	<ol style="list-style-type: none"> 1. Recall the Sustainable Development Goals and their targets. 2. Explain the concept of sustainable development and the importance of the SDGs in addressing global challenges. 3. Apply knowledge of the SDGs to analyze real-world issues and propose solutions. 4. Analyze the interconnections between different SDGs and their impact on various communities and regions. 5. Evaluate the progress made towards achieving the SDGs and the challenges faced in implementation. 	2	Evaluation by Remarks	
II	21AEHV03	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 	3	Evaluation by Remarks	
II	21AEFS201	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Recognize the message coming through different channels. 2. Understand the given situation to think critically, logically and creatively and deal accordingly based on that. 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others. 4. Reframe personality & right attitude through traditional Soft skills. 	-	Cumulative evaluation at the end of Semester VII	
III	21BTMECC301	Core 3: Material Technology (F)	<ol style="list-style-type: none"> 1. Apply the basic concept of material science and metallurgy. 2. Differentiate the ferrous and non-ferrous metals and alloys and their applications. 3. Identify the Scope and limitations of different materials. 4. Apply concept of heat treatment and its application. 5. Apply the knowledge of powder metallurgy for manufacturing 	4	40	60



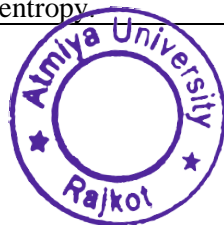
			of components.			
III	21BTMECC302	Core 4: Solid Mechanics (F)	<ol style="list-style-type: none"> 1. Recognize fundamental principles of mechanics, equilibrium and statics to practical problems of engineering. 2. Relate problems related to centroid and moment of inertia of a different geometrical shape in day to day life. 3. Determine different types of stresses and strains developed in the member subjected to axial & thermal loads. 4. Apply principles of statics to determine reactions & internal forces in statically determinate beams. 5. Solve problems related to stresses and strains developed in the member subjected to bending & shear load. 	4	40	60
III	21BTMECC303	Core 5: Theory of Machines (Ad)	<ol style="list-style-type: none"> 1. Select basic structure and elements of machines based on functional characteristics of various machine elements. 2. Illustrate various mechanisms based on position, velocity and acceleration requirement. 3. Analyze cam profile based on motion of follower and gyroscopic effect in aeroplane, ships and automobiles. 4. Identify the functional characteristics of flywheel and governors to enhance performance of an engine. 5. Apply the concept of friction and power transmitting elements for various applications. 	4	40	60
III	21BTMECC304	Core 6: Design of Machine Elements (Ad)	<ol style="list-style-type: none"> 1. Explain theories of failure for design of machine elements subjected to static load and solve the problems of mechanical components subjected to static and fluctuating load. 2. Explain the working and design procedure steps of different types of mechanical joints for different applications and will be able solve the problems. 3. Explain the working and design procedure steps of shaft, keys and couplings and will be able solve the problems. 4. Solve the problems of helical springs, concentric spring, leaf spring subjected to static loading. 5. Analyze different types of thread and profiles for design of 	4	40	60



			screw jack.			
III	21UH SMA301	HSM 4: Numerical Techniques for Engineers (Ap)	<ol style="list-style-type: none"> 1. Apply the concepts and principles in basic numerical approximation in well-defined contexts beyond those in which they were first studied, showing the ability to evaluate critically the appropriateness of different tools and techniques. 2. Demonstrate the capability to use a range of established techniques and a reasonable level of skill in calculation and manipulation of the material to solve problems in the following areas: root finding, interpolation, numerical quadrature, finite differences, and initial-value problems for ODEs. 3. Compare the viability of different approaches to the numerical solution of problems arising in roots of solution of non-linear equations, interpolation and approximation, numerical differentiation and integration, solution of linear systems. 4. Demonstrate knowledge and critical understanding of the well-established principles within a wide range of basic numerical methods, including iterative methods 5. Develop and apply the appropriate numerical techniques for a given problem, interpret the results, and assess accuracy 	4	40	60
III	21BTMECC305	Core Practical: 2 Engineering Metrology and Measurement (F)	<ol style="list-style-type: none"> 1. Explain the basics of standards of measurement, limits, fits & tolerances industrial applications. 2. Explain the uses of Linear and angular Measuring Instruments. 3. Explain the capabilities of machining process by measuring surface finish of the component produced. 4. Analyze the quality of surface produced using various methods. 5. Understand the concept of GD & T and its symbols used in the given industrial drawings. 	1	100	-
III		Core Enrichment 1: Concept to Practice	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written an oral forms. 4. Demonstrate a sound technical knowledge of their societal 	1	20	-



			<p>problems.</p> <p>5. Demonstrate the knowledge, skills, values and attitudes of professional graduates.</p>			
III	21AEFS301	FS 3: Career Acceleration Program	<p>1. Understand the need of 21st century skills, Understand and Analyze the skills through Learning: Critical Thinking, Creativity & Innovation.</p> <p>2. Understand the leading skills through edge of: Communication, Collaboration and Networking.</p> <p>3. Understand the skills through digital literacy: Information, Media and Technology Literacy</p> <p>4. Recall, Understand and Analyze Life Skills : Flexibility and Adaptability, Leadership and Responsibility.</p> <p>5. Recall, Understand and Analyze Life Skills :Productivity and Accountability, Social and Cross-Cultural Interaction</p>	-	Cumulative evaluation at the end of Semester VII	
IV	21BTMECC401	Core 7: Manufacturing Processes (F)	<p>1. Explain the fundamentals of casting processes and its supporting components.</p> <p>2. Explain about the different metal forming processes used in the manufacturing sector for preparing a part.</p> <p>3. Explain the basic types and principle used in the metal joining processes.</p> <p>4. Explain about the different metal cutting processes used in the manufacturing sector for creating components.</p> <p>5. Explain the various metal finishing processes used in the industry for multiple application.</p>	3	40	60
IV	21BTMECC402	Core 8: Engineering Thermodynamics (F)	<p>1. Understand the basic concepts of thermodynamic such as temperature, pressure, system, properties, process, state, cycles and equilibrium.</p> <p>2. Apply the first Law of Thermodynamics on open system.</p> <p>3. Apply the second Law of Thermodynamics on refrigerators and heat pumps.</p> <p>4. Analyse thermal efficiencies of heat engines such as Carnot and Rankine cycles.</p> <p>5. Calculate available and unavailable energy by applying the concept of entropy.</p>	4	40	60



IV	21BTMECC403	Core 9: Fluid Mechanics (Ad)	<ol style="list-style-type: none"> 1. Understand basic concepts fluid mechanics including hypothesis of continuum, Shear stress in a moving fluid, molecular structure of material, fluid density, viscosity, causes of viscosity in gases and liquids, surface tension, capillary effect, vapour pressure, cavitations, compressibility and the bulk modulus. 2. Determine pressure and forces on submerged bodies. 3. Measure and describe fluid flow including viscous flow, turbulent flow, two dimensional flow, and compressible flow with different cross section areas. 4. Identify relation among various parameters based on dimensional analysis by and model study using Rayleigh's method and Buckingham pi theorem. 5. Calculate Pressure with the help of various pressure measuring instruments including manometers, bourdon tube, bellows, force balance pressure gauges, electrical pressure gauges. 	4	40	60
IV	21BTMECC404	Core 10: Design of Transmission Systems (Ap)	<ol style="list-style-type: none"> 1. Explain the working and design procedure steps of flexible machine elements like belts, chain, and rope for solving examples. 2. Explain the working and design procedure steps of journal bearing and rolling contact bearing for solving examples. 3. Explain the working and design procedure steps of spur, helical and bevel gear for solving examples. 4. Explain the working and design procedure steps of gearbox for solving examples used for power transmission in machine tools application. 5. Explain the working and design procedure steps of gearbox of IC engine components for solving examples. 	4	40	60
IV	21BTMECC405	Core 11: Dynamics of Machines (Ad)	<ol style="list-style-type: none"> 1. Apply analytical and graphical methods for calculating balancing of rotary and reciprocating masses located in the same and different planes. 2. Understand the phenomenon of vibrations and its significance in engineering design. 3. Explain the concept of undamped, damped free and forced vibrations to determine the natural frequency of the single 	4	40	60



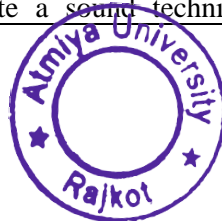
			<p>degree of freedom system.</p> <ol style="list-style-type: none"> 4. Explain about two degrees and multiple degrees of freedom systems to obtain mode shapes of the system. 5. Explain vibration measuring instruments that are useful in present life. 			
IV	21UH SMA404	HSM 5: Complex analysis & Statistical Methods for Mechanical Engineering	<ol style="list-style-type: none"> 1. To develop a strategic approach to organizing data and calculate the measure of central tendency. 2. To identify the direction and strength of correlation and regression between two variables. 3. To calculate probabilities by applying probability laws and theoretical results. 4. To decide when and where a given function is analytic 5. To compute the residue of a function and will be able to apply the concepts of the 	4	40	60
IV	21UH SMMG401	HSM 6: Engineering Economics & Management (Ap.)	<ol style="list-style-type: none"> 1. Explain cost estimation of machining process. 2. Make the use of scheduling for production planning and control. 3. Select the plant layout and material handling equipment. 4. Identify tools of Quality Control. 5. Explain the contemporary management concept. 	2	40	60
IV		Core Enrichment 1: Concept to Practice	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written and oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. 5. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 	-	20	
IV	21AEFS401	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Understand the basic concepts of quantitative ability. 2. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions. 3. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc. 	-	Cumulative evaluation at the end of Semester VII	



V	21BTMECC501	Core 12: Production Technology (Ad)	<ol style="list-style-type: none"> 1. Apply basics of metal machining processes very well with the detailed signature of tools. 2. Make use of locating and fixing devices. 3. Explain in depth about press and press work. 4. Explain Non conventional machining Process. 5. Explain composite material in plastic technology & their process. 	3	40	60
V	21BTMECC502	Core 13: Fluid Power Engineering (Ad)	<ol style="list-style-type: none"> 1. Understand the impact of jet on stationary, moving and curved plate from different direction. 2. Understand the operation of centrifugal pumps, centrifugal and axial compressors. 3. Understand the different types of turbine and its performance. 4. Understand the operation and use of compressor & requirement of multistage in compressor. 5. Understand the operation and use of different hydraulic machines like hydraulic crane, fluid coupling and fluid torque convertor etc. 	3	40	60
V	21BTMECC503	Core 14: Heat Transfer (Ad)	<ol style="list-style-type: none"> 1. Understand the basic concept of heat transfer modes. 2. Analyze problems involving steady state heat conduction in simple geometries. 3. Understand the fundamentals of convective heat transfer process. 4. Understand the radiation heat transfer rate between different surfaces. 5. Analyze heat exchanger performance by using the method of heat exchanger effectiveness. 	4	40	60
V	21BTMECC504	Core 15: (Self Study): Statistical Quality Control (Ap)	<ol style="list-style-type: none"> 1. Relate need, purpose and importance of statistical quality control in current era. 2. Apply the concept of Total Quality Management and failure mode. 3. Express the main attributes of Quality Assurance System. 4. Solve quality related issue using attributes and variables charts. 5. Develop basic Understanding of sampling plan and quality circle to solve quality related issue. 	3	40	60



V	21BTMECC505	Core Practical 3: Manufacturing Technology (Ap)	<ol style="list-style-type: none"> 1. Understand the theory behind cutting of materials for shaping them into desired forms. 2. Analyze forces involved during machining process. 3. Demonstrate the mould preparation process involved in sand casting. 4. Demonstrate the different types of chips generated during the machining. 5. Understand the concept of behind the joining of two materials with the help of welding process. 	2	100	100
V	21BTMECC506	Core Practical 4: Fluid Mechanics & Hydraulic Machines (Ap)	<ol style="list-style-type: none"> 1. Measure the pressure of fluid at rest or in motion using pressure measuring devices. 2. Test for stability of floating object by using fundamentals of meta-centric height. 3. Measure and describe fluid flow including viscous flow, turbulent flow at different cross section areas in pipe and open channel. 4. Understand the performance characteristics of fluid machines, including efficiency, power, and flow rate. 5. Apply knowledge of fluid machines to real-world engineering problems, such as the design of hydraulic systems. 	2	100	100
V	21UFEDE504	DSE 1: Computer Aided Modeling & Design	<ol style="list-style-type: none"> 1. Understand concepts in design, analysis and can visualize the models through the graphics standards. 2. Implement various transformations on geometric models for manipulation. 3. Understand the representation schemes of solid modeling. 4. Sketch solid models & assembly of mechanical parts using various CAD software. 5. Apply various advanced modeling concepts for mass property calculation and check the interference between mating objects using feature based modeling. 	4	40	60
V		Core Enrichment 1: Concept to Practice	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written an oral forms. 4. Demonstrate a sound technical knowledge of their societal 	-	20	-



			<p>problems.</p> <p>5. Demonstrate the knowledge, skills, values and attitudes of professional graduates.</p>			
V	21BTMECR501	Core Enrichment 2 Internship 1	<p>1. Empathize and understand social issues and problems through first-hand experience.</p> <p>2. Learn to appreciate and respect different ways of thinking and living and there by transform perspective towards culture, society and life at large.</p> <p>3. Learn skills of collecting, organizing and interpreting data and information.</p> <p>4. Develop critical thinking and problem-solving abilities.</p> <p>5. Develop interpersonal skills and learn social and professional etiquette.</p>	1	100	-
V	21AEFS501	FS 3: Career Acceleration Program	<p>1. Understand the basic concepts of quantitative ability.</p> <p>2. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions.</p> <p>3. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.</p>	-	Cumulative evaluation at the end of Semester VII	
VI	21BTMECC601	Core 16: Computer Aided Design (Ap)	<p>1. Explain the role of CAD in mechanical component and system design by creating geometric models, engineering drawings and applying algorithm for construction of entities using computer graphics.</p> <p>2. Apply the knowledge of transformation matrix to perform various geometric transformations of entities using theoretical concepts.</p> <p>3. Analyze the various geometric modeling techniques used for mathematical representation of model used in geometric construction.</p> <p>4. Develop the mathematical representations of curves and surfaces used in geometric construction.</p> <p>5. Apply basic concepts of optimization and its techniques used in design of mechanical components.</p>	3	40	60
VI	21BTMECC602	Core 17: Refrigeration & Air	<p>1. Describe the differences between various types of refrigerants, their applications and basic operation of the air refrigeration</p>	3	40	60



		Conditioning (Ap)	<p>cycle.</p> <ol style="list-style-type: none"> Analyze the impact of various operating conditions on the performance and efficiency of a VCRS. Explain the principles of psychrometric processes, such as heating, cooling, humidification, and dehumidification. Demonstrate the ability to select appropriate duct materials and sizes based on system specifications. Demonstrate the ability to select and size HVAC equipment based on load analysis results. 			
VI	21BTMECL601	Core Elective 1: Production & Operation Management (Ap)	<ol style="list-style-type: none"> Understand the role Production Planning and control activities in Manufacturing and Services. Apply the theoretical concepts of production scheduling & job sequencing and their application in Industry. Understand the project management system and latest software used in the field. Demonstrate and apply the knowledge of motion study, time study and work sampling. Explain Supply chain management technique used in the industry. 	4	40	60
VI	21BTMECL602	Core Elective 1: Internal Combustion Engine(Ap)	<ol style="list-style-type: none"> Illustrate a comprehensive overview of internal combustion engines, we will cover their categorization, utility, functioning, and operational processes. Explain a thorough understanding of the various fuels employed in internal combustion engines and the associated fuel delivery systems. Apply the concept of combustion processes within SI and CI engines. Identify the distinct aspects of performance testing and governing analysis for internal combustion engines. Apply the concept of electrical vehicle and modern technology. 	4	40	60
VI	21BTMECL603	Core Elective 1: Orientation to Artificial Intelligence(Ap)	<ol style="list-style-type: none"> Understand Fundamental Artificial Intelligence Concepts. Recognize the approach and components of Artificial Intelligence. Participate in interdisciplinary conversations about AI, recognizing how AI can be applied in various fields. 	4	40	60



			<ol style="list-style-type: none"> 4. Recognize Real-World Applications. 5. Identify potential career opportunities and educational pathways in AI, including the skills and qualifications required for different roles in the field. 			
VI	21BTMECC603	Core Practical 5: Applied Heat Transfer (Ap)	<ol style="list-style-type: none"> 1. Calculate heat transfer rates and temperature distributions in one-dimensional heat conduction scenarios. 2. Calculate heat transfer rates in forced and natural convection scenarios, considering fluid properties and geometrical factors. 3. Evaluate the impact of different materials and surface conditions on radiation heat transfer, considering factors like emissivity, absorptivity, and reflectivity. 4. Analyze the impact of various operating conditions on the performance and efficiency of a VCRS. 5. Explain the principles of Psychrometric processes, such as heating, cooling, humidification, and dehumidification. 	2	100	100
VI	21BTMECC604	Core Practical 6: Computer Aided Design & Analysis (Ap)	<ol style="list-style-type: none"> 1. Understand the 3D modeling software and its application. 2. Demonstrate various features of 3D Modeling Software. 3. Develop an Assembly using 3D components. 4. Perform motion study analysis of mechanical product. 5. Analyze the component for Different condition using Analysis software. 	2	100	100



VI	21UFEDE604	DSE 2: Robotics Technology	<ol style="list-style-type: none"> 1. Summarize the fundamentals, history and components for designing robots. 2. Design Electronics controller for robotics applications and actuators for robotic movements. 3. Write programs for interfacing various sensors for robotics applications. 4. Select different programming languages and environments used for robot controller program development. 5. Understands different automation system in manufacturing. 	4	40	60
VI	21UTDE008 21UTDE009	TDE 1: Total Quality Management / Plant Maintenance & Safety	<p>Total Quality Management</p> <ol style="list-style-type: none"> 1. Interpret Quality and Total quality management. 2. Make use of design of experiments, concepts of just in time and quality management. 3. Illustrate Total Productive maintenance and ISO. 4. Utilize knowledge of contemporary trends in quality engineering and Reliability Engineering in industry. <p>Plant Maintenance & Safety</p> <ol style="list-style-type: none"> 1. Relate troubles in mechanical elements. 2. Explain overhaul of mechanical components and electrical motor. 3. Illustrate plant maintenance using tribology, corrosion and preventive maintenance. 4. Apply the concept of industrial acts for health and safety. 5. Identify recovery methods, recovery and retrofitting processes for various applications. 	2	40	60



VI	21BTMECR601	Core Enrichment 1: Concept to Practice	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written and oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. 5. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 	1	40	-
VI	21AEFS601	FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Understand the given situation to think critically, logically and creatively and deal accordingly based on that. 2. Apply the knowledge, skills and judgment around human communication that facilitate employability skills. 3. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions. 4. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc. 	-	Cumulative evaluation at the end of Semester VII	
VI	21AECO021	CoC – 3D Printing Technology	<ol style="list-style-type: none"> 1. Skill development to demonstrate 3D Printing Process. 2. Skill development to identify the general procedure to create component in 3D Printing. 	2	100	-



Faculty of Health Sciences
School of pharmaceutical sciences
Program: M. Pharm (Pharmaceutics)-AY 2021-2022

OBJECTIVES OF THE PROGRAMME

- Provide advanced knowledge of pharmaceutical sciences, including drug development, formulation, and clinical pharmacology.
- Develop research skills to conduct independent investigations and contribute to the advancement of pharmaceutical knowledge.
- Equip students with the ability to practice pharmacy in clinical settings, focusing on patient care, therapeutic management, and drug therapy optimization.
- Foster professional communication, leadership, and ethical decision-making skills necessary for effective collaboration in healthcare teams.
- Prepare students for roles in the pharmaceutical industry, including regulatory affairs, quality control, and drug safety management

GRADUATE ATTRIBUTES

- **Core Competence:** possess in-depth professional knowledge of pharmaceutics, including conceptual, theoretical, methodology for further independent learning, ethics, and professional skills in pharmaceutical technology.
- **Transferable global & impactful societal skills:** Ability to Cooperate with other healthcare providers for high quality pharmaceutical services and effectively communicates with patients with respect of cultural diversity.
- **Adaptability and Resilience:** Demonstrate resilience, perseverance and positivity in unfamiliar situations and adapt their skills and knowledge to excel in new environment
- **Sense of purpose & curiosity:** Possess intellectual curiosity to apply the knowledge to generate, develop and realize new ideas of improved dosage form development.
- **Ethics & lifelong immersive learning:** Recognize the Use of recent information and technologies for lifelong learning, improving professional skills and serving the community for holistic and sustainable development.



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Depth and breadth of knowledge: will be capable to acquire knowledge on the fundamentals of Pharmaceutical Sciences, modern analytical techniques, patents, research methodology, regulatory affairs and novel drug delivery system.
PEO2	:	Practice, Operation and usage of modern tools and technology: will be able to use advanced lab equipment and computational tools to design, synthesize, analyze, evaluate and formulate pharmaceutical products.
PEO3	:	Professional capacity and passion of learning: are flexible and adaptable in different work environments, prepared to acquire, develop, employ and integrate new technologies and exhibit leadership and team work quality.
PEO 4	:	Research, numeracy, scholarship and data literacy: will exhibit ethical behaviour consistent with academic honesty and use of appropriate guidelines and procedures with responsible conduct of research.
PEO 5	:	Global, moral and aesthetic sustainability: will have life-long self-learning abilities and able to relate the concepts of Pharmaceutical Sciences with the global needs of social healthcare for sustainable development.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain knowledge: Imparts the fundamentals of research basis in order to validate techniques & technology in practice to pharmacy.
PO2	:	Problem analysis: Able to identify the problems related to dosage form development and regulatory requirements.
PO3	:	Drug development and research: Develop dosage forms for improvement of therapy and identify the need of suitable dosage forms for therapy.
PO 4	:	Modern tool usage: Use the modern tool like tablet punching machine, HPLC, FTIR, SEM, etc. for development of



		medicaments.
PO 5	:	Professional Identity: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
PO 6	:	Ethics: Apply pharmaceutical ethical principles and understand the impact of the professional solutions in societal and environmental contexts and need for holistic and sustainable development.
PO 7	:	Individual and team work: Demonstrate effective planning abilities including time management, resource management, and organizational skills to develop and implement plans and organize work to meet deadlines.
PO 8	:	Communication: Inculcate the professional relationship in multidisciplinary set up, patient management and co-partnership basis.
PO 9	:	Life-long learning: Able to recognize and understand need of lifelong learning in the broadest context of technological change with harmony.

Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PO 1	:	Domain knowledge: Imparts the fundamentals of research basis in order to validate techniques & technology in practice to pharmacy.
PO 2	:	Problem analysis: Able to identify the problems related to dosage form development and regulatory requirements.
PO 3	:	Drug development and research: Develop dosage forms for improvement of therapy and identify the need of suitable dosage forms for therapy.
PO 4	:	Modern tool usage: Use the modern tool like tablet punching machine, HPLC, FTIR, SEM, etc. for development of medicaments.
PO 5	:	Professional Identity: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.



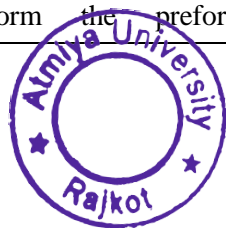
PO 6	:	Ethics: Apply pharmaceutical ethical principles and understand the impact of the professional solutions in societal and environmental contexts and need for holistic and sustainable development..
PO 7	:	Individual and team work: Demonstrate effective planning abilities including time management, resource management, and organizational skills to develop and implement plans and organize work to meet deadlines.
PO 8	:	Communication: Inculcate the professional relationship in multidisciplinary set up, patient management and co-partnership basis.
PO 9	:	Life-long learning: Able to recognize and understand need of lifelong learning in the broadest context of technological change with harmony.

Course Outcomes (COs):

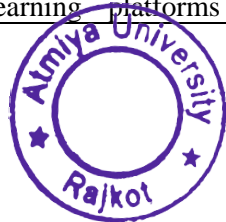
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21MPHPCC101	Core 1: Modern Pharmaceutical Analytical Techniques (Ad)	<ol style="list-style-type: none"> 1. Recognize basic Chemicals and Excipients 2. Understand analysis of various drugs in single and combination dosage forms 3. Apply theoretical and practical skills of the instruments 4. Evaluate the solid behaviors of drug and excipients 5. Develop the suitable analytical method for identification of drugs in raw material and dosage forms. 	4	25	75
I	21MPHPCC102	Core 2: Drug Delivery System (Ad)	<ol style="list-style-type: none"> 1. Understand the various approaches for development of novel drug delivery systems 2. Recognize the criteria for selection of drugs and polymers for the development of delivering system. 3. Apply the concepts in developing various novel dosage forms 4. Analyze the different dosage forms for their suitability in to drug delivery 	4	25	75



			5. Develop and evaluate the prepared dosage forms as per Pharmacopoeial standards and regulatory requirements.			
I	21MPHPCC103	Core 3:Modern Pharmaceutics (Ad)	<ol style="list-style-type: none"> 1. Understand the recent advances in Preformulation concepts, validation, optimization, and compression and compaction principles. 2. Understand and Apply the cGMP and Industrial management principles in dosage form development. 3. Understand and Evaluate Optimization Techniques & Pilot Plant Scale Up Techniques for the Pharmaceutical Dosage forms. 4. Design validation protocols for Pharmaceutical dosage forms. 5. Develop new dosage forms by applying the principles of optimization. 	4	25	75
I	21MPHPCC104	Core 4:Regulatory Affairs (F)	<ol style="list-style-type: none"> 1. Recognize the basic concepts of innovator and generic drugs, drug development process 2. Summarize the regulatory guidance's and guidelines for filing and approval process 3. Preparation of Dossiers and their submission to regulatory agencies in different countries 4. Understanding the post approval regulatory requirements for actives and drug products 5. Memorize and relate the clinical trials requirements for approvals for conducting clinical trials 	4	25	75
I	21MPHPID101/ 21MPHPID102	DSE – ID: Statistical methods / Data analysis tools in life sciences	<ol style="list-style-type: none"> 1. State the need of data analysis and normalization. 2. Execute various statistical tests and Analyze results. 3. Implement sorting and subtotalling and creating macros. 4. Develop Pivot charts and reports in different formats. 5. Designing presentation with rehears timings and animations. 	4	50	50
I	21MPHPCC105	Core Practical 1:	<ol style="list-style-type: none"> 1. Perform the preformulation studies before 	6	50	100



		Pharmaceutics Practical – I	<p>development of dosage forms.</p> <p>2. Recognize the criteria for selection of active pharmaceutical ingredients.</p> <p>3. Apply the concepts in the generic drug product development.</p> <p>4. Analyze the active pharmaceutical ingredients and dosage forms by novel instrumental techniques.</p> <p>5. Develop and evaluate the novel dosage forms as per Pharmacopoeial standards and regulatory requirements.</p>			
I	21MPHPCC106	Seminar/Assignment	<p>1. Demonstrate the ability to conduct in-depth research and synthesize information from various credible sources related to the seminar/assignment topic.</p> <p>2. Develop critical thinking and analytical skills by examining and evaluating diverse perspectives on current issues in their field of study.</p> <p>3. Present research findings and insights effectively through structured oral and written communication, utilizing appropriate academic conventions.</p> <p>4. Apply constructive feedback from faculty and peers to improve research quality and presentation skills, fostering a continuous improvement mindset.</p> <p>5. Reflect on the ethical considerations and societal impact of research topics, enhancing professional responsibility and awareness.</p>	4	100	NA
I		CEC – I: Online / Professional certification courses/STC*	<p>1. Acquire specialized knowledge and practical skills in a focused area, enhancing professional qualifications relevant to current industry standards.</p> <p>2. Apply learned concepts and techniques from the certification or short-term course to real-world problems, bridging theory and practical application.</p> <p>3. Develop self-directed learning and time management skills by engaging with structured online or short-term professional courses.</p> <p>4. Enhance technological proficiency by navigating online learning platforms and using digital tools</p>	NA	NA	NA



			effectively for skill development. 5. Reflect on the impact of newly acquired skills on professional growth and career advancement, fostering continuous improvement and adaptability.			
I		CEC - II :Co-curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities)	1.Gain exposure to current research and advancements in the field by attending academic conferences, seminars, and presentations. 2. Develop and refine presentation and communication skills by actively participating in scholarly discussions and presentations. 3. Network with professionals, researchers, and peers, establishing connections that support career development and collaborative opportunities. 4. Analyze and critically evaluate scientific presentations and research findings, enhancing understanding and critical-thinking skills. 5. Reflect on the significance of co-curricular engagement in academic and professional growth, fostering lifelong learning and adaptability.	NA	NA	NA
I	21CEWE01	Wisdom and Ethics for success in life	1. Differentiate the career success, academic success and life success. 2. Identify the correct priority order in life and illustrate the human goal. 3. Understand that the relationships are definite. 4. Understand the Interconnectedness between all the orders in existence.	2		
II	21MPHPCC201	Core 5 :Molecular Pharmaceutics (Nano Tech and Targeted DDS) (Ad)	1.Understand the various approaches for development of novel drug delivery systems 2. Recognize the criteria for selection of drugs and polymers for the development of delivering system. 3.Apply the concepts in developing various novel dosage forms and its evaluation 4.Analyze the different dosage forms for their suitability in to drug delivery	4	25	75



			5.Evaluate targeted and nanotechnology based drug delivery systems			
II	21MPHPCC202	Core 6: Advanced Biopharmaceutics & Pharmacokinetics (Ad)	<ol style="list-style-type: none"> 1. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance. 2. The use raw data and derive the pharmacokinetic models and parameters the best describe the process of drug absorption, distribution, metabolism and elimination. 3. The critical evaluation of biopharmaceutic studies involving drug product equivalency. 4.The design and evaluation of dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters 5. The potential clinical pharmacokinetic problems and application of basics of pharmacokinetic. 	4	25	75
II	21MPHPCC203	Core 7: Computer Aided Drug Delivery System (Ap)	<ol style="list-style-type: none"> 1.History of Computers in Pharmaceutical Research and Development 2.Computational Modeling of Drug Disposition 3.Computers in Preclinical Development 4.Optimization Techniques in Pharmaceutical Formulation 5.Computers in Market Analysis 6.Computers in Clinical Development 7.Artificial Intelligence (AI) and Robotics 8.Computational fluid dynamics (CFD) 	4	25	75
II	21MPHPCC204	Core 8: Cosmetic & Cosmeceuticals (Ad)	<ol style="list-style-type: none"> 1. Understand the various approaches for development of cosmetics and cosmeceuticals. 2. Recognize the criteria for selection of Ingredients and basic science to develop cosmetics and cosmeceuticals. 3. Apply the concepts in developing various cosmetic formulations. 4. Analyze cosmetics and cosmeceuticals with desired Safety, stability, and efficacy. 	4	25	75
II	21MPHPID201/ 21MPHPID202	DSE – ID : Industrial and Environment Management /	1. Analyze the advanced concepts of drugs and pharmaceuticals I	4	50	50



		Chemical Technology	<p>2. Analyze the advanced concepts of drugs and pharmaceuticals-II</p> <p>3. Analyze the advanced concepts of essential oil and isolation of natural products</p> <p>4. Evaluate the advanced concepts of Natural & Synthetic perfumes</p> <p>5. Evaluate the advanced concepts of heat treatments & non-destructive testing technology</p>			
II	21MPHPCC205	Core Practical 2: Pharmaceutics Practical II	<p>1. Perform the bioavailability and other studies using various software.</p> <p>2. Recognize the criteria for selection of active pharmaceutical ingredients for development of effective dosage forms.</p> <p>3. Apply the concept of QbD in the drug product development.</p> <p>4. Analyze the data obtained from various studies by using suitable software.</p> <p>5. Evaluate the prepared cosmetics and dosage forms as per Pharmacopoeial standards and regulatory requirements.</p>	6	50	100
II	21MPHPCC206	Seminar/Assignment	<p>1. Demonstrate the ability to conduct in-depth research and synthesize information from various credible sources related to the seminar/assignment topic.</p> <p>2. Develop critical thinking and analytical skills by examining and evaluating diverse perspectives on current issues in their field of study.</p> <p>3. Present research findings and insights effectively through structured oral and written communication, utilizing appropriate academic conventions.</p> <p>4. Apply constructive feedback from faculty and peers to improve research quality and presentation skills, fostering a continuous improvement mindset.</p> <p>5. Reflect on the ethical considerations and societal impact of research topics, enhancing professional responsibility and awareness.</p>	4	100	NA



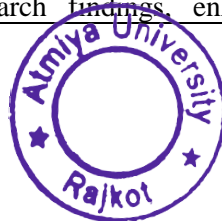
II		Online / Professional certification courses/STC*	<ol style="list-style-type: none"> 1. Acquire specialized knowledge and practical skills in a focused area, enhancing professional qualifications relevant to current industry standards. 2. Apply learned concepts and techniques from the certification or short-term course to real-world problems, bridging theory and practical application. 3. Develop self-directed learning and time management skills by engaging with structured online or short-term professional courses. 4. Enhance technological proficiency by navigating online learning platforms and using digital tools effectively for skill development. 5. Reflect on the impact of newly acquired skills on professional growth and career advancement, fostering continuous improvement and adaptability. 			
II		CEC - II : Co-curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities)	<ol style="list-style-type: none"> 1. Gain exposure to current research and advancements in the field by attending academic conferences, seminars, and presentations. 2. Develop and refine presentation and communication skills by actively participating in scholarly discussions and presentations. 3. Network with professionals, researchers, and peers, establishing connections that support career development and collaborative opportunities. 4. Analyze and critically evaluate scientific presentations and research findings, enhancing understanding and critical-thinking skills. 5. Reflect on the significance of co-curricular engagement in academic and professional growth, fostering lifelong learning and adaptability. 			
II	21CEWE201	Wisdom and Ethics for success in life	<ol style="list-style-type: none"> 1. Differentiate the career success, academic success and life success. 2. Identify the correct priority order in life and illustrate the human goal. 3. Understand that the relationships are definite. 	2		



			4. Understand the Interconnectedness between all the orders in existence.			
III	21MPHPCC301	Core 9: Research Methodology & Biostatistics	1.Learn general research methodology 2.Understand the basic concepts of biostatistics 3.Understand the functions of ethics committees in medical research 4.Learn the guidelines for developing animal facilities 5.Understand the genesis of bioethics with special reference to Helsinki declaration	4	25	75
III	21MPHPCC302	Core 9: Discussion/Presentation (Proposal presentation)	1. Develop a well-structured research or project proposal, showcasing a clear understanding of the topic, objectives, and methodology. 2. Demonstrate effective presentation skills by clearly communicating proposal goals, methods, and expected outcomes to an academic or professional audience. 3. Engage in constructive discussions, responding to questions and feedback from peers and faculty with confidence and clarity. 4. Apply critical-thinking skills to refine the proposal based on peer and faculty feedback, ensuring its relevance and rigor. 5. Reflect on the proposal presentation process, identifying areas for improvement in both research design and presentation technique.	2	50	NA
III	21MPHPCC303	Core 11: Journal Club - I	1.Learn scientific writing 2.Explain critical literature appraisal skills 3.Learn the guidelines for writing the manuscript 4.Formulate ideas for future research 5.Think and discuss controversies in research	1	25	NA
III	21MPHPCC304	Core 12: Research Work	1. Formulate a research question and design a structured research plan, applying foundational knowledge of pharmaceutical sciences. 2. Develop skills in conducting experiments, collecting data, and using appropriate techniques and tools relevant to pharmaceutical research.	14	NA	350



			<p>3. Analyze and interpret research data accurately, drawing meaningful conclusions that contribute to the understanding of pharmaceutical science.</p> <p>4. Communicate research findings effectively through written reports and oral presentations, adhering to scientific conventions and ethics.</p> <p>5. Demonstrate an understanding of ethical standards and regulatory requirements in pharmaceutical research, ensuring responsible conduct.</p>			
III	21MPHPCE301	<p>CEC – I : Online / Professional certification courses/STC*</p>	<p>1. Acquire specialized knowledge and practical skills in a focused area, enhancing professional qualifications relevant to current industry standards.</p> <p>2. Apply learned concepts and techniques from the certification or short-term course to real-world problems, bridging theory and practical application.</p> <p>3. Develop self-directed learning and time management skills by engaging with structured online or short-term professional courses.</p> <p>4. Enhance technological proficiency by navigating online learning platforms and using digital tools effectively for skill development.</p> <p>5. Reflect on the impact of newly acquired skills on professional growth and career advancement, fostering continuous improvement and adaptability.</p>	2		
III		<p>CEC - II : Co-curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities)</p>	<p>1. Gain exposure to current research and advancements in the field by attending academic conferences, seminars, and presentations.</p> <p>2. Develop and refine presentation and communication skills by actively participating in scholarly discussions and presentations.</p> <p>3. Network with professionals, researchers, and peers, establishing connections that support career development and collaborative opportunities.</p> <p>4. Analyze and critically evaluate scientific presentations and research findings, enhancing understanding and</p>			



			critical-thinking skills. 5. Reflect on the significance of co-curricular engagement in academic and professional growth, fostering lifelong learning and adaptability.			
IV	21MPHPCC401	Core 13:Journal Club - II	1.Learn scientific writing 2.Explain critical literature appraisal skills 3.Learn the guidelines for writing the manuscript 4.Formulate ideas for future research 5.Think and discuss controversies in research	1	25	NA
IV	21MPHPCC402	Core 14:Research Work	1. Formulate a research question and design a structured research plan, applying foundational knowledge of pharmaceutical sciences. 2. Develop skills in conducting experiments, collecting data, and using appropriate techniques and tools relevant to pharmaceutical research. 3. Analyze and interpret research data accurately, drawing meaningful conclusions that contribute to the understanding of pharmaceutical science. 4. Communicate research findings effectively through written reports and oral presentations, adhering to scientific conventions and ethics. 5. Demonstrate an understanding of ethical standards and regulatory requirements in pharmaceutical research, ensuring responsible conduct.	16	NA	400
IV	21MPHPCC403	Discussion/Proposal Presentation	1. Develop a well-structured research or project proposal, showcasing a clear understanding of the topic, objectives, and methodology. 2. Demonstrate effective presentation skills by clearly communicating proposal goals, methods, and expected outcomes to an academic or professional audience. 3. Engage in constructive discussions, responding to questions and feedback from peers and faculty with confidence and clarity. 4. Apply critical-thinking skills to refine the proposal based on peer and faculty feedback, ensuring its	3	75	NA



			relevance and rigor. 5. Reflect on the proposal presentation process, identifying areas for improvement in both research design and presentation technique.			
IV		CEC-II :Co-curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities)	1. Gain exposure to current research and advancements in the field by attending academic conferences, seminars, and presentations. 2. Develop and refine presentation and communication skills by actively participating in scholarly discussions and presentations. 3. Network with professionals, researchers, and peers, establishing connections that support career development and collaborative opportunities. 4. Analyze and critically evaluate scientific presentations and research findings, enhancing understanding and critical-thinking skills. 5. Reflect on the significance of co-curricular engagement in academic and professional growth, fostering lifelong learning and adaptability.	2-7*		



Faculty of Health sciences
School of pharmaceutical sciences
Program: M. Pharm (Quality Assurance)

OBJECTIVES OF THE PROGRAMME

- Develop expertise in pharmaceutical quality management to ensure adherence to international quality standards in drug manufacturing, testing, and distribution.
- Train students in regulatory compliance and the principles of Good Manufacturing Practices (GMP), Good Laboratory Practices (GLP), and Good Clinical Practices (GCP) to ensure that pharmaceutical products meet safety and quality requirements.
- Equip students with analytical and problem-solving skills to identify, investigate, and resolve quality issues in drug development, manufacturing, and quality control processes.
- Prepare students to manage and implement quality assurance systems within pharmaceutical companies, including risk management, quality audits, and documentation control to maintain product integrity.
- Promote knowledge of pharmaceutical laws, ethics, and global standards, enabling students to navigate the regulatory landscape and contribute to the development of high-quality, compliant pharmaceutical products.

Graduate Attributes:

- **Core Competence:** An ability to demonstrate in-depth professional knowledge of pharmacy, including conceptual, theoretical, methodology for further independent learning, ethics, and professional skills in pharmaceutical science and able to link them to local, national and global issues to seek positive and sustainable solutions



- **Transferable global & impactful societal skills:** Have the ability to apply problem-solving, research skills, retrieval, analysis, and interpretation of the scientific literature to enhance significantly their own practice-related activities and transferring them to impact through problem solving at local and global levels.
- **Adaptability and Resilience:** Perform effectively in a team environment, providing leadership, team building, exerting a positive influence, and demonstrating project management skills
- **Sense of purpose & curiosity:** Possess intellectual curiosity to apply the knowledge to generate, develop and realize ideas
- **Ethics & lifelong immersive learning:** Adhered to highest standards of ethics and recognize the use of recent information technologies for lifelong learning, improving professional skills and serving the community.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:		
PEO1	:	Depth and breadth of knowledge: will contribute to produce pharmacy graduates with strong fundamental concepts and high technical competence in pharmaceutical sciences who shall be able to use the tools in pharmaceutical arena for success.
PEO2	:	Practice, Operation and usage of modern tools and technology: will contribute to To generate potential knowledge pools with interpersonal and collaborative skills to identify, assess and formulate problems and execute the solution in closely related pharmaceutical industries.
PEO3	:	Professional capacity and passion of learning: are flexible and adaptable in different work environments, develop a sense of teamwork and awareness amongst students towards the importance of interdisciplinary approach for Developing competence in solving complex problems in the area of Pharmaceutical Sciences.
PEO 4	:	Research, numeracy, scholarship and data literacy: will exhibit ethical behaviour consistent with academic honesty and to promote the development of trained human resource in Pharmaceutical Science for spreading of quality education with highly professional and ethical attitude, strong communication skills, effective skills to work in a team.
PEO 5	:	Global, moral and aesthetic sustainability: will have love for learning in pursuance of excellence in all domains of life and will have the students to contribute towards health care system and encourage the students to participate in life-long learning process for a highly productive career, and to relate the concepts of Pharmaceutical Sciences



	towards serving the betterment of the society.
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Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain knowledge: acquire knowledge and comprehension of the core and specialization subjects of the respective pharmacy specialization
PO2	:	Problem analysis: be able to develop, critical thinking and analytical skills while solving problems and making decisions in dissertation research
PO3	:	Conduct investigations of complex problems: be able to generate ideas for research, analyse them, execute them and publish the findings.
PO 4	:	Modern tool usage: be able to learn, select, and apply appropriate current methods and procedures in modern pharmaceutical research with an understanding of the limitations.
PO 5	:	Environment and sustainability: Analyse global environmental problems and critically evaluate evidence to formulate and organize sustainable strategies.
PO 6	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Biotechnological practice.
PO 7	:	Individual and team work: Exhibit leadership qualities with ability to function effectively as an individual and in a team.
PO 8	:	Communication: able to learn communication by giving seminars, journal club and other organizational activities. They will be able to comprehend and write effective reports, make effective presentations and documentation.
PO 9	:	Life-long learning: able to integrate and appraise information/knowledge from a variety of sources throughout the life

Programme Specific Outcome (PSOs):

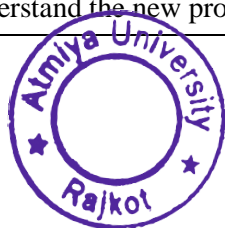
After completion of the programme the Graduate will:		
PSO1	:	Be able to Learn Quality Assurance, Total Quality Management, and Quality Management, GLP, GCP, QbD, PAT and their documentation concepts.
PSO2	:	Be able to apply the acquired knowledge to provide cost-effective and sustainable solutions in Pharmacy.



PSO3	:	Translate Pharmacy know-how to address environmental, ethical, intellectual property rights and societal issues.
PSO4	:	Be able to gain hands on experience in calibration, validation, product complain and also identification, characterization, and quantification of drugs and pharmaceuticals.

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	21MPHQCC101	Core 1: Modern Pharmaceutical Analytical Techniques (Ad)	1. Recognize basic principle of spectroscopy 2. Recognize basic principle of chromatography 3. Understand analysis of various drugs in single and combination dosage forms 4. Analyze the API and its degraded in pharmaceutical product and in biological sample 5. Apply Theoretical and practical skills of the instruments	4	25	75
I	21MPHQCC102	Core 2: Quality Management System (Ad)	1. Understand the importance of quality at all the level of Product Development. 2. Understand and apply ISO management system and tools for quality improvement. 3. Analyze the issues in quality and Evaluate various Pharmaceuticals. 4. Understand and perform various stability testing methods for Pharmaceuticals. 5. Identify and Apply appropriate statistical approach for the quality management of Pharmaceuticals.	4	25	75
I	21MPHQCC103	Core 3: Quality Control and Quality Assurance (Ap)	1. Understand the cGMP aspects in a pharmaceutical industry 2. Remember and appreciate the importance of documentation in pharma industries 3. To analyze the scope of quality certifications in to Pharmaceutical industries 4. To understand the responsibilities of QA & QC departments.	4	25	75
I	21MPHQCC104	Core 4: Product	1. To understand the new product development process	4	25	75



		Development and Technology Transfer (Ad)	2.To understand the necessary information to transfer technology from R&D to actual manufacturing by sorting out various information obtained during R&D 3.To elucidate necessary information to transfer technology of existing products between various manufacturing places			
I	21MPHQID101/ 21MPHQID102	DSE – ID: Statistical methods / Data analysis tools in life sciences	1. State the need of data analysis and normalization. 2. Execute various statistical tests and Analyze results. 3. Implement sorting and subtotalling and creating macros. 4. Develop Pivot charts and reports in different formats. 5. Designing presentation with rehears timings and animations.	4	50	50
I	21MPHQCC105	Core Practical 1: Pharmaceutical Quality Assurance Practical - I	1.To Analyze the Pharmacopoeial compounds in bulk and in their formulations 2.Interpret the different regulatory specification by case study 3.Operate the sophisticated instrument for pharmaceutical analysis 4. To Perform quality control tests for tablets, capsules, parenterals and semisolid dosage forms. 5.To create the Stability study protocol	6	50	100
I	21MPHQCC106	Core Practical 1: Seminar/Assignment	1. Demonstrate the ability to conduct in-depth research and synthesize information from various credible sources related to the seminar/assignment topic. 2. Develop critical thinking and analytical skills by examining and evaluating diverse perspectives on current issues in their field of study. 3. Present research findings and insights effectively through structured oral and written communication, utilizing appropriate academic conventions. 4. Apply constructive feedback from faculty and peers to improve research quality and presentation skills, fostering a continuous improvement mindset. 5. Reflect on the ethical considerations and societal impact of research topics, enhancing professional responsibility and awareness.	4	100	-
I		CEC-I : Online / Professional certification	1. Acquire specialized knowledge and practical skills in a focused area, enhancing professional qualifications relevant to current industry standards.			



		courses/STC*	<p>2. Apply learned concepts and techniques from the certification or short-term course to real-world problems, bridging theory and practical application.</p> <p>3. Develop self-directed learning and time management skills by engaging with structured online or short-term professional courses.</p> <p>4. Enhance technological proficiency by navigating online learning platforms and using digital tools effectively for skill development.</p> <p>5. Reflect on the impact of newly acquired skills on professional growth and career advancement, fostering continuous improvement and adaptability.</p>			
I		CEC-II :Co-curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities)	<p>1. Gain exposure to current research and advancements in the field by attending academic conferences, seminars, and presentations.</p> <p>2. Develop and refine presentation and communication skills by actively participating in scholarly discussions and presentations.</p> <p>3. Network with professionals, researchers, and peers, establishing connections that support career development and collaborative opportunities.</p> <p>4. Analyze and critically evaluate scientific presentations and research findings, enhancing understanding and critical-thinking skills.</p> <p>5. Reflect on the significance of co-curricular engagement in academic and professional growth, fostering lifelong learning and adaptability.</p>			
I	21CEWE01	Wisdom and Ethics for success in life	<p>1. Differentiate the career success, academic success and life success.</p> <p>2. Identify the correct priority order in life and illustrate the human goal.</p> <p>3. Understand that the relationships are definite.</p> <p>4. Understand the Interconnectedness between all the orders in existence.</p>	2		
II	21MPHQCC201	Core 5: Hazards and Safety	<p>1. Understand about environmental problems among learners.</p> <p>2. Impart basic knowledge about the environment and its allied</p>	4	25	75



		Management (F)	<p>problems.</p> <p>3.Develop an attitude of concern for the industry environment</p> <p>4.Ensure safety standards in pharmaceutical industry</p> <p>5.Provide comprehensive knowledge on the safety management and Empower an ideas to clear mechanism and management in different kinds of hazard management system</p> <p>6.Teach the method of Hazard assessment, procedure, methodology for provide safe industrial atmosphere and Understand the various approaches for development of novel drug delivery systems</p>			
II	21MPHQCC202	Core 6: Pharmaceutical Validation (Ad)	<p>1.Understand The concepts of calibration, qualification and validation</p> <p>2. Understand The qualification of various equipments and instruments Recognize the criteria for selection of drugs and polymers for the development of delivering system.</p> <p>3.Apply Process validation of different dosage forms</p> <p>4.Analyze Validation of analytical method for estimation of drugs</p> <p>5.Understand the Cleaning validation of equipments employed in the manufacture of pharmaceuticals</p>	4	25	75
II	21MPHQCC203	Core 7: Audits and Regulatory Compliance (Ap)	<p>1.Recognize and understand the methodology of auditing</p> <p>2.Understand the importance of auditing</p> <p>3.Carry out the audit process</p> <p>4.Prepare and analyze the auditing report</p> <p>5.Prepare the check list for auditing</p>	4	25	75
II	21MPHQCC204	Core 8: Pharmaceutical Manufacturing Technology (Ad)	<p>1.Recognize the basic requirements of pharmaceutical industry</p> <p>2.Understand the various process technology for development of dosage forms</p> <p>3.Understand and implement the principles of Quality by design and process analytical technology in pharmaceutical manufacturing</p> <p>4.Analyze and develop the packaging systems for pharmaceutical products</p> <p>5.Evaluate the packaging systems for their stability</p>	4	25	75
II	21MPHQID201/ 21MPHQID202	DSE – ID: Industrial and Environment	<p>1.Analyze the advanced concepts of drugs and pharmaceuticals</p> <p>I</p>	4	50	50



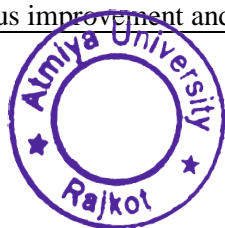
		Management / Chemical Technology	2.Analyze the advanced concepts of drugs and pharmaceuticals-II 3.Analyze the advanced concepts of essential oil and isolation of natural products 4.Evaluate the advanced concepts of Natural & Synthetic perfumes 5.Evaluate the advanced concepts of heat treatments & non-destructive testing technology			
II	21MPHQCC205	Core Practical 2 : Pharmaceutical Quality Assurance Practical II	1.Apply the concepts of Qualification for Pharma equipment 2.Recognize the criteria for Validation 3.Apply the Validation of an analytical method for a drug. 4.Analyze the organic contaminants residue, antibiotic residue and Metallic contaminants 5.Evaluate Case study on application of QbD and PAT	6	50	100
II		CEC-I: Online / Professional certification courses/STC*	1. Acquire specialized knowledge and practical skills in a focused area, enhancing professional qualifications relevant to current industry standards. 2. Apply learned concepts and techniques from the certification or short-term course to real-world problems, bridging theory and practical application. 3. Develop self-directed learning and time management skills by engaging with structured online or short-term professional courses. 4. Enhance technological proficiency by navigating online learning platforms and using digital tools effectively for skill development. 5. Reflect on the impact of newly acquired skills on professional growth and career advancement, fostering continuous improvement and adaptability.	NA	NA	NA
II		Co-curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities)	1. Gain exposure to current research and advancements in the field by attending academic conferences, seminars, and presentations. 2. Develop and refine presentation and communication skills by actively participating in scholarly discussions and presentations. 3. Network with professionals, researchers, and peers,	NA	NA	NA



			<p>establishing connections that support career development and collaborative opportunities.</p> <p>4. Analyze and critically evaluate scientific presentations and research findings, enhancing understanding and critical-thinking skills.</p> <p>5. Reflect on the significance of co-curricular engagement in academic and professional growth, fostering lifelong learning and adaptability.</p>			
II	21CEWE201	Wisdom and Ethics for success in life	<p>1. Differentiate the career success, academic success and life success.</p> <p>2. Identify the correct priority order in life and illustrate the human goal.</p> <p>3. Understand that the relationships are definite.</p> <p>4. Understand the Interconnectedness between all the orders in existence.</p>	2		
III	21MPHQCC301	Core 9: Research Methodology & Biostatistics	<p>1. Learn general research methodology</p> <p>2. Understand the basic concepts of biostatistics</p> <p>3. Understand the functions of ethics committees in medical research</p> <p>4. Learn the guidelines for developing animal facilities</p> <p>5. Understand the genesis of bioethics with special reference to Helsinki declaration</p>	4	25	75
III	21MPHQCC302	Core 10: Discussion/Presentation (Proposal presentation)	<p>1. Develop a well-structured research or project proposal, showcasing a clear understanding of the topic, objectives, and methodology.</p> <p>2. Demonstrate effective presentation skills by clearly communicating proposal goals, methods, and expected outcomes to an academic or professional audience.</p> <p>3. Engage in constructive discussions, responding to questions and feedback from peers and faculty with confidence and clarity.</p> <p>4. Apply critical-thinking skills to refine the proposal based on peer and faculty feedback, ensuring its relevance and rigor.</p> <p>5. Reflect on the proposal presentation process, identifying areas for improvement in both research design and</p>	2	50	NA



			presentation technique.			
III	21MPHQCC303	Core 11: Journal Club - I	1.Learn scientific writing 2.Explain critical literature appraisal skills 3.Learn the guidelines for writing the manuscript 4.Formulate ideas for future research 5.Think and discuss controversies in research	1	25	NA
III	21MPHQCC304	Core 12: Research Work	1. Formulate a research question and design a structured research plan, applying foundational knowledge of pharmaceutical sciences. 2. Develop skills in conducting experiments, collecting data, and using appropriate techniques and tools relevant to pharmaceutical research. 3.Analyze and interpret research data accurately, drawing meaningful conclusions that contribute to the understanding of pharmaceutical science. 4.Communicate research findings effectively through written reports and oral presentations, adhering to scientific conventions and ethics. 5.Demonstrate an understanding of ethical standards and regulatory requirements in pharmaceutical research, ensuring responsible conduct.	14	NA	350
III	21MPHQCE301	CEC-I: Online / Professional certification courses/STC*	1.Acquire specialized knowledge and practical skills in a focused area, enhancing professional qualifications relevant to current industry standards. 2.Apply learned concepts and techniques from the certification or short-term course to real-world problems, bridging theory and practical application. 3.Develop self-directed learning and time management skills by engaging with structured online or short-term professional courses. 4.Enhance technological proficiency by navigating online learning platforms and using digital tools effectively for skill development. 5.Reflect on the impact of newly acquired skills on professional growth and career advancement, fostering continuous improvement and adaptability.	2		



III		CEC-II :Co-curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities)	<p>1.Gain exposure to current research and advancements in the field by attending academic conferences, seminars, and presentations.</p> <p>2.Develop and refine presentation and communication skills by actively participating in scholarly discussions and presentations.</p> <p>3.Network with professionals, researchers, and peers, establishing connections that support career development and collaborative opportunities.</p> <p>4.Analyze and critically evaluate scientific presentations and research findings, enhancing understanding and critical-thinking skills.</p> <p>5.Reflect on the significance of co-curricular engagement in academic and professional growth, fostering lifelong learning and adaptability.</p>			
IV	21MPHQCC401	Core 13: Journal Club - II	<p>1.Learn scientific writing</p> <p>2.Explain critical literature appraisal skills</p> <p>3.Learn the guidelines for writing the manuscript</p> <p>4.Formulate ideas for future research</p> <p>5.Think and discuss controversies in research</p>	1	25	NA
IV	21MPHQCC402	Core 14: Research Work	<p>1.Formulate a research question and design a structured research plan, applying foundational knowledge of pharmaceutical sciences.</p> <p>2.Develop skills in conducting experiments, collecting data, and using appropriate techniques and tools relevant to pharmaceutical research.</p> <p>3.Analyze and interpret research data accurately, drawing meaningful conclusions that contribute to the understanding of pharmaceutical science.</p> <p>4.Communicate research findings effectively through written reports and oral presentations, adhering to scientific conventions and ethics.</p> <p>5.Demonstrate an understanding of ethical standards and regulatory requirements in pharmaceutical research, ensuring responsible conduct.</p>	16	NA	400
IV	21MPHQCC403	Core 14:	1.Develop a well-structured research or project proposal,	3	75	NA



		Discussion/Proposal Presentation	<p>showcasing a clear understanding of the topic, objectives, and methodology.</p> <p>2.Demonstrate effective presentation skills by clearly communicating proposal goals, methods, and expected outcomes to an academic or professional audience.</p> <p>3.Engage in constructive discussions, responding to questions and feedback from peers and faculty with confidence and clarity.</p> <p>4.Apply critical-thinking skills to refine the proposal based on peer and faculty feedback, ensuring its relevance and rigor.</p> <p>5.Reflect on the proposal presentation process, identifying areas for improvement in both research design and presentation technique.</p>			
IV		CEC-II :Co-curricular Activities (Attending Conference, Scientific Presentations and Other Scholarly Activities)	<p>1.Gain exposure to current research and advancements in the field by attending academic conferences, seminars, and presentations.</p> <p>2.Develop and refine presentation and communication skills by actively participating in scholarly discussions and presentations.</p> <p>3.Network with professionals, researchers, and peers, establishing connections that support career development and collaborative opportunities.</p> <p>4.Analyze and critically evaluate scientific presentations and research findings, enhancing understanding and critical-thinking skills.</p> <p>5.Reflect on the significance of co-curricular engagement in academic and professional growth, fostering lifelong learning and adaptability.</p>	2-7*		



Faculty of Health sciences
School of pharmaceutical sciences
Program: B. Pharm (Year 22-23)

OBJECTIVES OF THE PROGRAMME

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

- This programme will enable students to acquire knowledge on the Fundamentals of Pharmacy, Pharmacy Practice, Pharmacology, Dosage Form Design, Herbal Drug and Manufacturing Technology to understand emerging and advanced concept in pharmacy to meet requirements of pharmaceutical related industry and entrepreneurship.
- This programme provides students with strong fundamental concepts with high technical competence in pharmaceutical sciences required to solve problems and to pursue higher studies & research.
- After completion of the programme, the students will be able to use advanced lab equipment and computational tools to design, synthesize, analyze, evaluate and formulate pharmaceutical products.
- The programme is intended to inculcate self-learning abilities, professionalism, leadership skills, team building skills, community service outlook and ethical practices in the students.
- After completion of the programme, the students will be able to participate in life-long learning process and relate the concepts of Pharmaceutical Sciences with the needs of social healthcare.

GRADUATE ATTRIBUTES

- An ability to demonstrate in-depth professional knowledge of pharmacy, including conceptual, theoretical, methodology for further independent learning, ethics, and professional skills in pharmaceutical science.
- Have the ability to apply problem-solving, research skills, retrieval, analysis, and interpretation of the scientific literature to enhance significantly their own practice-related activities.



- Perform effectively in a team environment, providing leadership, team building, exerting a positive influence, and demonstrating project management skills.
- Make effective use of communication and information technology and able to carry out numerical calculations and analyses relevant to pharmacy and pharmaceutical practice.
- An ability to apply knowledge of Preparing and dispensing medications legally, ethically and according to guidelines.
- Ability to Cooperation with pharmacists and other healthcare providers in providing high quality pharmaceutical services and effectively communicate with patients and healthcare providers with complete respect of cultural diversity.
- Demonstrating leadership and performing necessary pharmacy administrative duties.
- Recognize the Use of recent information technologies for lifelong learning, improving professional skills and serving the community.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Our programme will produce Graduates who will attain following PEOs after few years of graduation:	
PEO 1	Preparation: To prepare students with theoretical and practical knowledge of pharmaceutical sciences to meet requirements of pharmaceutical related industry and entrepreneurship.
PEO 2	Core Competence: To provide students with strong fundamental concepts with high technical competence in pharmaceutical sciences required to solve problems and to pursue higher studies & research.
PEO 3	Breadth: To empower students with use of advanced lab equipment and computational tools to design, synthesize, analyze, evaluate and formulate pharmaceutical products.
PEO 4	Professionalism: To inculcate in students self-learning abilities, professionalism, leadership skills, team building skills, community service outlook and ethical practices.
PEO 5	Learning environment: To nurture the students with academic environment to participate in life-long learning process and relate the concepts of Pharmaceutical Sciences with the needs of social healthcare.



PROGRAM OUTCOMES

After completion of the programme the Graduate will be able to:	
PO1	: Possess comprehensive knowledge of fundamental principles and their applications in the area of Health Science and Pharmaceutical Technology.
PO2	: Apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PO3	: Design, synthesize, formulate and evaluate novel natural and synthetic pharmaceutical product.
PO4	: Identify and solve the problems related to Pharmaceutical Industry, Regulatory Agencies, Hospital Pharmacy and Community Pharmacy by analytical and critical thinking.
PO5	: Participate and succeed in pharmacy related competitive examinations.
PO6	: Develop written and oral communication skills in order to communicate with pharmacy community and society.
PO7	: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills to be successful entrepreneur with leadership skill and comply with requirement of regulatory and legal system.
PO8	: Understand, analyze and communicate the value of their professional roles in society.
PO9	: Honor personal values and apply ethical principles in professional and social contexts.
PO10	: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
PO11	: Understand the impact of the professional solutions in societal and environmental contexts and need for holistic and sustainable development.
PO12	: Recognize and understand need of lifelong learning in the broadest context of technological change with harmony.



PROGRAM SPECIFIC OUTCOMES (PSOs)

After completion of the programme the Graduate will:		
PSO 1	:	Possess comprehensive knowledge of fundamental principles and their applications in the area of Health Science and Pharmaceutical Technology.
PSO 2	:	Apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PSO 3	:	Design, synthesize, formulate and evaluate novel natural and synthetic pharmaceutical product.
PSO 4	:	Identify and solve the problems related to Pharmaceutical Industry, Regulatory Agencies, Hospital Pharmacy and Community Pharmacy by analytical and critical thinking.
PSO 5	:	Participate and succeed in pharmacy related competitive examinations.

Course Outcomes (COs):

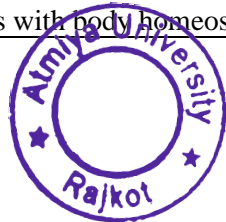
Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGEN146	Communication skills – Theory	1. Recognize basic process of communication needs for a Pharmacist to function effectively in the areas of pharmaceutical operation 2. Summarize Verbal and Non Verbal Communicate skills 3. Understand the team as a team player 4. Summarize interview skills 5. Recognize Leadership qualities and essentials	2	15	35
I	23UGEN147	Communication skills – Practical	1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation 2. Communicate effectively (Verbal and Non Verbal)	1	15	25



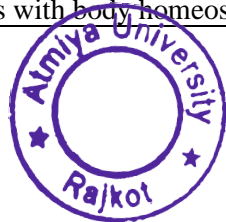
			<p>3. Effectively manage the team as a team player</p> <p>4. Develop & scrutinize interview skills</p> <p>5. Develop Leadership qualities and essentials</p>			
I	23UGPH101	Human Anatomy and Physiology - I (F)	<p>1. Memorize basic anatomical terminology</p> <p>2. Recognize basic structure of the major organs in human body systems</p> <p>3. Summarize basic physiological aspects of body parts</p> <p>4. Interpret interrelationships among body systems and regulation of physiological functions involved to maintain homeostasis</p> <p>5. Memorize and relate the causes and effects of homeostatic imbalances</p>	4	25	75
I	23UGPH102	Pharmaceutical Analysis – I (F)	<p>1. Memorize fundamentals of pharmaceutical analysis and pharmacopoeia.</p> <p>2. Summarize basic concepts involved in errors and to know the sources of impurities and methods to determine the impurities</p> <p>3. Recognize the basic principles of Acid Base titration, non aqueous titration, complexometric titration, precipitation titrations, gravimetric analysis etc</p> <p>4. Recognize the principle, types of electrode, instrumentation and applications of Potentiometry, Conductometry and Polarography</p> <p>5. Interpret the accuracy, precision and significant figure error concepts.</p>	4	25	75
I	23UGPH103	Pharmaceutics – I (F)	<p>1. Recognize history of profession of Pharmacy in India & Pharmacopoeia and its development.</p> <p>2. Understand basic requirement and formulation of conventional Dosage forms.</p> <p>3. Understand the professional way of handling the prescription.</p> <p>4. Summarize different factors influencing dose calculation and prescription handling.</p> <p>5. Apply the basic knowledge for identifying, analyzing and resolving various drug and dosage form related</p>	4	25	75



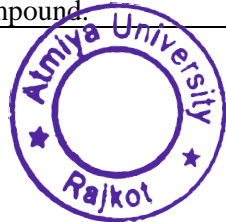
			incompatibilities.			
I	23UGPH104	Pharmaceutical Inorganic Chemistry (F)	<ol style="list-style-type: none"> 1. Know the sources of impurities and methods to determine the impurities in inorganic pharmaceuticals drugs. 2. Know the preparation, estimation and medicinal significances of inorganic compounds as per Pharmacopoeias. 3. Aware with characteristics, storage conditions, precautions and pharmaceutical application of radioactive substances. 4. Identify different anions, cations of inorganic pharmaceutical compounds. 5. Understand the medicinal and pharmaceutical importance of inorganic compounds. 	4	25	75
I	23UGPH105	Remedial Biology # (F)	<ol style="list-style-type: none"> 1. Memorize basic anatomical terminology 2. Recognize basic structure of the major organs in plants & human body systems 3. Summarize basic physiological aspects of plants body parts 4. Interpret interrelationships among body systems and regulation of physiological functions involved to photosynthesis. 5. Memorize and relate the causes and effects of plant growth. 	2	15	35
I	OR 23UGPH106	OR Remedial Mathematics \$ (F)	<ol style="list-style-type: none"> 1. Know the theory and their application of Logarithms in Pharmacy 2. Know the theory and their application of Matrices and Determinant in Pharmacy 3. Know the theory and their application of Analytical Geometry in Pharmacy 4. Solve the different types of problems by applying theory 5. Appreciate the important application of mathematics in Pharmacy 	2	15	35
I	23UGPH107	Human Anatomy and Physiology	<ol style="list-style-type: none"> 1. Memorize location, structure and functions of body tissues 2. Recognize bones of human skeletal system 3. Memorize and use appropriately laboratory equipments and experiment kits. 4. Summarize and perform scientific methods for laboratory experiments related to blood and interpret and relate results of experiments with body homeostasis. 	2	15	35



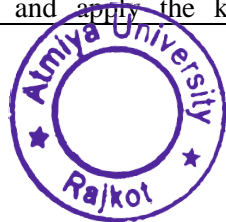
			5. Understand and perform laboratory experiments related to cardiovascular system with scientific equipments and interpret results of experiments in relation to body homeostasis			
I	23UGPH108	Pharmaceutical Analysis	1. Summarize the importance of calibration, calibration of weights, pipette and burette. 2. Standardization of solutions with different strengths. 3. To experiment with volumetric analysis such as acidimetry and alkalimetry, oxidation and reduction reactions, complexometry, precipitation and non-aqueous titration. 4. To analyze gravimetric analytical techniques. 5. To analyze pharmaceuticals by electro-analytical methods.	2	15	35
I	23UGPH109	Pharmaceutics	1. Explain formulation, evaluation and labeling of different mono and biphasic liquids, Powders and semisolid dosage forms. 2. Understand use of ingredients in formulation and category of formulation 3. Compare various monophasic preparations depending upon their formulation. 4. Describe the use of ingredients in formulation and category of formulation. 5. Selection of suitable packaging material (container-closure) for the preparation	2	15	35
I	23UGPH110	Pharmaceutical Inorganic Chemistry	1. Recognize basic principles of limit test to check impurities present in inorganic drugs and pharmaceutical compound 2. Apply pharmaceutical Identification test, test for purity of inorganic compounds. 3. Apply methods for preparation of Inorganic pharmaceuticals.	2	15	35
I	23UGPH111	Remedial Biology – Practical #	1. Memorize location, structure and functions of body tissues 2. Recognize plant tissue system 3. Memorize and use appropriately laboratory equipments and experiment kits. 4. Summarize and perform scientific methods for laboratory experiments related to blood and interpret and relate results of experiments with body homeostasis.	1	10	15



			5. Understand and perform laboratory experiments related to monocot and dicot plants with scientific equipments and interpret results of structure of plant.			
I	23AESDG01	Introduction to SDG (online course)	1. Define and relate to concepts of sustainability and development 2. Identify and interpret the SDGs 3. Recognize and Classify the SDGs into 5 Ps 4. Infer the importance of SDGs as Development Index 5. Summarize the interdependence and interconnectedness of SDGs in three dimensions – Social, Economical and Environmental.	NA	100	NA
I	21AEVA01	AECC 3: Human Values for Holistic Living	1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature.	2		
I		Career Acceleration Program	1. Remember the message coming through different communication channels 2. Understand the message coming through different communication channels to think critically, logically and creatively 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Develop personality & right attitude through communication skills.	NA	100	NA
II	23UGPH201	Human Anatomy and Physiology II (F)	1. Study of Organ system of Human body. 2. Functions of Organ. 3. Understand about Life. 4. Summarize Homeostasis of Body. 5. Apply the basic knowledge for Disease for specific organ.	4	25	75
II	23UGPH202	Pharmaceutical Organic	1. Know the structure, name and the type of isomerism of the organic compound.	4	25	75



		Chemistry I (F)	<ol style="list-style-type: none"> 2. Know method of preparation of various organic compounds. 3. Understand the mechanism and orientation of reaction of various functional groups. 4. Identify different functional group and properties of organic pharmaceutical compounds. 5. Understand reactivity and stability of organic compounds 			
II	23UGPH203	Biochemistry (F)	<ol style="list-style-type: none"> 1. Memorize classification, chemical nature and biological role of biomolecules 2. Recognize concept of bioenergetics and biological oxidation occurring at cellular level 3. Understand genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins 4. Memorize and relate the concept of enzyme kinetics, enzyme inhibitors and regulation of enzymes 5. Apply the basic knowledge for identifying, analyzing, and relating metabolism of biomolecules in physiological and pathological conditions 	4	25	75
II	23UGPH204	Pathophysiology (F)	<ol style="list-style-type: none"> 1. Understand the concept of pathophysiology which is a prime requirement to understand the concepts of pharmacology. 2. In addition they will be able to know about pathogenesis of common diseases. 3. Summarize different factors influencing the disorders and diseases. 4. Provide the information about the etiological and risk factors of the various diseases. 5. Apply the basic knowledge for identifying, diagnosing and treat various diseases and diseases. 	4	25	75
II	23UGPH205	Computer Applications in Pharmacy (F)	<ol style="list-style-type: none"> 1. Know about the fundamental concept of Software and Programming language. 2. Identify, understand and apply the various types of applications of computer in pharmacy. 3. Know about the various diagnostic systems and Bioinformatics. 4. Know the various applications of databases in pharmacy. 5. Identify and apply the knowledge of data analysis in 	3	25	50



			preclinical studies.			
II	23UGPH206	Environmental sciences – Theory	<ol style="list-style-type: none"> 1. Know about the natural resources and associated problems 2. Identify and understand the various types of natural resources 3. Identify and understand the ecosystem 4. Know the role of an individual in conservation of natural resources. 5. Identify and apply the knowledge to control the environmental pollutions 	3	25	50
II	23UGPH207	Human Anatomy and Physiology II	<ol style="list-style-type: none"> 1. Study of Organ system of Human body. 2. Functions of Organ. 3. Understand about Life. 4. Summarize Homeostasis of Body. 5. Apply the basic knowledge for Disease for specific organ. 	2	15	35
II	23UGPH208	Pharmaceutical Organic Chemistry I	<ol style="list-style-type: none"> 1. Know the identification test for organic compounds by systematic qualitative analysis. 2. Determine the boiling point/melting point of organic compounds. 3. Construct molecular models of compounds using atomic models sets. 4. Prepare solid derivatives from organic compounds. 	2	15	35
II	23UGPH209	Biochemistry	<ol style="list-style-type: none"> 1. Memorize identification tests for biomolecules 2. Recognize and use appropriately scientific methods for laboratory experiments with appropriately laboratory instruments and experiment kits. 3. Memorize and perform scientific methods for laboratory experiments related to blood and interpret and relate results of experiments with standard data. 4. Summarize and perform scientific methods for laboratory experiments related to enzyme and interpret results of experiments. 5. Understand and perform laboratory experiments related to preparation of buffer solution and measurement of pH with scientific equipments and interpret results of experiments 	2	15	35



II	23UGPH210	Computer Applications in Pharmacy	<ol style="list-style-type: none"> 1. Know about the fundamental concept of Software and Programming language. 2. Identify, understand and apply the various types of applications of computer in pharmacy. 3. Know about the various diagnostic systems and Bioinformatics. 4. Know the various applications of databases in pharmacy. 5. Identify and apply the knowledge of data analysis in preclinical studies. 	1	10	15
II	21AEVA01	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 	3		



Faculty of Health sciences
School of pharmaceutical sciences
Program: B. Pharm (AY 2021-2022)

Program Objective: The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

- This programme will enable students to acquire knowledge on the Fundamentals of Pharmacy, Pharmacy Practice, Pharmacology, Dosage Form Design, Herbal Drug and Manufacturing Technology to understand emerging and advanced concept in pharmacy to meet requirements of pharmaceutical related industry and entrepreneurship.
- This programme provides students with strong fundamental concepts with high technical competence in pharmaceutical sciences required to solve problems and to pursue higher studies & research.
- After completion of the programme, the students will be able to use advanced lab equipment and computational tools to design, synthesize, analyze, evaluate and formulate pharmaceutical products.
- The programme is intended to inculcate self-learning abilities, professionalism, leadership skills, and team building skills, community service outlook and ethical practices in the students.
- After completion of the programme, the students will be able to participate in life-long learning process and relate the concepts of Pharmaceutical Sciences with the needs of social healthcare.

Graduate Attributes: An ability to demonstrate in-depth professional knowledge of pharmacy, including conceptual, theoretical, methodology for further independent learning, ethics, and professional skills in pharmaceutical science.

- Have the ability to apply problem-solving, research skills, retrieval, analysis, and interpretation of the scientific literature to enhance significantly their own practice-related activities.



- Perform effectively in a team environment, providing leadership, team building, exerting a positive influence, and demonstrating project management skills.
- Make effective use of communication and information technology and able to carry out numerical calculations and analyses relevant to pharmacy and pharmaceutical practice.
- An ability to apply knowledge of Preparing and dispensing medications legally, ethically and according to guidelines.
- Ability to Cooperation with pharmacists and other healthcare providers in providing high quality pharmaceutical services and effectively communicate with patients and healthcare providers with complete respect of cultural diversity.
- Demonstrating leadership and performing necessary pharmacy administrative duties.
- Recognize the Use of recent information technologies for lifelong learning, improving professional skills and serving the community.

Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation:	
PEO1	Preparation: To prepare students with theoretical and practical knowledge of pharmaceutical sciences to meet requirements of pharmaceutical related industry and entrepreneurship.
PEO2	Core Competence: To provide students with strong fundamental concepts with high technical competence in pharmaceutical sciences required to solve problems and to pursue higher studies & research.
PEO3	Breadth: To empower students with use of advanced lab equipment and computational tools to design, synthesize, analyze, evaluate and formulate pharmaceutical products.
PEO4	Professionalism: To inculcate in students self-learning abilities, professionalism, leadership skills, team building skills, community service outlook and ethical practices.
PEO5	Learning environment: To nurture the students with academic environment to participate in life-long learning process



	and relate the concepts of Pharmaceutical Sciences with the needs of social healthcare.
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Program Outcomes (POs):

After completion of the programme the Graduate will be able to:	
PO1	: Possess comprehensive knowledge of fundamental principles and their applications in the area of Health Science and Pharmaceutical Technology.
PO2	: Apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PO3	: Design, synthesize, formulate and evaluate novel natural and synthetic pharmaceutical product.
PO4	: Identify and solve the problems related to Pharmaceutical Industry, Regulatory Agencies, Hospital Pharmacy and Community Pharmacy by analytical and critical thinking.
PO5	: Participate and succeed in pharmacy related competitive examinations.
PO6	: Develop written and oral communication skills in order to communicate with pharmacy community and society.
PO7	: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills to be successful entrepreneur with leadership skill and comply with requirement of regulatory and legal system.
PO8	: Understand, analyze and communicate the value of their professional roles in society.
PO9	: Honor personal values and apply ethical principles in professional and social contexts.
PO10	: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
PO11	: Understand the impact of the professional solutions in societal and environmental contexts and need for holistic and sustainable development.



PO12	:	Recognize and understand need of lifelong learning in the broadest context of technological change with harmony.
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Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Possess comprehensive knowledge of fundamental principles and their applications in the area of Health Science and Pharmaceutical Technology.
PSO2	:	Apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PSO3	:	Design, synthesize, formulate and evaluate novel natural and synthetic pharmaceutical product.
PSO4	:	Identify and solve the problems related to Pharmaceutical Industry, Regulatory Agencies, Hospital Pharmacy and Community Pharmacy by analytical and critical thinking.
PSO5	:	Participate and succeed in pharmacy related competitive examinations.

Course Outcomes (COs): Upon completion of this course, the learner will be able to

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE



I	21BPHCC101	Core 1: Human Anatomy and Physiology -I	<ol style="list-style-type: none"> 1.Memorize basic anatomical terminology 2.Recognize basic structure of the major organs in human body systems 3.Summarize basic physiological aspects of body parts 4.Interpret interrelationships among body systems and regulation of physiological functions involved to maintain homeostasis 5.Memorize and relate the causes and effects of homeostatic imbalances 	4	25	75
	21BPHCC102	Core 2: Pharmaceutical Analysis – I	<ol style="list-style-type: none"> 1. Memorize fundamentals of pharmaceutical analysis and pharmacopoeia. 2.Summarize basic concepts involved in errors and to know the sources of impurities and methods to determine the impurities 3.Recognize the basic principles of Acid Base titration, non aqueous titration, complexometric titration, precipitation titrations, gravimetric analysis etc 4.Recognize the principle, types of electrode, instrumentation and applications of Potentiometry, Conductometry and Polarography 5. Interpret the accuracy, precision and significant figure error concepts. 	4	25	75
	21BPHCC103	Core 3: Pharmaceutics – I	<ol style="list-style-type: none"> 1. Recognize history of profession of Pharmacy in India & Pharmacopeia and its development. 2. Understand basic requirement and formulation of conventional Dosage forms. 3. Understand the professional way of handling the prescription. 4. Summarize different factors influencing dose calculation and prescription handling. 5. Apply the basic knowledge for identifying, analyzing and resolving various drug and dosage form related incompatibilities. 	4	25	75



	21BPHCC104	Core 4: Pharmaceutical Inorganic Chemistry	<ol style="list-style-type: none"> 1. Know the sources of impurities and methods to determine the impurities in inorganic pharmaceuticals drugs. 2. Know the preparation, estimation and medicinal significances of inorganic compounds as per Pharmacopoeias. 3. Aware with characteristics, storage conditions, precautions and pharmaceutical application of radioactive substances. 4. Identify different anions, cations of inorganic pharmaceutical compounds. 5. Understand the medicinal and pharmaceutical importance of inorganic compounds. 	4	25	75
	21BPHIC101	IDC 1: Remedial Biology	<ol style="list-style-type: none"> 1. Memorize basic anatomical terminology 2. Recognize basic structure of the major organs in plants & human body systems 3. Summarize basic physiological aspects of plants body parts 4. Interpret interrelationships among body systems and regulation of physiological functions involved to photosynthesis. 5. Memorize and relate the causes and effects of plant growth. 	2	15	35
	21BPHIC102	IDC 1: Remedial Mathematics	<ol style="list-style-type: none"> 1. Know the theory and their application of Logarithms in Pharmacy 2. Know the theory and their application of Matrices and Determinant in Pharmacy 3. Know the theory and their application of Analytical Geometry in Pharmacy 4. Solve the different types of problems by applying theory 5. Appreciate the important application of mathematics in Pharmacy 	2	15	35
	21ULCEN106	Communication skills – Theory	<ol style="list-style-type: none"> 1. Recognize basic process of communication needs for a Pharmacist to function effectively in the areas of pharmaceutical operation 2. Summarize Verbal and Non Verbal Communicate skills 3. Understand the team as a team player 4. Summarize interview skills 5. Recognize Leadership qualities and essentials 	2	15	35



	21BPHCC105	Core Practical 1: Human Anatomy and Physiology – I	<ol style="list-style-type: none"> 1. Memorize location, structure and functions of body tissues 2. Recognize bones of human skeletal system 3. Memorize and use appropriately laboratory equipments and experiment kits. 4. Summarize and perform scientific methods for laboratory experiments related to blood and interpret and relate results of experiments with body homeostasis. 5. Understand and perform laboratory experiments related to cardiovascular system with scientific equipments and interpret results of experiments in relation to body homeostasis 	2	15	35
	21BPHCC106	Core Practical 2: Pharmaceutical Analysis – I	<ol style="list-style-type: none"> 1. Summarize the importance of calibration, calibration of weights, pipette and burette. 2. Standardization of solutions with different strengths. 3. To experiment with volumetric analysis such as acidimetry and alkalimetry, oxidation and reduction reactions, complexometry, precipitation and non-aqueous titration. 4. To analyze gravimetric analytical techniques. 5. To analyze pharmaceuticals by electro-analytical methods. 	2	15	35
	21BPHCC107	Core Practical 3: Pharmaceutics – I	<ol style="list-style-type: none"> 1. Explain formulation, evaluation and labeling of different mono and bi-phasic liquids, Powders and semisolid dosage forms. 2. Understand use of ingredients in formulation and category of formulation 3. Compare various monophasic preparations depending upon their formulation. 4. Describe the use of ingredients in formulation and category of formulation. 5. Selection of suitable packaging material (container-closure) for the preparation 	2	15	35



21BPHCC108	Core Practical 4: Pharmaceutical Inorganic Chemistry	<ol style="list-style-type: none"> 1. Recognize basic principles of limit test to check impurities present in inorganic drugs and pharmaceutical compound 2. Apply pharmaceutical Identification test, test for purity of inorganic compounds. 3. Apply methods for preparation of Inorganic pharmaceuticals. 	2	15	35
21BPHIC103	IDC Practical 1: Remedial Biology	<ol style="list-style-type: none"> 1..Memorize location, structure and functions of body tissues 2..Recognize plant tissue system 3. Memorize and use appropriately laboratory equipments and experiment kits. 4. Summarize and perform scientific methods for laboratory experiments related to blood and interpret and relate results of experiments with body homeostasis. 5. Understand and perform laboratory experiments related to monocot and dicot plants with scientific equipments and interpret results of structure of plant. 	1	10	15
21ULCEN107	Communication skills – Practical	<ol style="list-style-type: none"> 1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical operation 2. Communicate effectively (Verbal and Non Verbal) 3. Effectively manage the team as a team player 4. Develop & scrutinize interview skills 5. Develop Leadership qualities and essentials 	1	10	15
21AESDG01	AECC 1 : Introduction to SDG (online course)	<ol style="list-style-type: none"> 1. Define and relate to concepts of sustainability and development 2. Identify and interpret the SDGs 3. Recognize and Classify the SDGs into 5 Ps 4. Infer the importance of SDGs as Development Index 5. Summarize the interdependence and interconnectedness of SDGs in three dimensions – Social, Economical and Environmental. 	NA	100	NA



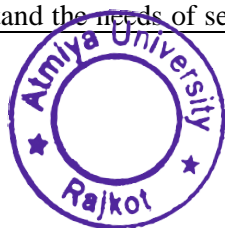
	21AEVA01	AECC 3: Human Values for Holistic Living	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural acceptance and solves their conflict using self exploration. 3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations. 4. Understand required skills to understand the laws of nature. 			
		FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Remember the message coming through different communication channels 2. Understand the message coming through different communication channels to think critically, logically and creatively 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Develop personality & right attitude through communication skills. 			
II	21BPHCC201	Core 5: Human anatomy and Physiology II	<ol style="list-style-type: none"> 1. Study of Organ system of Human body. Functions of Organ. 2. Understand about Life. 3. Summarize Homeostasis of Body. 4. Apply the basic knowledge for Disease for specific organ. 	4	25	75
II	21BPHCC202	Core 6: Pharmaceutical Organic Chemistry – I	<ol style="list-style-type: none"> 1. Know the structure, name and the type of isomerism of the organic compound. 2. Know method of preparation of various organic compounds. 3. Understand the mechanism and orientation of reaction of various functional groups. 4. Identify different functional group and properties of organic pharmaceutical compounds. 5. Understand reactivity and stability of organic compounds 	4	25	75
II	21BPHCC203	Core 7: Biochemistry	<ol style="list-style-type: none"> 1. Memorize classification, chemical nature and biological role of biomolecules 2. Recognize concept of bioenergetics and biological oxidation occurring at cellular level 3. Understand genetic organization of mammalian genome and 	4	25	75



			<p>functions of DNA in the synthesis of RNAs and proteins</p> <p>4. Memorize and relate the concept of enzyme kinetics, enzyme inhibitors and regulation of enzymes</p> <p>5. Apply the basic knowledge for identifying, analyzing, and relating metabolism of biomolecules in physiological and pathological conditions</p>			
II	21BPHCC204	Core 8: Pathophysiology	<p>1. Understand the concept of pathophysiology which is a prime requirement to understand the concepts of pharmacology.</p> <p>2. In addition they will be able to know about pathogenesis of common diseases.</p> <p>3. Summarize different factors influencing the disorders and diseases.</p> <p>4. Provide the information about the etiological and risk factors of the various diseases.</p> <p>5. Apply the basic knowledge for identifying, diagnosing and treat various diseases and diseases.</p>	4	25	75
II	21BPHCC205	Core 9: Computer Applications in Pharmacy	<p>1. Know about the fundamental concept of Software and Programming language.</p> <p>2. Identify, understand and apply the various types of applications of computer in pharmacy.</p> <p>3. Know about the various diagnostic systems and Bioinformatics.</p> <p>4. Know the various applications of databases in pharmacy.</p> <p>5. Identify and apply the knowledge of data analysis in preclinical studies.</p>	3	25	50
II	21BPHCC206	Core 10: Environmental sciences – Theory	<p>1. Know about the natural resources and associated problems</p> <p>2. Identify and understand the various types of natural resources</p> <p>3. Identify and understand the ecosystem</p> <p>4. Know the role of an individual in conservation of natural resources.</p>	3	25	50
II	21BPHCC207	Core Practical 5: Human Anatomy and Physiology II	<p>1. Identify and apply the knowledge to control the environmental pollutions</p> <p>2. Functions of Organ.</p> <p>3. Understand about Life.</p> <p>4. Summarize Homeostasis of Body.</p>	2	15	35



			5. Apply the basic knowledge for Disease for specific organ.			
II	21BPHCC208	Core Practical 6: Pharmaceutical Organic Chemistry I	<ol style="list-style-type: none"> 1. Know the identification test for organic compounds by systematic qualitative analysis. 2. Determine the boiling point/melting point of organic compounds. 3. Construct molecular models of compounds using atomic models sets. 4. Prepare solid derivatives from organic compounds. 	2	15	35
II	21BPHCC209	Core Practical 7: Biochemistry	<ol style="list-style-type: none"> 1. Memorize identification tests for biomolecules 2. Recognize and use appropriately scientific methods for laboratory experiments with appropriately laboratory instruments and experiment kits. 3. Memorize and perform scientific methods for laboratory experiments related to blood and interpret and relate results of experiments with standard data. 4. Summarize and perform scientific methods for laboratory experiments related to enzyme and interpret results of experiments. 5. Understand and perform laboratory experiments related to preparation of buffer solution and measurement of pH with scientific equipments and interpret results of experiments 	2	15	35
II	21BPHCC210	Core Practical 8: Computer Applications in Pharmacy	<ol style="list-style-type: none"> 1. Know about the fundamental concept of Software and Programming language. 2. Identify, understand and apply the various types of applications of computer in pharmacy. 3. Know about the various diagnostic systems and Bioinformatics. 4. Know the various applications of databases in pharmacy. 5. Identify and apply the knowledge of data analysis in preclinical studies 	1	15	25
II	21AEHV03	AECC 3: Human Values for Holistic	<ol style="list-style-type: none"> 1. Recall basic guidelines of value education and understand the basic aspirations. 2. Understand the needs of self and body based on their natural 	3		



		Living	<p>acceptance and solves their conflict using self exploration.</p> <p>3. Identify the relations between human-human and they have the ability to fulfill the expectations in relations.</p> <p>4. Understand required skills to understand the laws of nature.</p>			
II		FS 3: Career Acceleration Program	<p>1. Recognize the message coming through different channels</p> <p>2. Understand the given situation to think critically, logically and creatively and deal accordingly based on that.</p> <p>3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others</p> <p>4. Reframe personality & right attitude through traditional Soft skills.</p>			
III	21BPHCC301	Core 11: Pharmaceutical Organic Chemistry II (F)	<p>1. Remember properties and uses of polynuclear compounds.</p> <p>2. Understand structure, preparations and reactions of benzene.</p> <p>3. Understand physical and chemical properties of Phenols and Aromatic amine.</p> <p>4. Understand stability and reactions of various cycloalkanes.</p> <p>5. Apply the analytical constants to check properties of Fats and Oils.</p>	4	25	75
III	21BPHCC302	Core 12: Physical Pharmaceutics I (F)	<p>1. Know about states of matter and to understand the applications of physicochemical properties of drug molecules in designing pharmaceutical dosage forms.</p> <p>2. Determine pKa value and HLB value for various chemicals.</p> <p>3. Perceive and apply the concepts of complexation and protein binding in pharmacy.</p> <p>4. Understand the principle of interfacial tension, role and applications of surface-active agents in drug solubilization.</p> <p>5. Demonstrate the role of various physicochemical properties in evaluation of dosage forms including solubility, isotonicity, buffers, absorption, distribution and protein binding.</p>	4	25	75
III	21BPHCC303	Core 13: Pharmaceutical Microbiology (F)	<p>1. Understand the concept of microbiology and sterilization in pharmacy.</p> <p>2. In addition they will be able to remember microbial cycle of fungi, virus.</p> <p>3. Understand different factors influencing the disinfectant and</p>	4	25	75



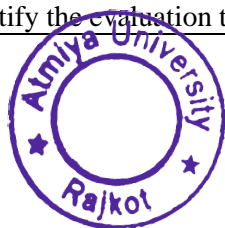
			<p>estimate potency of antibiotic by various microbial assays.</p> <p>4. Understand the information about the animal cell line, aseptic area and Discuss the concepts of immunity.</p> <p>5. Understand basic knowledge for bacterial structure and its growth.</p>			
III	21BPHCC304	Core 14: Pharmaceutical Engineering (F)	<p>1. To know various unit operations used in Pharmaceutical industries.</p> <p>2. To understand the material handling techniques.</p> <p>3. To perform various processes involved in pharmaceutical manufacturing process.</p> <p>4. To carry out various test to prevent environmental pollution.</p> <p>5. To appreciate and comprehend significance of plant lay out design for optimum use of resources.</p> <p>6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.</p>	4	25	75
III	21BPHCC305	Core Practical 9: Pharmaceutical Organic Chemistry II	<p>1. Know the preparation for organic compounds by systematic qualitative analysis.</p> <p>2. Determine the various oil values.</p> <p>3. Know the various laboratory techniques for the synthesis of organic compounds.</p> <p>4. Prepare synthetic organic compounds from various starting materials.</p>	2	15	35
III	21BPHCC306	Core Practical 10: Physical Pharmaceutics I	<p>1. Determine solubility, pKa, Partition co-efficient for different drug molecules.</p> <p>2. Determine Surface tension, Critical Micellar Concentration for various formulations.</p> <p>3. Determine and Calculate HLB, CST, stability constant, donor – acceptor ratio for complexes.</p> <p>4. Construct adsorption isotherm.</p>	2	15	35
III	21BPHCC307	Core Practical 11: Pharmaceutical Microbiology	<p>1. Identification, cultivation and preservation of various microorganisms.</p> <p>2. Understand the importance and application of sterilization in pharmaceutical processing and industry</p> <p>3. To analyze sterility testing of pharmaceutical products.</p> <p>4. To apply microbiological standardization of Pharmaceuticals</p>	2	15	35



III	21BPHCC308	Core Practical 12: Pharmaceutical Engineering	<ol style="list-style-type: none"> 1. To know various unit operations used in Pharmaceutical industries. 2. To understand the material handling techniques. 3. To perform various processes involved in pharmaceutical manufacturing process. 4. To carry out various test to prevent environmental pollution. 5. To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries. 	2	15	35
III	21BPHCR601	Concept to Practice Course	<ol style="list-style-type: none"> 1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written and oral forms. 4. Demonstrate a sound technical knowledge of their societal problems. 5. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 			
III		FS 3: Career Acceleration Program	<ol style="list-style-type: none"> 1. Understand the need of 21st century skills, Understand and Analyze the skills through Learning : Critical Thinking, Creativity & Innovation 2. Understand the leading skills through edge of :Communication, Collaboration and Networking 3. Understand the skills through digital literacy :Information, Media and Technology Literacy 4. Recall, Understand and Analyze Life Skills : Flexibility and Adaptability, Leadership and Responsibility 5. Recall, Understand and Analyze Life Skills : Productivity and Accountability, Social and Cross-Cultural Interaction 			
IV	21BPHCC401	Core 15: Pharmaceutical Organic Chemistry – III (Ad)	<ol style="list-style-type: none"> 1. Know the basic terminologies in stereochemistry and organic reactions. 2. Understand the stereo chemical aspects of organic compounds and stereo chemical reaction. 3. Understand the methods of preparation and properties of organic compounds. 4. Understand the properties and reactivity of heterocyclic compounds. 	4	25	75



			5. Understand the important named reactions.			
IV	21BPHCC402	Core 16: Medicinal Chemistry – I (Ap)	<ol style="list-style-type: none"> 1. Know the chemistry of drugs with respect to their pharmacological activity 2. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs. 3. Understand the various synthetic routes of some important drugs. 4. Understand the Structural Activity Relationship (SAR) of different class of drugs. 5. Understand the mechanism of action, metabolism, adverse effects and uses of different medicinal compounds. 	4	25	75
IV	21BPHCC403	Core 17: Physical Pharmaceutics – II (F)	<ol style="list-style-type: none"> 1. Characterize the physico-chemical properties of drug substances and will be able to solve problems related to physical pharmacy topics, e.g., Kinetic principles, drug substance stability, micromeritics, coarse and colloidal dispersion. 2. Know the principles of chemical kinetics & to use them for stability testing and determination of expiry date of formulations. 3. Understand various physicochemical properties of drug molecules in the designing the dosage forms. 4. Demonstrate use of physicochemical properties in the formulation development and evaluation of dosage forms. 5. Apply knowledge of the fundamental principles of physical pharmacy to various physiochemical processes and pharmaceutical dosage forms. 	4	25	75
IV	21BPHCC404	Core 18: Pharmacology – I (Ap)	<ol style="list-style-type: none"> 1. To Understand the concept of Pharmacology. 2. To Know about ADME. 3. To Analyse how drugs works on body and body works on Drugs.. 4. To Apply Knowledge to treatment of various diseases. 5. To Know about drugs. 	4	25	75
IV	21BPHCC405	Core 19: Pharmacognosy and Phytochemistry	<ol style="list-style-type: none"> 1. Understand the techniques in the cultivation and production of crude drugs 2. To recognize the crude drugs, their uses and chemical nature 3. To identify the evaluation techniques for the herbal drugs 	4	25	75



		- I (F)	4. To carry out the microscopic and morphological study of crude drugs 5. To know plant biotechnology and tissue culture technique			
IV	21BPHCC406	Core Practical 13: Medicinal Chemistry - I	1. Know the importance of drug design and different techniques of drug design. 2. Understand the chemistry of drugs with respect to their biological activity by determination of physicochemical properties. 3. Understand preparation of drugs and intermediates. 4. Understand assay determination of drugs.	2	15	35
IV	21BPHCC407	Core Practical 14: Physical Pharmaceutics – II	1. Perform particle size analysis using different methods. 2. Determine optimum concentration of various influencing substances (e.g., Flow promoter, suspending agent) 3. Prepare and evaluate dispersion systems. 4. Measure the order of reaction and expiry date of formulation using accelerated stability study. 5. Appreciate the various physicochemical properties of drug and their importance in development of pharmaceutical products.	2	15	35
IV	21BPHCC408	Core Practical 15: Pharmacology - I	1. To Know about various guidelines for animal welfare. 2. To know about basics of Pharmacology. 3. To perform Handling of animals. 4. To carry out various procedure for practice on animals. 5. To understand physiological correlation between animals and humans.	2	15	35
IV	21BPHCC409	Core Practical 16: Pharmacognosy and Phytochemistry - I	1. To know the techniques in the quantitative microscopy 2. To recognize the crude drugs, their uses and chemical nature 3. To identify the evaluation techniques for the herbal drugs 4. To carry out the physical parameters of crude drugs 5. Understand plant tissue culture technique	2	15	35
IV	21BPHCR601	Core Enrichment 1: Concept to Practice Course	1. Understand problem identification, formulation and solution. 2. Design an engineering solution to complex problems. 3. Communicate with the community at large in written an oral forms. 4. Demonstrate a sound technical knowledge of their societal			



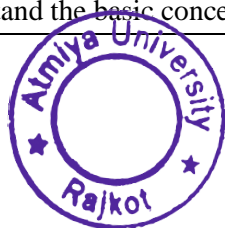
			problems. 5. Demonstrate the knowledge, skills, values and attitudes of professional graduates.			
IV		Career Acceleration Program	1. Understand the basic concepts of quantitative ability 2. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions 3. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.			
V	21BPHCC501	Core 20: Medicinal Chemistry II (Ap)	1. Know various classes of drugs and their mechanisms of action. 2. Understand the chemical and biological properties of drugs and how they interact with the human body. 3. Understand the drug metabolic pathways, adverse effect and therapeutic value of drugs. 4. Evaluate the Structural Activity Relationship of different class of drugs. 5. Apply knowledge of synthesis of various drugs to design and execute synthetic routes to target molecules.	4	25	75
V	21BPHCC502	Core 21: Industrial Pharmacy I (Ap)	1. Carry out assessment of physicochemical properties of drugs as a tool in the optimization of solid and liquid dosage forms. 2. Formulate and prepare tablets, capsules, liquid orals and aerosols using established procedures and technology. 3. Formulate and prepare different types of sterile dosage forms like parenteral and ophthalmic products. 4. Evaluate the pharmaceutical dosage forms for quality and stability and compare with standards prescribed in the pharmacopoeia. 5. Select ingredients and formulate cosmetics such as lipsticks, shampoos, cold cream and vanishing cream, tooth pastes, hair dyes and sunscreens. 6. Select and evaluate appropriate packaging components and materials for various pharmaceutical dosage forms.	4	25	75
V	21BPHCC503	Core 22: Pharmacology II (Ad)	1. Memorise Classifications of Drugs using for various diseases. 2. Understand Mechanism of action of various drugs.	4	25	75



			<ol style="list-style-type: none"> Analyse and Understand Side effects and Drug Interaction. Evaluate dosage and concentration of various drugs for diseases. 			
V	21BPHCC504	Core 23: Pharmacognosy and Phytochemistry II (Ad)	<ol style="list-style-type: none"> Memorize and understand metabolic pathways and biosynthesis of different secondary metabolites through these pathways. Memorize and recognize composition, chemistry and chemical classes, biosources, therapeutic uses and commercial applications of secondary metabolites. Understand and differentiate methods for isolation, identification and analysis of various phytoconstituents. Understand and distinguish methods for industrial production, estimation and utilization of various phytoconstituents. Recognize and differentiate the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents. 	4	25	75
V	21BPHCC505	Core 24: Pharmaceutical Jurisprudence (F)	<ol style="list-style-type: none"> Recognize the code of ethics during follows Understand the Pharmaceutical rules, regulation & legislations. Comprehend Various Indian Pharmaceutical Acts and Laws. Understand import & manufacturing of pharmaceutical medicines. Implications in the development of pharmaceutical products Marketing of pharmaceutical goods & medicines 	4	25	75
V	21BPHCC506	Core Practical 17: Industrial Pharmacy I	<ol style="list-style-type: none"> Analyze the characteristics of drug for selection of dosage form types. Identify the excipients for development of various dosage forms. Understand and perform the evaluation of dosage forms like tablets, capsules, liquid orals etc. Select the packaging materials and evaluate them according to drug products to be packed. 	2	15	35
V	21BPHCC507	Core Practical 18: Pharmacology II	<ol style="list-style-type: none"> Memorise Bioassay of Drugs. Understand Mechanism of action of various drugs on diseases. 	2	15	35



			<ol style="list-style-type: none"> Analyse and Understand of experiments. Evaluate activity of various drugs on body tissues. 			
V	21BPHCC508	Core Practical 19: Pharmacognosy and Phytochemistry II	<ol style="list-style-type: none"> Memorize identification tests for different phytoconstituents. Understand and perform experiments related to morphology, histology and powder characteristics of crude drugs with scientific equipment and interpret results of experiments. Understand and perform experiments related to isolation and detection of active phytoconstituents in plant drugs. Understand and perform experiments related to extraction and detection of active phytoconstituents in plant drugs. Understand and perform different chromatography techniques for identification of phytoconstituents. 	2	15	35
V	21BPHCR601	Concept to Practice Course	<ol style="list-style-type: none"> Understand problem identification, formulation and solution. Design an engineering solution to complex problems. Communicate with the community at large in written and oral forms. Demonstrate a sound technical knowledge of their societal problems. Demonstrate the knowledge, skills, values and attitudes of professional graduates. 	NA	20	NA
V	21BPHCR501	Internship 1	<ol style="list-style-type: none"> Identify and analyze social and healthcare needs within diverse communities, using insights gained through immersive field experience. Apply discipline-specific knowledge in real-world settings to support public health and well-being, fostering a hands-on understanding of societal challenges. Develop and demonstrate culturally competent communication skills and empathy while engaging with individuals from various socio-economic backgrounds. Exercise critical-thinking and analytical skills to assess and provide sustainable solutions to public health or social issues. Reflect on social, ethical, and professional responsibilities, deepening awareness of how professional practice impacts communities. 	1	100	NA
		Career	<ol style="list-style-type: none"> Understand the basic concepts of quantitative ability 			



		Acceleration Program	<ol style="list-style-type: none"> Apply the knowledge, information parameters and mathematical skills to develop time saving solutions Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc. 			
VI	21BPHCC601	Core 25: Medicinal Chemistry -III (Theory)	<ol style="list-style-type: none"> Understand SAR and chemical synthesis of antibiotics, including both natural product and synthetic approaches. Apply acquired knowledge to real-world scenarios, including the design of new antibiotics, strategies to combat antibiotic resistance, and responsible antibiotic use. Analyze the historical impact of antibiotics on public health and the ongoing need for effective antibiotics. Analyze the chemical and biological basis of antibiotic efficacy and articulate their respective mechanisms of action. Analyze strategies to create antibiotics that are more effective, less toxic, and less prone to resistance. 	4	25	75
VI	21BPHCC602	Core 26: Pharmacology - III	<ol style="list-style-type: none"> Memories Classification of various drugs. Learn Mechanism of action of drugs. Apply basic knowledge of Pharmacology to manage disease conditions. Understand about Various diseases and its therapy. Knowledge of First aid teach students in Person poisoned Learn Animal Study according to diseases. 	4	25	75
VI	21BPHCC603	Core 27: Herbal Drug Technology	<ol style="list-style-type: none"> Understand raw material as source of herbal drugs from cultivation to herbal drug product as well as understand importance of biodynamic agriculture of medicinal plants. Understand evaluation of herbal drugs as per WHO and ICH guidelines. Memorize and recognize nutraceuticals, herbal-drug and herb-food interactions, herbal cosmetics and herbal excipients. Understand regulatory issues, patenting and regulatory requirements of natural products. Differentiate herbal formulations and Ayurvedic formulations, understand preparation and evaluation of Herbal formulations and Ayurvedic formulations. Understand GMP (Good Manufacturing Practice) of Indian systems of medicine 	4	25	75



VI	21BPHCC604	Core 28: Biopharmaceutics and Pharmacokinetics	<ol style="list-style-type: none"> 1. To understand the concept of Absorption, Distribution, metabolism and excretion (ADME) in human body. 2. To apply the various regulations related to developing BA - BE study protocol for the new drug molecule. 3. To determine various pharmacokinetic parameters from plasma and urinary excretion data applying compartment modeling and model independent methods. 4. To understand the concepts of bioavailability and bioequivalence of drug products and their significance 5. To calculate loading and maintenance dose. 6. To understand the fundamentals of non-linear pharmacokinetics. 	4	25	75
VI	21BPHCC605	Core 29: Pharmaceutical Biotechnology	<ol style="list-style-type: none"> 1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries 2. Understanding Genetic engineering applications in relation to production of pharmaceuticals 3. Importance of Monoclonal antibodies in Industries 4. Appreciate the use of microorganisms in fermentation technology 5. Brief introduction to PCR, MHC, Immuno blotting techniques, f cloning vectors, restriction endonucleases and DNA ligase. 6. Concept of Recombinant DNA technology. 	4	25	75
VI	21BPHCC606	Core 30: Quality Assurance	<ol style="list-style-type: none"> 1. Understand the cGMP aspects in a pharmaceutical industry 2. Appreciate the importance of documentation 3. Understand the scope of quality certifications applicable to pharmaceutical industries 4. Understand the responsibilities of QA & QC departments 5. Understand the GLP aspects in a non-clinical testing facilities 6. Understand the ISO aspects in a pharmaceutical industry 	4	25	75
VI	21BPHCC607	Core Practical 20: Medicinal Chemistry -III	<ol style="list-style-type: none"> 1. Understand the importance of drug design and different techniques of drug design. 2. Understand the chemistry of drugs with respect to their biological activity by determination of physicochemical 	2	15	35



			properties. 3. Analyze method of assay determination of drugs. 4. Apply drug design software Drug likeliness screening (Lipinskies RO5).			
VI	21BPHCC608	Core Practical 21: Pharmacology - III	1. Analyze the effects of drugs. 2. Identify the Mechanism of Action of drugs. 3. Understand and various tests. 4. Handling the Animals.	2	15	35
VI	21BPHCC609	Core Practical 22: Herbal Drug Technology	1. Understand monograph analysis of herbal drugs from recent pharmacopoeias. 2. Understand and perform experiments related to Preliminary phytochemical screening of crude drug. 3. Understand and experiment perform for determination of phytoconstituents present in herbal crude drugs and herbal products. 4. Understand and evaluate excipients of natural origin along interpretation of results of experiments. 5. Formulation and standardization of herbal products.	2	15	35
VI	21BPHCR601	Career Acceleration Program	Understand the given situation to think critically, logically and creatively and deal accordingly based on that. Apply the knowledge, skills and judgment around human communication that facilitate employability skills. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.			



Faculty of Humanities & Social Sciences

Department: English

Program: B.A.

Program Objective:

The Curriculum is designed to have the following learning goals which students shall accomplish by the time of their graduation:

- To make the students proficient in using English while strengthening their base of literature.
- To solidify students' understanding of the various literary forms, theories, methods and cultures that prepare them for higher studies and research
- To direct the students with intellectual flexibility that can comprehend and analyze the real-life challenges and solutions for it
- To develop the student's professional skills by providing them a platform that improves their communication skills
- To provide the students with the learning and excellence that the world outside demands

Graduate Attributes:

- **Academic excellence:** Ability to identify key questions, research and pursue rigorous evidence-based arguments
- **Critical Thinking and Effective communications:** Analysis and evaluation of information to form a judgement about a subject or idea and ability to effectively communicate the same in a structured form.
- **Global Citizenship:** Mutual understanding with others from diverse cultures, perspectives and backgrounds
- **Life Long Learning:** Open, curious, willing to investigate, and consider new knowledge and ways of thinking



Program Educational Objectives (PEOs):

Our programme will produce Graduates who will attain following PEOs after few years of graduation		
PEO1	:	Core competency: will develop the competency to pursue higher education or successful professional career with synergistic combination of the knowledge and skills of English
PEO2	:	Breadth of knowledge: will show capabilities of independently designing, executing and interpreting small research problems by integrating the interdisciplinary knowledge of English and other domains.
PEO3	:	Preparedness: will have the potential to show willingness to take any task or assignment in the capacity of a leader or team member in their chosen occupations or careers and communities.
PEO4	:	Professionalism: will show values and responsibilities in the character to make them fit to work in a multidisciplinary team and to become socio-ethically responsible citizen.
PEO5	:	Learning environment: will develop mind-set of self-learning abilities and keep themselves abreast with new development in all spheres of life.

Program Outcomes (POs):

After completion of the programme the Graduate will be able to:		
PO1	:	Domain knowledge: Demonstrate and apply the knowledge of translation, forms and critical theories professionally.
PO2	:	Problem analysis: Acquire critical thinking skills to understand and solve contemporary problems with interdisciplinary knowledge of English and other domains.
PO3	:	Multicultural Competence: receive the understanding of language, literature and culture from across the globe.



PO4	:	Communication: Communicate effectively using different modes such as written and verbal to interact and understand the requirement of the society.
PO5	:	Modern tool usage: Learning the modern advancement and understand standard operating procedures and acquire in-depth technical competence to be prepared for the chosen career.
PO6	:	Values and society: Understand own's role in society and act in an honest and consistent manner based on a strong sense of self and personal values
PO7	:	Environment and sustainability: Understand complex environmental issues and their interrelationships and requirement of interdisciplinary domains for sustainable development
PO8	:	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Biotechnological practice.
PO9	:	Individual and team work: Able to function effectively as individual and as a member in multidisciplinary settings
PO10	:	Self-Directing Learning: Work independently in terms of reading texts and application of theories.
PO11	:	Digital Literacy: Utilize the digital sources for better explanations and understanding of a concept, theory and idea.
PO12	:	Life-long learning: Able to recognize the need to undertake life-long learning and acquire the capacity to do so



Programme Specific Outcome (PSOs):

After completion of the programme the Graduate will:		
PSO1	:	Be able to utilize English language while making their base of English literature stronger.
PSO2	:	Be able to absorb the knowledge of various literary forms, theories, methods and culture that will contribute in the development of their creativity.
PSO3	:	Be able to analyse the impacts of literature in the society and vice versa.
PSO4	:	Be able to think and write creatively and critically
PSO5	:	Be able to use and apply their knowledge of language and literature professionally

Course Outcomes (COs):

Semester	Course code	Course Title	Course Outcomes	Credits	Assessment (marks)	
					CIA	SEE
I	23UGEN145	Foundation English	<ol style="list-style-type: none"> 1. Developing the basic skill of reading skill 2. Infer the true meaning of the text and execute values received through the literature 3. Understand and interpret text related to science, leading to the cultivation of the reading habit. 4. Recall the essential grammatical aspects of the language 5. Articulate their ideas and thoughts through writing skill 	3	40	60
I	23UGEN101	Core-1: Introduction to Literary Studies	<ol style="list-style-type: none"> 1. Understand some of the basic forms of literature 2. Infer the true meaning of the text 3. Recall the previous ideas of literature 4. Articulate their ideas and thoughts through 	3	30	70



			various forms of literature 5. Execute the values received through literature			
I	23UGEN102	Core-2: Literary Form Short Story	1. Understand the short story as a literary form and its development. 2. Classify the types of short stories. 3. Understand the elements and literary devices which give a better understanding of a form. 4. Confidently read and understand a range of literary texts. 5. Correlate the concept of the form with the literary texts.	3	30	70
II	23UGEN245	English Language & Communication	1. Articulate their ideas and thoughts through speaking and listening 2. Applying acquired knowledge, facts and techniques by inferring the true meaning of a given text. 3. Utilize ethics and moral-based knowledge acquired from value-based literature. 4. Interpret and apply advanced concepts of grammar to enrich the linguistic skills of the students. 5. Articulate varied thoughts and perspectives and understand the importance of Formal Writing by learning different forms of Correspondence	3	40	60
II	23UGEN201	Core-3: Metaphysical Poetry	1. Understand metaphysical poetry as a form of literature 2. Understand major as well as minor metaphysical poets 3. Remember and understand the different types figures of speech 4. Comprehend metaphysical poetry	3	30	70



			5. Understand and analyze various metaphysical poets and their works			
II	23UGEN202	Core-4: Literary Form- Drama	1. Remember the origin & development of English drama 2. Understand different types of drama 3. Take hold of the different types of drama 4. Comprehend sub-types of drama 5. Evaluate the prescribed text as a work of art	3	30	70
I	21ULCEN104	Development of Functional English	1. Understand and interpret text related to science, leading to cultivation of the reading habit. 2. Infer the true meaning of the text 3. Recall the essential grammatical aspects of the language 4. Articulate their ideas and thoughts through speaking 5. Execute the values received through literature	3	40	60
I	21BAENCC101	Core 1: Introduction to Literary Studies in English (F)	1. Understand some of the basic forms of literature 2. Infer the true meaning of the text 3. Recall the previous ideas of literature 4. Articulate their ideas and thoughts through various forms of literature 5. Execute the values received through literature	4	30	70
I	21BAENCC102	Core 2: Literary Form: Short Story (F)	1. Understand the short story as a literary form and its development. 2. Classify the types of short stories. 3. Understand the elements and literary devices which give better understanding of a form. 4. Confidently read and understand a range of literary texts. 5. Correlate the concept of the form with the literary texts.	4	30	70
I	21BAENCC103	Core 3: Literary Form:	1. Develop the interest in the literature and to hone	4	30	70



		Lyric (F)	<p>the comprehensive skill, by introducing poetry as a literary form.</p> <ol style="list-style-type: none"> Understand the classification of lyric form. Recognize poetic technique and literary devices which give better understanding of a form. Interpret and analyze poems of various poets and the impact of their culture, background and age on their works. Corelate the concept of the form with the literary works. 			
I	21BAENCC104	Core 4: Functional Grammar (F)	<ol style="list-style-type: none"> Use different parts of speech of the English Grammar effectively Understand Noun & Noun Phrase in English in detail. Grasp the different types of Noun Phrase. Comprehend simple and complex prepositions Perceive all kinds of Adjective and its phrase 	4	30	70
II	21ULCEN204	Functional English	<ol style="list-style-type: none"> Understand and interpret text related to literature, leading to cultivation of the writing habit. Infer the true meaning of the text Recall the essential grammatical aspects of the language Articulate their ideas and thoughts through speaking Execute the values received through literature 	3	40	60
II	21BAENCC201	Core 5: History of English Literature: Elizabethan Age to Neo-Classical Age (F)	<ol style="list-style-type: none"> Understand about the historical development of English literature To identify the students understand the significant writers of the age Discuss about the historical movements that influenced the transformation of the literary 	4	30	70



			<p>tastes and standards</p> <p>4. Develop an understanding of the literary form drama</p> <p>5. Contribute in the enactment of various fictions</p>			
II	21BAENCC202	Core 6: Introduction to Linguistics (F)	<p>1. Understand general use of doing linguistics</p> <p>2. Understand Morpheme and its Classifications</p> <p>3. Understand Speech Mechanism and difference between Phone, Phoneme and Allophone</p> <p>4. Comprehend Meaning and Lexical Relations</p> <p>5. Basic notions of Syntax and its categories; an informal theory of Syntax</p>	4	30	70
II	21BAENCC203	Core 7: Literary Form: Drama (Ad)	<p>1. Remember the origin & development of English drama</p> <p>2. Understand different types of drama</p> <p>3. Take hold of the different types of drama</p> <p>4. Comprehend sub types of drama</p> <p>5. Evaluate the prescribed text as a work of art</p>	4	30	70
II	21BAENCC204	Core 8: Metaphysical Poetry (Ad)	<p>1. Understand metaphysical poetry as a form of literature</p> <p>2. Understand major as well as minor metaphysical poets</p> <p>3. Remember and understand the different types figures of speech</p> <p>4. Comprehend metaphysical poetry</p> <p>5. Understand and analyze various metaphysical poets and their works</p>	4	30	70
III	21ULCEN302	Advanced English & Correspondence	<p>1. Demonstrate the detailed understanding of facts and ideas by organizing, comparing and analyzing given articles and passages from the domain of literature.</p> <p>2. Applying acquired knowledge, facts and techniques by inferring the true meaning of a</p>	3	40	60



			<p>given text.</p> <ol style="list-style-type: none"> 3. Interpret and apply advanced concepts of grammar to enrich the linguistic skills of the students. 4. Articulate varied thoughts and perspectives and understand the importance of Formal Writing by learning different forms of Correspondence 5. Utilize ethics and moral based knowledge acquired from value-based literature. 			
III	21BAENCC301	Core 9: History of English Literature [Romantic to Modern Age] (Ad)	<ol style="list-style-type: none"> 1. Compare and classify the eras of literature leading to a better understanding of works. 2. Interpret the movements and the works prevailing in the eras 3. Identify the era, their prominent writers and the various features of it. 4. Articulate their ideas, perspectives and contribution of several writers. 5. Analyze and appraise the works of eminent writers belonging to different ages. 	4	30	70
III	21BAENCC302	Core 10: Indian Writing in English (Ad)	<ol style="list-style-type: none"> 1. Recognize the contribution of the Indian English authors 2. Distinguish the Indian authors writing in English from the native English writers through their works 3. Analyze, interpret and describe the critical ideas, values, and themes that appear in literary and cultural texts 4. Construct a better understanding of Indian texts 5. Appraise the genius of Indian writers in terms of their content and language 	4	30	70
III	21BAENCC303	Core-11: English Language and Literary	<ol style="list-style-type: none"> 1. Recognize the origin of a term and hence will be able to understand the true, derivative meaning 	4	30	70



		Terms (Ad)	<p>of the term</p> <ol style="list-style-type: none"> Analyze various aspects of English Language Explain the development of English language and how other languages have influenced it Apply their new understanding of literary terms in order to ornament their language Employ literary aspect of English language in their communication 			
III	21BAENCC304	Core-12: Romantic Revival (Ad)	<ol style="list-style-type: none"> Identify various aspects of Romantic Era in English Literature Review several poets and novelists of the Era and their works Apply their understanding of the age to interpret the texts Critically analyze distinctive features of Romantic novels and poems Develop critical thinking and imagination by studying novel 	4	30	70
III	21UFHDE301	DSE 1: Corporate Correspondence	<ol style="list-style-type: none"> To equip learners with language skills for effective writing. To develop the ability to express ideas regarding the fields of business and commerce in written communication. To strengthen learners' ability for business writing To equip the learners with the knowledge of various aspects of Office Communication. To enhance Business Correspondence skills. 	4	30	70
IV	21ULCEN401	Effective Communicative Skills	<ol style="list-style-type: none"> prepare and produce new ideas by reading and understanding texts classify and apply the ideas given in the texts improve understanding and thinking ability 	3	40	60



			<p>through literature</p> <ol style="list-style-type: none"> 4. consider viewpoints through oral communication 5. develop vocabulary power to enhance communication skills 			
IV	21BAENCC401	Core 13: Classical Criticism (Ad)	<ol style="list-style-type: none"> 1. To demonstrate an understanding of key concepts in literary theory 2. To give a historical perspective to learners about the development of critical ideas 3. To make learners understand various critics and critical concepts 4. To make learner conversant with the various critics and their contribution 5. Think critically about a range of literary theories. 	4	30	70
IV	21BAENCC402	Core 14: Life Writing (Ad)	<ol style="list-style-type: none"> 1. Build a better understanding and appreciation of Life Writing. 2. Critically examine the texts in question. 3. Analyze the significance of historical and cultural contexts in different life stories. 4. Support and value the inner thoughts of authors with experience. 5. Form their own opinions on various works and other things 	4	30	70
IV	21BAENCC403	Core 15: Translation Studies (Ap)	<ol style="list-style-type: none"> 1. appreciate the historical trajectory of art of translation 2. analyze how the sociological, historical, cultural and political context impacted the texts selected for study 3. Compare the original texts and their translations 4. Examine the issues in the social, historic and cultural context. 5. Modify the vocabularies to develop an 	4	30	70



			appreciation of language.			
IV	21BAENCC404	Core 16: Women's Writing (Ad)	<ol style="list-style-type: none"> 1. Build a better understanding and appreciation of Women's writing. 2. Critically examine the texts in question. 3. Compare the works of women from different nations and cultures. 4. Support and value the inner thoughts of women. 5. Form their own opinions on various works and other things 	4	30	70
IV	21BAENCL401	Core Elective 1: Non-British Masters	<ol style="list-style-type: none"> 1. Distinguish the Non-British writers and their styles 2. Judge and justify knowledge of literary traditions to produce imaginative writing. 3. Delineate and explain and the different works by authors who are not native British 4. Express the aesthetic ideas present in fiction. 5. Critically analyze American prose as a expression of individual or communal values 	4	30	70
IV	21BAENCL402	Core Elective 1: Creative Writing	<ol style="list-style-type: none"> 1. Distinguish between the literary genres 2. Make innovative use of their creative and critical faculties 3. Familiarize learners with the process of writing fiction poetry and drama 4. Prepare learners to write for the contemporary modes 5. Encourage learners to write for publication 	4	30	70
IV	21UFHDE401	DSE 2: Basic Macro Economics	<ol style="list-style-type: none"> 1. Understanding barter system and evolution and functions of money. 2. Analyzing and examining various economic situations. 3. Understanding the issues of inflation and remedies. 	4	30	70



			<ol style="list-style-type: none"> 4. Discussing the role of banking and central banking in economy 5. Explaining various theories of exchange rate 			
V	21BAENCC501	Core 17: Phonetics (Ap)	<ol style="list-style-type: none"> 1. Build a better understanding and appreciation of Phonetics as a discipline. 2. Critically examine the pronunciation in English 3. Analyze the significance of historical and cultural contexts in different accents of English 4. Improves Pronunciation with experience. 5. Form their own opinions on various types of pronunciation 	4	30	70
V	21BAENCC502	Core 18: Criticism: Renaissance to Modern Age (Ap)	<ol style="list-style-type: none"> 1. To demonstrate an understanding of key concepts in literary theory 2. To give a historical perspective to learners about the development of critical ideas 3. To make learners understand various critics and critical concepts 4. To make learner conversant with the various critics and their contribution 5. Think critically about a range of literary theories. 	4	30	70
V	21BAENCC503	Core 19: Indian Poetics (Ap)	<ol style="list-style-type: none"> 1. Introducing learners to the field of Indian Poetics through of the history of its tradition. 2. Critically examine the basic concepts of Rasa and Ahankara Aesthetics 3. Introducing and explaining rudimentary aspects of Dhvani and Vakrokti theories 4. Elucidate the elementary concepts of Riti, Auchitya and Anuman in Indian Poetics 5. To develop the application ability of learners from putting theories to practice 	4	30	70
V	21BAENCC504	Core 20: Introduction to Literary Genres (Self-	<ol style="list-style-type: none"> 1. Restate interpretation and moral values. 2. Apply different methods to understand letters. 	4	30	70



		Study)	<ol style="list-style-type: none"> 3. Analyze various elements in works. 4. Compare writing techniques with other styles. 5. Evaluate the adaptation of books in movies. 			
V	21BAENCL501	Core Elective 2: English Language	<ol style="list-style-type: none"> 1. To equip them to teach English as Second Language at the undergraduate levels with its historical background. 2. To introduce themselves to various aspects of language teaching. 3. To make themselves aware of various theories of language teaching and testing. 4. To find problem and solutions in English language teaching. 5. To make them learn how to use literature for English Language teaching. 	4	30	70
V	21BAENCL502	Core Elective 2: Mass Media Studies (AP)	<ol style="list-style-type: none"> 1. Build a better understanding of mass media. 2. Critically analyse the areas of mass media. 3. Evaluate the importance of mass media for the growth of an individual and society. 4. Scrutinize the development of the world through mass media. 5. Create ideas to contribute in the growth of the field. 	4	30	70
VI	21BAENCC601	Core 22: Contemporary Literary & Cultural Theory (Ap)	<ol style="list-style-type: none"> 1. Identify key concepts and historical underpinnings of contemporary literary theory. 2. Interpret and summarize the central ideas within postcolonial theory. 3. Utilize feminist, gender, and queer theories in the examination of literary texts. 4. Analyze literary works using ecocriticism, assessing their environmental thematic presence. 5. Synthesize cultural studies theory with other frameworks to critique cultural expressions. 	3	30	70



VI	21BAENCC602	Core 23: Modern Masters (Ad)	<ol style="list-style-type: none"> 1. Interpret literary aspects in Modern Age 2. Distinguish the modern - writers and their styles 3. Discuss the different works by modern poets 4. Construct the aesthetic ideas present in fiction. 5. Critically evaluate prose as a individuals and social spheres. 	3	30	70
VI	21BAENCC603	Core 24: Popular Literature (Ad)	<ol style="list-style-type: none"> 1. Recognize the origin of popular literature and hence will be able to understand the true, derivative meaning of the pop and its branches. 2. Analyze various aspects of the characteristic and Genres Popular Literature 3. Explain the development of Popular Literature in English language and how other countries have been influenced by it. 4. Apply their new understanding of popular literature in the prescribed novel of the world literature order to get the idea of Pop. 5. Employ literary aspect of their knowledge of pop literature in Indian Context with Indian Text. 	3	30	70



Faculty of Transformative Education
School of Consciousness Development and Value Education
Name of Department: Chetna Vikas Mulya Shiksha (CVMS) Cell
Offered to all Programs - PG

Subject: Wisdom and Ethics for Success in Life (WESL)

Program Objective:

- Provides students with a holistic perspective of life.
- Students are able to differentiate between success in career & success in life.
- This module teaches the students the innate values in human being.
- Students can understand harmony in family and how to fulfil those values in family.
- This module will also help students to understand ethical human conduct.

Graduate Attributes:

- Trust within oneself
- Respect for qualities & values
- Balanced & integrated personalities
- Social in behavior
- Self-reliance in occupation



Course Outcomes (COs):

Course Outcomes: Upon completion of this course, the learner will be able to		
CO No.	CO Statement	Bloom's taxonomy Level (K₁ to K₆)
CO ₁	Differentiate the career success, academic success and life success	K2
CO ₂	Identify the correct priority order in life and illustrate the human goal	K1, K3
CO ₃	Understand that the relationships are definite.	K2
CO ₄	Understand the Interconnectedness between all the orders in existence.	K2



Faculty of Transformative Education
School of Consciousness Development and Value Education
Chetna Vikas Mulya Shiksha (CVMS) Cell
Offered to all Program - UG and Integrated

Subject: Human Values for Holistic Living (HVHL)

Program Objective:

1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
2. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).

Students can rightly evaluate their skills and accordingly contribute in the society and in the nature.

Graduate Attributes:

- Trust within oneself
- Respect for qualities & values
- Balanced & integrated personalities
- Social in behavior
- Self-reliance in occupation



Course Outcomes (COs):

Course Outcomes: Upon completion of this course, the learner will be able to		
CO No.	CO Statement	Bloom's taxonomy Level (K₁ to K₆)
CO ₁	Recall basic guidelines of value education and understand the basic aspirations.	K1, K2
CO ₂	Understand the needs of self and body based on their natural acceptance and solves their conflict using self-exploration.	K2, K3
CO ₃	Identify the relations between human-human and they have the ability to fulfill the expectations in relations.	K1, K2
CO ₄	Understand required skills to understand the laws of nature.	K2



Ability Enhancement Compulsory Course
Environmental Conservation and Sustainable Development
Offered to all Program – UG & Integrated

Course Description:

This course is deal with interdependence between human activities and the ecosystem of nature. Environmental science is a transdisciplinary discipline which requires precise perception about the environment, as well as consciousness about the ways in which human being work with its ecosystem. We investigate the effects of human being accomplishments towards the environment, policies and regulations associated with nature, and how intervention impacted on the mankind. We also interpret the human psychology and socio cultural aspects and affects on the surrounding nature.

Course Purpose:

The course focuses comprehension of the concept of sustainability in an amalgamated way, including surrounding, socioeconomic aspects. This course explores the coming future and what transformation need in current. The basic idea of the environmental conservation is that progression towards a sustainable future depends on what creative interdisciplinary thinking you derived from society. We look to motivate creativity and combine passion with critical thinking skills in students who one day will be the citizens working to convert the world to more sustainable systems.

Course Outcomes: Upon completion of this course, the learner will be able to		
CO No.	CO Statement	Blooms taxonomy Level (K₁ to K₆)
CO ₁	Gain insights into the international efforts to safeguard the Earth's environment and resources	K2
CO ₂	Understand importance of natural resources and biological diversity	K2
CO ₃	Understand the sectoral effects on the local, regional, and global environmental issues	K1
CO ₄	Correlate the exploitation and utilization of conventional and non-conventional energy resources	K3
CO ₅	Learn about the major international treaties and our country's stand on and responses to the major international agreements.	K1, K3



Core Enrichment Component
Social Immersion Internship
Offered to all Program - UG and Integrated

Internship Objectives

Empathize and understand social issues and problems through first-hand experience. Learn to appreciate and respect different ways of thinking and living and there by transform perspective towards culture, society and life at large.

- Learn skills of collecting, organizing and interpreting data and information.
- Develop critical thinking and problem-solving abilities.
- Develop interpersonal skills and learn social and professional etiquette.
- Nurture an attitude of ‘giving back’ to society.



Core Enrichment Component
Concept to Practice
Offered to all Program - UG and Integrated

Course Description:

This Course on concept to practice is intended to introduce ideas, methodologies, principles, fundamentals and skills that comprise a common knowledge base important to all disciplines. These fundamentals will foster a multidisciplinary design experience among students and will prepare them to move to the next level. It will provide the students with foundation and fundamentals of skills in design. The course will benefit applicants who have little or no training or experience in art and design and who wish to begin formal education in this field.

Course Purpose:

Concept to practice enables organizations to create lasting value for consumers. The process is useful in any complex system it:

- Aims to solve concrete human needs.
- Tackles problems ambiguous or difficult to define
- Leads to more innovative solutions.

Course Outcomes: Upon completion of this course, the learner will be able to		
CO No.	CO Statement	Blooms taxonomy Level (K₁ to K₆)
CO ₁	Understand problem identification, formulation and solution.	K2
CO ₂	Design an engineering solution to complex problems.	K3
CO ₃	Communicate with the community at large in written and oral forms.	K3
CO ₄	Demonstrate a sound technical knowledge of their societal problems.	K2
CO ₅	Demonstrate the knowledge, skills, values and attitudes of professional graduates.	K3



Finishing School Compulsory Course
Orientation to Design Thinking
Offered to all Program - UG and Integrated

Course Description:

Design thinking is a systematic method of solving problems and is different from traditional scientific or marketing focused approaches. Today industries, innovators, social entrepreneurs and leading universities across the globe are speaking and writing a lot about design thinking. It has taken a center stage in many organizations which are trying to rapidly adopt a user-centered approach and a culture in order to be more innovative. Design thinking is enabling individual and organizations to be more creative in developing new solutions that are unique in the market there by creating a large impact on the market and life of individuals. This is an introductory course that will help to understand the notions of Design Thinking along with some of the related tools, techniques and methods. Through interesting examples, case-studies and exercises the course will help to develop critical thinking and problem-solving abilities.

Course Purpose:

The main purpose of this course is to describe design thinking and its use, variety of approaches within the design thinking discipline and the explanation of basic elements & importance practices in design thinking. It also explain the use of various tools and methods in alignment to a specific design thinking approach, the role of project management within design thinking with application of design thinking for problem solving.

Course Outcomes: Upon completion of this course, the learner will be able to		
CO No.	CO Statement	Blooms taxonomy Level (K₁ to K₆)
CO ₁	Describe design thinking and its use	K2
CO ₂	Explain basic elements & practices in design thinking	K3
CO ₃	Explain the use of various tools and methods in alignment to a specific design thinking approach	K3
CO ₄	Explain the role of project management within design thinking	K2
CO ₅	Apply design thinking for problem solving	K3



Ability Enhancement Compulsory Course
Introduction to Sustainable Development Goals (SDG)
Offered to all Program - UG and Integrated

Course Description:

This course provides the definition of the concepts of sustainability and development, the development indices, evolution of UN SDG2030 agenda and its 17 Goals. The course further elaborates the interconnectedness and interdependence of the goals in terms of three dimensions- Social, economic and Environmental and also the 5 aspects namely People, Planet, Prosperity, Peace and Partnership.

Course Purpose:

The course has been designed to create awareness and sensitize the youth towards the aspects of Sustainability and Development by introducing the UN SDG 2030 agenda and its global and national relevance.

Course Outcomes: Upon completion of this course, the learner will be able to

Course Outcomes	CO Statement	Bloom's taxonomy Level (K1 to K6)
CO1	Define and relate to concepts of sustainability and development	K1, K2
CO2	Identify and interpret the SDGs	K1, K2
CO3	Recognize and Classify the SDGs into 5 Ps	K1, K2
CO4	Infer the importance of SDGs as Development Index	K1, K2
CO5	Summarize the interdependence and interconnectedness of SDGs in three dimensions – Social, Economical and Environmental	K2, K3



**Finishing School Compulsory Course
Career Acceleration Program
Offered to all Program - UG and Integrated**

Course Objectives:

- This Program serves the purpose of achieving Job Placement, Entrepreneurship, Research work, Study in abroad and in Competitive exam sector.
- To make communication better and effective through series of activities
- To achieve career relevant and life skills through practical activity based learning.

Program Outcomes (POs):

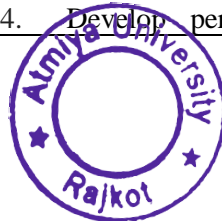
1. **Effective Communication and Interpersonal Skills:** Graduates will be able to communicate effectively across multiple channels (verbal, written, and digital) and will demonstrate the ability to engage with diverse audiences, ensuring clarity and professionalism in all interactions.
2. **Digital Literacy and Technological Proficiency:** Graduates will possess the necessary skills in Information, Media, and Technology Literacy to utilize modern digital tools and platforms effectively in their careers, research, and personal development.
3. **Leadership, Adaptability, and Problem Solving:** Graduates will demonstrate leadership and adaptability by taking responsibility in diverse and dynamic environments, solving complex problems, and making informed decisions through critical thinking and time-management strategies.
4. **Career-Ready Competencies and Entrepreneurial Mindset:**
Graduates will apply career-relevant life skills, including entrepreneurship and research acumen, to secure job placements, develop their own businesses, or pursue further academic studies and competitive exams.



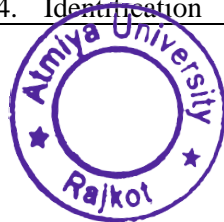
Program Educational Outcomes (PEOs):

1. **Industry-Ready Professionals:** Graduates will be equipped with the communication, leadership, and technical skills needed to excel in their chosen careers, enabling them to secure jobs, pursue entrepreneurial ventures, or engage in academic research and competitive exams.
2. **Proficiency in Digital Tools and Lifelong Learning:**
Graduates will have a solid foundation in digital literacy, which will allow them to continually adapt to emerging technologies and trends in their professional and personal lives. They will engage in continuous learning to stay relevant in an evolving job market.
3. **Holistic Development and Responsible Citizenship:**
Graduates will demonstrate flexibility, adaptability, and responsibility, both as leaders and contributors in their professional settings, with an understanding of ethical standards and social responsibilities.
4. **Global and Cultural Awareness:**
Graduates will be prepared for international opportunities, whether through higher studies abroad or by working in global contexts, leveraging cross-cultural communication skills and global perspectives to succeed in a diverse world.

Semester	Course code	Course Title	Course Type	Course Outcomes	Credits	Assessment (marks)	
						CIA	SEE
I	21AEFS501	Finishing School Part III Course : Communication Skills		1. Remember the message coming through different communication channels 2. Understand the message coming through different communication channels to think critically, logically and creatively 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Develop personality & right attitude through	Audit	100	0



				communication skills.			
II	21AEFS501	Finishing School Part III Course : Traditional Soft Skills		<ol style="list-style-type: none"> 1. Recognize the message coming through different channels 2. Understand the given situation to think critically, logically and creatively and deal accordingly based on that. 3. Apply the knowledge, skills and judgment around human communication that facilitate their ability to work collaboratively with others 4. Reframe personality & right attitude through traditional Soft skills. 	Audit	100	0
III	21AEFS501	Finishing School Part III Course : Revolutionary Skills for Triumph		<ol style="list-style-type: none"> 1. Understand the need of 21st century skills, Understand and Analyze the skills through Learning : Critical Thinking, Creativity & Innovation 2. Understand the leading skills through edge of : Communication, Collaboration and Networking 3. Understand the skills through digital literacy :Information, Media and Technology Literacy 4. Recall, Understand and Analyze Life Skills : Flexibility and Adaptability, Leadership and Responsibility 5. Recall, Understand and Analyze Life Skills : Productivity and Accountability, Social and Cross-Cultural Interaction 	Audit	100	0
IV	21BCHCC40 1	Core 8: Organic Chemistry(Ad)	Core	<ol style="list-style-type: none"> 1. Recognize the basic concept of carbonyl compounds and active Methylene group for a chemical reaction. 2. Predict and synthesis of carboxylic acid and derivatives with help of different reagents. 3. Understanding of classification, properties and synthesis of nitrogen containing compounds 4. Identification Classification, properties and 	4	40	60



				prediction of the products of alcohol and phenol with various synthetic paths. 5. Differentiate mechanisms of nucleophilic substitution and Elimination and the factors affecting it.			
IV	21AEFS501	Finishing School Part III Course : Quantitative Aptitude Training		1. Understand the basic concepts of quantitative ability 2. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions 3. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.	Audit	100	0
V	21AEFS501	Finishing School Part III Course : Logical Reasoning Training		1. Understand the basic concepts of quantitative ability 2. Apply the knowledge, information parameters and mathematical skills to develop time saving solutions 3. Reframe terms for various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.	Audit	100	0




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