AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

B.TECH. (CSE)

Programme Educational Objectives

PEO-1: To provide graduating students with core competencies by strengthening their mathematical, scientific and basic engineering fundamentals.

PEO-2: To train graduates in diversified and applied areas with analysis, design and synthesis of data to create novel products and solutions to meet current industrial and societal needs.

PEO-3: To inculcate high professionalism among the students by providing technical and soft skills with ethical standards.

PEO-4: To promote collaborative learning and spirit of teamwork through multidisciplinary projects and diverse professional activities.

PEO-5: To encourage students for higher studies, research activities and entrepreneurial skills by imparting interactive quality teaching and organizing symposiums, conferences, seminars, workshops and technical discussions.

Prof.(Dr.) Kuldip Dwivedi
Dy. Dean & I/c Dean (Academics)
Amity University Madhya Pradesh

PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES
Bachelor of Technology (B. Tech.) CSE

Programme Outcomes:

[PO.1]: **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, andanengineeringspecializationtothesolutionofcomplexengineeringproblems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO.3]. **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.

[PO.4]. **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.

[PO.5]. **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.

[PO.6]. **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.

[PO.7]. **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.

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[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 learning instructions.

[PO.11]. Project management and finance: Demonstrate knowledge and understandingoftheengineeringandmanagementprinciplesandapplythesetoone'sownwork, 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 Outcomes

PSO1. Professional Skills: An 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.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An 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 Outcomes:

FIRST SEMESTER

Course Code	Course Title	Outcome
BTC 101	Applied Mathematics – I	· To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.
		· The mathematical tools needed in evaluating multipleintegrals and their usage.
		· The tools of differentiation and integration of functionsof a complex variable that are used in various techniques dealing engineering problems.
		· The essential tools of matrices and linear algebra including linear transformations, eigen values, diagonalization.
BTC 102	Applied Physics - I –Fields & Waves	After successful completion of the course students will havethe knowledge and skill to:
		· Apply vector calculus to static electric-magnetic fieldsin different engineering situations.
		· Analyze and Apply Maxwell's equation to diverseengineering problems.
		· Relate semiconductor material properties to

		semiconductor devices.
BTC 103	Element of Mechanical Engineering	• Understand about the working, functions and applications ofequipments used in daily life.
		Identify the broad context of Mechanical engineeringproblems, including describing the problem conditions and identifying possible contributing factors
		• Understand the fundamental elements of Mechanical engineering systems, system components and processes, with a good understanding of associated safety, quality, schedule and cost considerations.
BTC 104	Introduction to Computers & Programming in C	On completion of the course, students are able to:
		• Develop their programming skills.
		• Be familiar with programming environment with C Programstructure.
		• Declaration of variables and constants.
		• Understand operators, expressions and preprocessors.
		• Understand arrays , it's declaration and uses.
BTC 105	Applied Chemistry	The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. To understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:
		• Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
		• Rationalise bulk properties and processes usingthermodynamic considerations.
		• Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
		• Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
		• List major chemical reactions that are used in the synthesis ofmolecules.
BTC 106	Environmental Studies - I	**Upon course completion, students will be able to understand:** The multidisciplinary nature of environmental studies, Our natural resources The ecosystem its structure and function, ecological succession, Biodiversity and its conservation and Biological classification of India.
BTC 120	Applied Physics Lab – I	After completion of course student will develop: Practical understanding and applications of fundamental concept of classical and modern Physics.

BTC 121	Element of Mechanical Engineering Lab	• Be able to apply design knowledge for Design of Cotter Jointand Knuckle Joint etc and
		formulate the design procedure and acquire skill of finding resisting areas against failure.
		Apply the knowledge of Design Data Hand Book and ISO standards for selection of
		materials, strengths, standard dimensions of designcomponents.
		• Able to apply design and drafting knowledge of CAD software for drafting assembly and
		details of Bolted joint, Coupling, Cotter joint, Knuckle Jointetc.
		• Develop Logical and Analytical ability to apply Knowledgeof CAD for design of Shaft
		subjected to direct and combined loading
BTC 122	Programming in CLab	After Completion of this course the student would be able to
		• Read, understand and trace the execution of programs writtenin C language.
		• Write the C code for a given algorithm.
		• Implement Programs with pointers and arrays, perform pointer arithmetic, and
		use the pre-processor.
		• Write programs that perform operations using derived datatypes.
BTC 123	Applied Chemi stryLab	The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
BTC 124	Engineering Graphics Lab	· Introduction to engineering design and its place in society
		· Exposure to the visual aspects of engineering design
		· Exposure to engineering graphics standards
		· Exposure to solid modelling
		· Exposure to computer-aided geometric design
		· Exposure to creating working drawings
		· Exposure to engineering communication
	English	· The students should be able to :
		· Identify Common Errors and Rectify Them
		· Develop and Expand Writing Skills Through Controlledand Guided Activities
		· To Develop Coherence, Cohesion and Competence inOral Discourse through Intelligible Pronunciation

Course Code	Course Title	Outcome
BTC 143	Behavioural Science - I	· The knowledge of self will be utilized by students to resolve their personal, interpersonal and life problems
		· Rather than extrinsic locus of control, students will acquire an intrinsic approach towards life
		· The heightened awareness of self, attitudes and emotions will help students to work towards removal of obstacles created by self-limitations and enhance their full potential in their education and career.
	Foreign Language –I	· To understand basic French. Able to read, write basic French
BTC 144	French	· To express basic day to day activities in French

SECOND SEMESTER

Course Code	Course Title	Outcome
BTC 201	Applied Mathematics - II	• Upon completion of this course, students will be able tosolve field problems in engineering involving PDEs.
		• The effective mathematical tools for the solutions of differential equations that model physical processes.
BTC 202	Applied Physics - II – Modern Physics	In Modern physics II applications of the foundations of relativity and quantum physics
		given in Modern Physics I are included. After completion ofthis course the student will
		be able to:
		• outline the main ideas and theories in the more applied areasof modern physics
		• solve problems in modern physics by choosing appropriatemethods and assess the
		plausibility of the results obtained
		• formulate and evaluate mathematical models describing physical problems
		• explain the significance of the Swedish and English terms used in the field
BTC 203	Electrical Science	• an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
		• an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
		• an ability to communicate effectively with a range of audiences

		• an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
BTC 204	Object oriented programming usingC++	At the end of this course, students will demonstrate ability to:
		• To apply concepts of classes and objects in real world scenarios.
		• Understand object-oriented programming features in C++,
		• Apply these features to program design and implementation,
		• Understand object-oriented concepts and how they are supported by C++,
		• Gain some practical experience of C++.
BTC 205	Engineering Mechanics	• Confidently tackle equilibrium equations, moments and inertiaproblems
		• Master calculator/computing basic skills to use to advantagein solving mechanics problems.
		• Gain a firm foundation in Engineering Mechanics for furthering the career in Engineering
BTC 206	Environmental Studies-II	**Upon course completion, students will be able to:**
		Explain various types of environmental pollutions. Understandrole of individual in abatement of environmental pollution. Explain methods to mitigate disasters. Learn various environmental protection laws. Learn role of IT in environment and human health
BTC 220	Applied Phy sicsLab - II	After completion of course student will develop: Practical understanding and applications of fundamental concept of classical and modern Physics.
BTC 221	Electrical Scie nceLab	Understand the fundamentals of e.m.f, potential difference, current, resistance and energy conversions from one form to another. They should be able to calculate cost of energy consumption.
BTC 222	Object oriented programming usingC++ Lab	At the end of this course, students will demonstrate ability to:
		• knowledge of the structure and model of the C++programming language, (knowledge)
		• evaluate user requirements for software functionality required to decide whether the C++ programming language can meetuser requirements (analysis)
		• design the object-oriented programs for real world problems.
BTC 223	Engineering Mechanics Lab	• Understand and be able to apply Newton's laws of motion.
		• Understand basic dynamics concepts – force, momentum, work and energy.
BTC 240	English	· The students should be able to :
		· Identify Common Errors and Rectify Them
		· Develop and Expand Writing Skills Through Controlledand Guided Activities
		· To Develop Coherence, Cohesion and Competence in

Cour se Cod e	Course Title	Outcomes
		Oral Discourse through Intelligible Pronunciation
BTC 243	Behavioural science - II	Through this course,
		· Students will get aware of their personality through theuse of various tests, and utilize this information to apply in everyday life events.
		· The knowledge of socialization process will help studentsidentify the source of their behavior patterns and help them change destructive and problematic behaviors.
		· Students will learn to appreciate the diversity in humannature and bring it to their benefit at a workplace situation.
		· Students will learn about the societal and national identities, and be able to shape their goals in accordance with such knowledge.
	Foreign Language -II	· To understand and read official mail in French.
BTC 244	French	· To understand and present biography of Scientist in French
		· Able to write, read and understand simple scientific article in French

THIRD SEMESTER

Cour se Cod e	Course Title	Outcomes
BTC 301	Applied Mathematics – III	The objective of this course is to familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables. It aimsto equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.
		The students will learn:
		· The mathematical tools needed in evaluating multiple integrals and their usage.
		· The effective mathematical tools for the solutions of differential equations that model physical processes.
		· The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems
BTC 302	Analog Electronics	At the end of this course students will demonstrate the ability to
		• Understand the characteristics of diodes and transistors
		• Design and analyze various rectifier and amplifier circuits
		• Design sinusoidal and non-sinusoidal oscillators
		• Understand the functioning of OP-AMP and design OP-AMP based circuits

		• Design ADC and DAC
BTC 303	Operating Systems	At the end of the course, the students should be able to:
		Analyze various scheduling algorithms.
		Understand deadlock, prevention and avoidance algorithms.
		Compare and contrast various memory management schemes.
		Understand the functionality of file systems.
BTC 304	Data Structure UsingC	Ability to choose appropriate data structures to represent data items in real world problems.
		Ability to analyze the time and space complexities of algorithms.
		Ability to design programs using a variety of data structures such as stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees.
		Able to analyze and implement various kinds of searching andsorting techniques.
BTC 305	Database Management Systems	Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
		Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.
		Learn and apply Structured query language (SQL) for databasedefinition and database manipulation.
		Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
		Understand various transaction processing, concurrency controlmechanisms and database protection mechanisms.
BTC 320	Analog ElectronicsLab	Students will be able to:
		· Design and test rectifiers, clipping circuits, clamping circuits and voltage regulators.
		· Compute the parameters from the characteristics ofJFET and MOSFET devices.
		· Design, test and evaluate BJT amplifiers in CE configuration.
		· Design and test JFET/MOSFET amplifiers.
BTC 321	Data Base Management Systems Lab	· At the end of lab session students would be able to designthe Database application for the real life projects.
		· Students would be able to perform insertion, deletion andupdation operation on Databases.
BTC 322	UNIX ProgrammingLab-I	· Identify the basic Unix general purpose commands.
		· Apply and change the ownership and file permissions using advance Unix commands.
		· Use the awk, grep, perl scripts.
		· Implement shell scripts and sed.
		· Apply basic of administrative task.

BTC 323	Data Structure Lab	· Ability to identify the appropriate data structure for givenproblem.
		· Graduate able to design and analyze the time and spacecomplexity of algorithm or program.
		· Ability to effectively use compilers includes library functions, debuggers and trouble shooting.
BTC 341	Communication Skills – I	· The students should be able to :
		· Identify Common Errors and Rectify Them
		· Develop and Expand Writing Skills Through Controlledand Guided Activities
		· To Develop Coherence, Cohesion and Competence in Oral Discourse through Intelligible Pronunciation
BTC 343	Behavioural Science - III	• Student will be able to understand and solve the problemseffectively in their personal and professional life.
		• Students will outline multiple divergent solutions to a problem,
		• Student will able to create and explore risky or controversialideas, and synthesize ideas/expertise to generate innovations
	Foreign Language –III	• les adjectifs démonstratifs
BTC 344	French	• les verbes : 'ir groupe' devoir, falloir
		• les prépositions de lieu, de pays
		• l'impératif, le passé composé, forme et accord du participepassé, la négation au passé composé
		• les indicateurs de temps (il y a, depuis)
BTC 330	Term Paper (Evaluation)	After successful completion of this course, students will be ableto
		• Carry out intense study on a specific topic related to currentdevelopment in their field of specialization
		• Collect, interpret and analyze the information
		• Compare and evaluate the existing solutions for a specific cases study
		• Develop skills of presentation and report writing

FOURTH SEMESTER

Course Code	Course Title	Outcomes
BTC 401	Theory of Automata& Computation	At the end of this course, students will be able to do the following:
		· Students will demonstrate knowledge of basic mathematical models of computation and describe how they relate to formal languages.

		· Students will understand that there are limitations on what computers can do, and learn examples of unsolvable problems.
		Students will learn that certain problems do not admit efficientalgorithms, and identify such problems.
BTC 402	Digital Electronics	· At the end of this course, students will demonstrate theability to
		Understand working of logic families and logic gates.
		Design and implement Combinational and Sequential logic circuits.
		Understand the process of Analog to Digital conversion and Digital to Analog conversion.
		Be able to use PLDs to implement the given logical problem
BTC 403	Discrete Mathematics	· For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives
		· For a given a problem, derive the solution using deductivelogic and prove the solution based on logical inference.
		· For a given a mathematical problem, classify its algebraicstructure
		· Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.
		· Develop the given problem as graph networks and solvewith techniques of graph theory.
BTC 404	Communication Systems	Show clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking.
		Demonstrate the ability to unambiguously explain networking as it relates to the connection of computers, media, and devices (routing).
		Able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities. Able to identify limitations of typical communication systems.
BTC 405	Computer Graphics	· Know and be able to describe the general software architecture of programs that use 3D computer graphics.
		· Know and be able to discuss hardware system architecture for computer graphics. This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators /co-processors.
		· Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).
BTC 420	Digital Electronics	After studying this course the students would gain enough

Course	Course Title	Outcomes
	Lab	knowledge.
		· To have thorough understanding of the fundamental concepts and techniques used in digital electronics.
		· To understand and examine the structure of various number systems and its application in digital design.
		· The ability to understand, analyze and design various combinational and sequential circuits.
		· Ability to identify basic requirements for a design application and propose a cost-effective solution.
		· To develop skill to build and troubleshoot digital circuits.
BTC 421	Communication Systems Lab	Show clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking.
		Demonstrate the ability to unambiguously explain networking as it relates to the connection of computers, media, and devices (routing).
		Able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities. Able to identify limitations of typical communication systems.
BTC 422	Computer GraphicsLab	· Know and be able to describe the general software architecture of programs that use 3D computer graphics.
		· Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).
BTC 441	Communication Skills - II	• Develop a resume for oneself
		• Ability to handle the interview process on fidently
		• Learn the subtle nuances of an effective group discussion
BTC 443	Behavioural Science - IV	• Able to answer the question: What do I stand for?
		• Ability to apply a coherent set of moral principles within professional and specialized contexts
		• Willing to make unpopular but right decision
		• Committed to working for justice and peace locally and globall
	Foreign Language –IV	• imparfait,
BTC 444	French	• la comparaison du verbe/du nom ; mieux/meilleur
		• les pronoms relatifs

FIFTH SEMESTER

Course	Course Title	Outcomes

Cod e		
BTC 501	VHDL Programming	At the end of the course, students will demonstrate the abilityto:
		• Design synchronous and asynchronous sequential circuits
		• Translate real world problems into digital logic formulations.
		• Construct test and debug digital networks using VHDL.
BTC 502	Software Engineering	Ability to use the modeling approaches for the designing of software.
		Ability to use the testing tools and designing of test cases for testing.
		Ability to use the Unified modeling language (UML) for the designing of software product.
BTC 503	Computer Architecture	Ability to understand basic structure of computer.
		Ability to perform computer arithmetic operations.
		Ability to understand control unit operations.
		Ability to design memory organization that uses banks for different word size operations.
		Ability to understand the concept of cache mapping techniques.
		Ability to understand the concept of I/O organization.
		Ability to conceptualize instruction level parallelism
BTC 504	Data Communication & Computer Networks	· Show clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking.
		· Demonstrate the ability to unambiguously explain networking as it relates to the connection of computers, media, and devices (routing).
		· Able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities. Able to identify limitations of typical communication systems.
		· Able to differentiate among and discuss the four levels of addresses (physical, logical, port, and specific used by the Internet TCP/IP protocols.
		· Understand the concept of reliable and unreliable transfer protocol of data and how TCP and UDP implement these concepts
		· Developing the understanding of various advanced techniques like ISDN,ATM and wifi.
BTC 505	Java Programming	The student will learn:
		· Students can perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members

		· Students can demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance
		· Students can demonstrate ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solution of problems
		· Students can demonstrate ability to implementmultithreading in the programming.
		· To learn syntax and features of exception handling
		· Students can demonstrate the ability to implement solution to various I/O manipulation operations and the abilityto create two-dimensional graphic components using Swings.
		· To demonstrate the ability to handle Events in the Programming
BTC 520	VHDL Programming Lab	• Write a VHDL code for various combinational and sequentialcircuits.
		• Testing of Various digital designs using test bench in VHDL.
BTC 521	Software Engineering Lab	· Ability to design the proper documentation of software product.
		· Ability to implement the cost estimation modelling approaches.
		· Ability to use the unified modelling language as a tool.
BTC 522	Computer Architecture Lab	Know and be able to describe the general software architectureof programs that use 3D computer graphics.
		Know and be able to select among models for lighting/shading:Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).
BTC 523	Data Communication & Computer Networks Lab	Students can demonstrate the ability to Study Different types ofNetwork Topology and networking
BTC 524	Java ProgrammingLab	· knowledge of the structure and model of the Java programming language, (knowledge)
		· use the Java programming language for various programming technologies (understanding)
		· develop software in the Java programming language, (application)
		· evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
		· propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
	Communication	• Communicate fluently and sustain comprehension of an extended discourse.

BTC 541	Skills - III	• Demonstrate ability to interpret texts and observe the rules of

Course Code	Course Title	Outcome
		good writing.
		• Prepare and present effective presentations aided by ICT tools.
BTC 543	Behavioural Science - V	• Students will Develop critical and reflective thinking abilities
		• Students will Demonstrate an understanding of group dynamics and effective teamwork
		• Student will develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others
		• Student will Gain knowledge and understanding of organization resources, policies, and involvement opportunities.
		• Student will Develop strategies to recruit, retain, and continually motivate contributing members to the organization
BTC 544	Foreign Language –V French	• le présent (révision), le passé composé (révision)
		• les pronoms compléments directs, les pronoms complémentsindirects
BTC 550	Industrial PracticalTraining - I (Evaluation)	After successful completion of the course, the students will beable to
		· Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills.
		Manage the technical content and work.
		Learn the various administrative process followed in industry.
		Prepare and present technical report.

SIXTH SEMESTER

Course Code	Course Title	Outcome
BTC 601	Microprocessor	At the end of this course students will demonstrate the ability to
		• Do assembly language programming
		• Do interfacing design of peripherals like, I/O, A/D, D/A, timeretc.
		• Develop systems using different microcontrollers
		• Understand RISC processors and design ARM microcontrollerbased systems

BTC 602	System Programming	Demonstrate the knowledge of Systems Programming and Operating Syste ms 2. Formulate the Problem and develop the solution for same. 3. Compare and analyze the different implementation approachof system programming and operating system abstractions. 4. Interpret various OS functions used in Linux / Ubuntu

BTC 603	E-Commerce and ERP	Upon successful completion, Introduction to E-Commerce, the student will be able to: Demonstrate an understanding of the foundations and importance of E-commerce Demonstrate an understanding of retailing in E-commerce by: analyzing branding and pricing strategies, using and determining the effectiveness of market research assessing the effects of disintermediation.
BTC 604	Advanced Networking	The student will be able to: · Illustrate reference models with layers, protocols and interfaces. · Summarize functionalities of different Layers. · Combine and distinguish functionalities of different Layers. · Describe and Analysis of basic protocols of computer networks, and how they can be used to assist in network design and implementation. · Identify and describe development history of routing protocols. · Describe Subnetting and Addressing of IP V4
BTC 605	Advanced Java programming	The student will learn:
		Can develop Java Applets, Beans programming.
		Can Understand Advanced Java Networking concepts and develop server side application.
		Can learn Server Side Programming Concepts and create Dynamic web Application.
		Know about the JDBC Principles and can interact with backend database with java programming.
		Understand the application server and also understand the enterprise level applications.
BTC 620	Microprocessor Lab	Upon completion of this laboratory course students will demonstrate the ability to
		• Do assembly language programming
		• Do interfacing design of peripherals like, I/O, UART, LCD,Keyboard, timer etc. to 8051
		• Develop systems using different microcontrollers
BTC 621	System Programming Lab	Demonstrate the knowledge of Systems Programming and Operating Syste ms 2. Formulate the Problem and develop the solution for same. 3. Compare and analyze the different implementation approachof system programming and operating system abstractions. 4. Interpret various OS functions used in Linux / Ubuntu

BTC 622	Advanced Networking Lab	Upon successful completion of this course, a student should beable to: 1. Design and build a wireless LAN. 2. Design and implement a network security policy using accesslists. 3. Use VLANs in a switched network environment. 4. Troubleshoot wireless LANs and VLANs. 5. Troubleshoot security policies such as access lists.
BTC 623	Advanced Java Programming Lab	· Ability to design and develop Java Applets, Beans programming.
		· Ability to design and structure the Server Side Programming Concepts.
		· Ability to Create and design Dynamic web Application.
		· Write the structured code for JDBC (back end database).
		· Ability to develop and design the enterprise level applications.
BTC 641	Communication Skills - IV	• To communicate contextually in specific personal and professional situations with courtesy.
		• To inject humour in their regular interactions.
		• To strengthen their creative learning process through individual expression and collaborative peer activities.
BTC 643	Behavioural Science - VI	• Student will able demonstrate thorough understanding of stress and its effects
		• Student will able to learn various coping strategies to deal stress effectively so to overcome the consequences and impact of stress on their health and wellbeing, ultimately it will enhance their performance
	Foreign Language –VI	• Le présent (révision)
BTC 644	French	• Les prépositions et les verbes
		• Les pronoms possessives
		• Les verbes réciproques

SEVENTH SEMESTER

Course Code	Course Title	Outcome
BTC 701	Compiler Construction	After learning the course, the students should be able to:
		· Underst andCompiler Design t h e b as ic conce pts a n d applicat ion o f
		· Apply their basic knowledge Data Structure to design Symbol Table, Lexical Analyzer Intermediate Code Generation, Parser (Top Down and Bottom Up Design) and will able to understand strength of Grammar and Programming Language.
		· Understand various Code optimization Techniques and Error Recovery mechanisms.
		· Understand and Implement a Parser.
BTC 702	Artificial Intelligence	Upon successful completion of this course student will:
		be able to design a knowledge based system,
		be familiar with terminology used in this topical area,
		have read and analyzed important historical and current trendsaddressing artificial intelligence.
BTC 703	Analysis and Design of Algorithm	· At the end of the course, the student should be able to:
		· Design and implement projects using OO concepts.
		· Use the UML analysis and design diagrams.
		· Apply appropriate design patterns.
		· Create code from design.
BTC 704	Information Storage & Management (EMC²)	Students can design and implement OLTP, OLAP and Warehouse concepts, Data Warehouse using Various Schemas & Dimensional modelling
BTC 720	Compiler Construction Lab	After learning the course, the students should be able to:
		· Underst andCompiler Design t h e b as ic conce pts a n d applicat ion o f
		· Apply their basic knowledge Data Structure to design Symbol Table, Lexical Analyzer Intermediate Code Generation, Parser (Top Down and Bottom Up Design) and will able to understand strength of Grammar and Programming Language.
		· Understand various Code optimization Techniques and Error Recovery mechanisms.
		· Understand and Implement a Parser.
BTC 721	Artificial Intelligence Lab	Students can design a knowledge based system be familiar withterminology used in this tropical area,
		and have read and analyzed important historical and current trends addressing artificial intelligence.
BTC 722	Analysis and Design of Algorithm Lab	Perform OO analysis and design for a given problem specification.
		Identify and map basic software requirements in UML mapping.

		Improve the software quality using design patterns and to explain the rationale behind applying specific design patterns
		Test the compliance of the software with the SRS.
BTC 741	Communication Skills - V	Student Learning Outcomes:
		• Conduct all business activities related to the workplacewith technical efficiency.
		• Contribute positively to the overall growth of the organization.
BTC 743	Behavioural Science -VII	• Students develop the ability to identify suitable career options and to create a suitable career plan based on the utilization of the counseling process, assessment tools, and other resources.
		• Students will know how to assess their skills, interests andvalues.
		• Students will know how to make informed career choicesbased on their self- assessment.
		Students will know how to explore relevant career options andbuild skills pertinent to those of greatest interest.
	Foreign Language – VII	Grammaire :
BTC 744	French	1. Le pronom " en "
BTC 750	Practical Training – II(Evaluation)	The students will be able to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills
BTC 760	Project (Dissertation)	On successful completion of the course students will be able to:
		1. Demonstrate a sound technical knowledge of their selectedproject topic.
		2. Undertake problem identification, formulation and solution.
		3. Design engineering solutions to complex problems utilising asystems approach.
		4. Conduct an engineering project
		5. Communicate with engineers and the community at large inwritten an oral forms.
		6. Demonstrate the knowledge, skills and attitudes of a professional engineer.
		7. Write comprehensive report on project work.

ELECTIVES (Any one from each category)

A (With Practical)

BTC 705	Advanced DBMS	The student will learn
		Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
		Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.

		Learn and apply Structured query language (SQL) for databasedefinition and database manipulation.
		Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
		Understand various transaction processing, concurrency controlmechanisms and database protection mechanisms.
BTC 706	Programming withASP.Net	After completion of the course the student will be able to use the features of Dot Net Framework along with the features of ASP. NET & Web Services.
BTC 707	Website Design	The student will be able to
		· Understand different components in web technology andto know about CGI and CMS.
		· Develop interactive Web pages using HTML/XHTML.
		· Present a professional document using Cascaded Style Sheets.
		· Construct websites for user interactions using JavaScriptand JQuery.
		· Develop Web applications using PHP.
BTC 708	Distributed Operating System	After learning the course the students should be able to:
		· List the principles of distributed systems and describe theproblems and challenges associated with these principles.
		· Understand Distributed Computing techniques, Synchronous and Processes.
		· Apply Shared Data access and Files concepts.
		· Design a distributed system that fulfills requirements with regards to key distributed systems properties.
		· Understand Distributed File Systems and Distributed Shared Memory.
		· Apply Distributed web-based system.
		· Understand the importance of security in distributed systems
BTC 709	Operational Research	Identify and develop operational research models from the verbal description of the realsystem. Understand the mathematical tools that are needed to solve optimisation proble ms. Use mathematical software to solve the proposed models.
BTC 723	Advanced DBMSLab	· At the end of lab session students would be able to designthe Database application for the real life projects.
		· Students would be able to perform insertion, deletion andupdation operation on Databases.
BTC 724	Programming withASP.Net Lab	· Develop dynamic web applications, create and consumeweb services.
		· Use appropriate data sources and data bindings in ASP.NET web applications
BTC 725	Website Design	At the end of the course, students should be able to:

	Lab	Design and implement dynamic websites with good aestheticsense of designing and latest technical know-how's.
		Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.
		Get introduced in the area of Online Game programming.
BTC 726	Distributed Operating Syst emLab	· Ability to identify the appropriate distributed operating system for given problem.
		· Apply Distributed web-based system.
		· Understand the importance of security in distributed systems
BTC 727	Operational Research Lab	Knowledge and understanding - Be able to understand the characteristics of different types ofdecision-making environments and the appropriate decision making approaches and tools to beused in each type. • Cognitive skills (thinking and analysis) - Be able to build and solve Transportation Models and Assignment Models.
BTC 710	Mobile Computing	After learning this course
		· Students will able to describe the basic concepts and principles in mobile computing
		· Students will able to understand the concept of WirelessLANs, PAN, Mobile Networks, and Sensor Networks
		· Students will able to explain the structure and components for Mobile IP and Mobility Management
		· Students will able to describe the important issues and concerns on security and privacy
BTC 711	Object Oriented Analysis and Design	· At the end of the course, the student should be able to:
		· Design and implement projects using OO concepts.
		· Use the UML analysis and design diagrams.
		· Apply appropriate design patterns.
		Create code from design.
BTC 712	Grid Computing	Thorough grounding in the architecture of the Grid, and exposure to various implementations of the infrastructure • Experience in using one particular implementation to construct a Grid-based application – Competence in Grid programming – Exposure to large-scale cluster computing facilities
BTC 713	Numerical Methods& Statistical Techniques	Upon completion of the course students shall be able to: 1. Recognize the error in the number generated by the solution. 2. Compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method. 3. Apply method of interpolation and extrapolation for

Course Code	Course Title	Outcome
		prediction
BTC 714	Marketing Management	Understand fundamental marketing concepts, theories and principles in areas of marketing policy; of market and consumerbehavior; of product, distribution, promotion and pricing decisions. Understand the role of marketing as a fundamental organizational policy process. Analyze the interaction of marketing and environmental forces through an understanding of marketing decisions and practiceswith social, technological, economic, and political forces

EIGHTH SEMESTER

Course Code	Course Title	Outcome
BTC 801	Digital Image Processing	Ability to examine various types of images, intensity transformations and spatial filtering.
		Ability to evaluate the methodologies for image segmentation,restoration etc.
		Ability to apply image processing algorithms in practical applications.
		Ability to develop Fourier transform for image processing in frequency domain.
BTC 802	Advanced Computer Architecture	Demonstrate concepts of parallelism in hardware/software. 2 : Discuss memory organization and mapping techniques. 3 : Describe architectural features of advanced processors. 4 : Interpret performance of different pipelined processors. 5 : Explain data flow in arithmetic algorithms
BTC 803	Cryptography & Network Security	At the end of the course students should be able to:
		· Analyze the vulnerabilities in any computing system andhence be able to design a security solution.
		· Identify the security issues in the network and resolveit.
		· Evaluate security mechanisms using rigorous approaches, including theoretical
		· Compare and Contrast different IEEE standards and electronic mail security
BTC 820	Digital Im ageProcessing Lab	· Ability to implement the image processing techniques using colour models.
		· Ability to implement the image compression algorithm.
		· Ability to implement the various image enhancement techniques.

BTC 841	Communication Skills - VI	Students will be able to: • Students will be able to navigate cross cultural encounters in a global economy. • Facilitate students to develop learning to construct and deliver messages that incorporate the appropriate use of organizing content, language, vocabulary, kinesics, eye contact, appearance, visual aids, and time constraints.
BTC 843	Behavioural Science - VIII	have a great deal of insight into one's character. Understanding of positive emotions
BTC 844	Foreign Language –VIII French	Foreign Language-communication skills
BTC 860	Project	On successful completion of the course students will be able to: • Apply critical and creative thinking in the design of engineering projects • Plan and manage time effectively as a team. • Consider the business context and commercial positioning ofdesigned devices or systems. • Apply knowledge of the 'real world' situations that a professional engineer can encounter. • Use fundamental knowledge and skills in engineering and apply it effectively on a project. • Design and develop a functional product prototype while working in a team. • Use various tools and techniques to study existing systems. • Achieve precision in uses of the tools related to their experiments/fabrication. • Timely reflect on peers' technical and non-technical learning. • Orally present and demonstrate your product to peers, academics, general and industry community. • Write comprehensive report on project work.
BTC 804	Windows Programming usingVC++	Upon successful completion of the course, the student will beable to: • Create flowcharts for simple programming problems. • Develop algorithms for simple programming problems. • Write pseudo-code as solutions to programming problems. • Demonstrate proficiency in writing structured programs usingthe Visual C++ programming language to resolve problems. • Incorporate the use of control structures, data manipulation,and and input/output in programs. • Express a working knowledge of arrays, sorted properties, and file processing.

BTC 805	Network OperatingSystem	Upon successful completion of this course, students are expected to have the ability to: • Describe and explain the fundamental components of a computer operating system. • Describe and explain the fundamental components of a computer operating system. • Define, restate, discuss, and explain the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems.
BTC 806	Software Testing &Quality Assurance	After the completion of the course the students will be able to:
		Design and develop bug free software systems using conceptsof software testing.
		Identify, formulate, review and analyze complex engineeringproblems of testing using principles of mathematics.
		Create, select and apply appropriate techniques and modern engineering and IT tools for software testing.
		Analyze verification, validation activities, static, dynamic testing, debugging tools and techniques and importance of working in teams.
BTC 807	Interface Programming	Interpret and implement design and programming protocols tocreate a Graphic User Interface (GUI).
BTC 808	VLSI Design	1. Be able to use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic componentsand their interconnect. 2. Be able to create models of moderately sized CMOS circuitsthat realize specified digital functions. 3. Be able to apply CMOS technology-specific layout rules inthe placement and routing of transistors and interconnect, and to verify the functionality, timing, power, and parasitic effects.
BTC 821	Windows Programming usingVC++ Lab	On successful completion of the course students will be able to: • Apply critical and creative thinking in the design of engineering projects • Plan and manage time effectively as a team. • Consider the business context and commercial positioning ofdesigned devices or systems. • Apply knowledge of the 'real world' situations that a professional engineer can encounter. • Use fundamental knowledge and skills in engineering and apply it effectively on a project.

BTC 822	Network OperatingSystem Lab	Upon successful completion of this course, students are expected to have the ability to: • Describe and explain the fundamental components of a computer operating system. • Describe and explain the fundamental components of a computer operating system.
BTC 823	Software Testing &Quality Assurance Lab	• Apply modern software testing processes in relation tosoftware development and project management.
		• Create test strategies and plans, design test cases, prioritize and execute them.
		• Manage incidents and risks within a project.
		• Contribute to efficient delivery of software solutions and implement improvements in thesoftware development processes.
		• To gain expertise in designing, implementation and development of computer based systems and IT processes.
BTC 824	Interface Programming Lab	Inculcate and apply various skills in problem solving Choose most appropriate programming constructs and featuresto solve the problems in diversified domains.
BTC 825	VLSI Design Lab	This course provides the design of various digital circuits usingdifferent VLSI simulation software tools like Modelsim,Xilinx and Questa. The outcome of this course to learn VHDL and Verilog language and also learn the usage of different tools. 1. To design and simulate list of combinational and sequestional digital circuits using Modelsim & Xilinx –VHDL language 2. To design and simulate the brawn array multiplierand ALU using Modelsim and Xilinx-Verilog language

Programme Educational Objectives
B. Tech (Civil Engineering)

Graduates of the programme B Tech (Civil Engineering) will

PEO 1: Gain knowledge and skills in Civil engineering which will enable them to have a career and professional accomplishment in the public or private sector organizations

PEO 2: Become consultants on complex real life Civil Engineering problems related to Infrastructure development especially housing, construction, water supply, sewerage, transport, spatial planning.

PEO 3: Become entrepreneurs and develop processes and technologies to meet desired infrastructure needs of society and formulate solutions that are technically sound, Economically feasible, and socially acceptable.

PEO 4: Perform investigation for solving Civil Engineering problems by conducting research using modern equipment and software tools.

PEO 5: Function in multi-disciplinary teams and advocate policies, systems, processes and equipment to support civil engineering

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Technology (B. Tech.) CE

Programme Outcomes:

PO1. **Engineering 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

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 Outcomes

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

Course Outcomes:

FIRST SEMESTER

S.No.	Course Code	Course Title	Outcome
1	BTCE 101	Applied Mathematics - I	• To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have a basic understanding of Beta andGamma functions. • The mathematical tools needed in evaluating multiple integrals and their usage.
2	BTCE 102	Applied Physics - I – Fields & Waves	• Apply vector calculus to static electric-magnetic fields in different engineering situations. • Analyze and Apply Maxwell's equation to diverse engineering problems. • Relate semiconductor material properties to semiconductor devices.

3	BTCE 103	Elements of Mechanical Engineering	• Understand about the working, functions and applications ofequipments used in daily life. Identify the broad context of Mechanical engineering problems, including describing the problem conditions and identifying possible contributing factors • Understand the fundamental elements of Mechanical engineering systems, system components and processes, with a good understanding of associated safety, quality, schedule and cost considerations.
4	BTCE 104	Introduction to Computers & Programming in C	On completion of the course, students are able to: • Develop their programming skills. • Be familiar with programming environment with C Programstructure. • Declaration of variables and constants. • Understand operators, expressions and preprocessors. • Understand arrays , it's declaration and uses.
5	BTCE 105	Electrical Science	• an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering,science, and mathematics • an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health,safety, and welfare, as well as global, cultural, social, environmental, and economic factors • an ability to communicate effectively with a range of audiences • an ability to recognize ethical and professional responsibilities in engineering situations and make informedjudgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
6	BTCE 106	Environmental Studies-I	**Upon course completion, students will be able to understand:** The multidisciplinary nature of environmental studies, Our natural resources The ecosystem its structure and function, ecological succession, Biodiversity and its conservation and Biological classification of India.
7	BTCE 120	Applied Physics Lab - I	After completion of course student will develop: Practical understanding and applications of fundamental concept of classical and modern Physics.
8	BTCE 121	Elements of Mechanical Engineering Lab	• Be able to apply design knowledge for Design of Cotter Joint and Knuckle Joint etc and formulate the design procedure and acquire skill of finding resisting areas against failure. Apply the knowledge of Design Data Hand Book and ISO standards for selection of materials, strengths, standard dimensions of design components. • Able to apply design and drafting knowledge of CAD software for drafting assembly and details of Bolted joint, Coupling, Cotter joint, Knuckle Jointetc. • Develop Logical and Analytical ability to apply Knowledgeof CAD for design of Shaft subjected to direct and combined loading

S.No.	Course Code	Course Title	Outcome
9	BTCE 122	Programming in C Lab	After Completion of this course the student would be able to • Read, understand and trace the execution of programs written in C language. • Write the C code for a given algorithm. • Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor. • Write programs that perform operations using derived datatypes.
10	BTCE 123	Electrical Science Lab	Understand the fundamentals of e.m.f, potential difference, current, resistance and energy conversions from one form toanother. They should be able to calculate cost of energy consumption.
11	BTCE 124	Engineering GraphicsLab	• Identify and implement basic concepts of BIS conventionsto sketch Engineering drawing. • Create geometric constructions with hand tools. • Construct orthographic projection and sectional view of amachine part. • Create isometric projection from multiview drawings of anobject. • Sketch projection of solids and development of lateral surfaces of solids.
12	BTCE 141	English	• The students should be able to : • Identify Common Errors and Rectify Them • Develop and Expand Writing Skills Through Controlled andGuided Activities • To Develop Coherence, Cohesion and Competence in OralDiscourse through Intelligible Pronunciation.
13	BTCE 143	Behavioural Sciences - I	•Student will Develop accurate sense of self • Student will nurture a deep understanding of personal motivation • Student will develop thorough understanding of personal and professional responsibility Student will able to analyse the emotions of others for betteradjustment.
14	BTCE 144	Foreign Language – I(French)	• To understand basic French. Able to read, write basic French. • To express basic day to day activities in French.

SECOND SEMESTER

S. N o.	Cou rse Co de	Course Title	Outcome
1	BT CE 20 1	Applied Mathematics - II	• Upon completion of this course, students will be able to solve fieldproblems in engineering involving PDEs. • The effective mathematical tools for the solutions of differential equations that model physical processes.

2	BT CE 20 2	Applied Physics - II – Modern Physics	In Modern physics II applications of the foundations of relativity andquantum physics given in Modern Physics I are included. After completion of this course the student will be able to: • outline the main ideas and theories in the more applied areas of modern physics • solve problems in modern physics by choosing appropriate methodsand assess the plausibility of the results obtained • formulate and evaluate mathematical models describing physical problems • explain the significance of the Swedish and English terms used in the field
3	BT CE 20 3	Applied Chemistry	The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. To understand phenomena at nanometer levels, one has to base the description of allchemical processes at molecular levels. The course will enable the student to: • Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. • Rationalise bulk properties and processes using thermodynamic considerations. • Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques • Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. • List major chemical reactions that are used in the synthesis of molecules.
4	BT CE 20 4	Object Oriented Programming in C^{++}	At the end of this course, students will demonstrate ability to: • To apply concepts of classes and objects in real world scenarios. • Understand object-oriented programming features in C++, • Apply these features to program design and implementation, • Understand object-oriented concepts and how they are supported byC++, • Gain some practical experience of C++.
5	BT CE 20 5	Engineering Mechanics	• Confidently tackle equilibrium equations, moments and inertia problems • Master calculator/computing basic skills to use to advantage in solving mechanics problems. • Gain a firm foundation in Engineering Mechanics for furthering thecareer in Engineering
6	BT CE 20 6	Environmental Studies II	understand various types of environmental pollution. educate masses, in general and students, about the issues related to degradation of environment and social issues related to environment.
7	BT CE 22 0	Applied Phy sicsLab - II	After completion of course student will develop: Practical understanding and applications of fundamental concept of classical and modern Physics.
8	BT CE 22 1	Applied ChemistryLab	The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to measure molecular/system properties such as surface tension, viscosity, conductance of solutions,

			redox potentials, chloride content of water, etc.
9	BTCE 222	Object Oriented Programming in C++ Lab	At the end of this course, students will demonstrate ability to: • knowledge of the structure and model of the C++ programming language,(knowledge) • evaluate user requirements for software functionality required to decide whether the C++ programming language can meet user requirements(analysis) • design the object-oriented programs for real world problems.
10	BTCE 223	Engineering Mechanics Lab	• Understand and be able to apply Newton's laws of motion. • Understand basic dynamics concepts – force, momentum, work and energy.
11	BTCE 240	English	The student will be able to write an impressive resume and face theinterview confidently.
12	BTCE 243	Behavioural Science – II	• Student will be able to identify, understand, and apply contemporarytheories of leadership to a wide range of situations and interactions • Student will be able to understand and respect individual difference,so to enhance the relationship • Learn social responsibility and develop a sense of citizenship • Student will be able to identify and understand the impact of cultureon one's leadership style
13	BTCE 244	Foreign Language –II (French)	• To understand and read official mail in French. • To understand and present biography of Scientist in French Able to write, read and understand simple scientific article in French

THIRD SEMESTER

S.N.	Course Code	Course Title	Outcomes
1	BTCE 301	Applied Mathematics -III	After completing the course, students should be able to: • Apply the fundamental concepts of Ordinary Differential Equations and Partial Differential Equations and the basic numerical methods for their resolution. • Solve the problems choosing the most suitable method. • Understand the difficulty of solving problems analyticallyand the need to use numerical approximations for their resolution. • Use computational tools to solve problems and applicationsof Ordinary Differential Equations and Partial Differential Equations.
2	BTCE 302	Engineering Geology	• Site characterization and how to collect, analyze, and reportgeologic data using standards in engineering practice • The fundamentals of the engineering properties of earth materials and fluids.
3	BTCE 303	Mechanics of Solids	Students will understand the following. • Simple Stresses and Strains • Compound Stresses and Strains • Bending moment and Shear Force Diagrams • They will develop skills to problem solving in solid mechanics.

4	BTCE 304	Mechanics of Fluids	**Students should understand the:** properties of fluids, pressure measurement devices, hydraulicforces on surfaces, bouncy and flotation in fluids, kinematics and static behavior of fluids, dimension and model analysis, laminar and turbulent flow, flow through pipes and orifices, boundary layer theory.
5	BTCE 305	Building Technology	Upon successful completion of the Building & Construction Technologies AAS Degree program, the learner will be able to: • Demonstrate understanding of industry standards and practices Interpret blueprints and schematics • Convey information professionally, in both verbal and written forms • Understand, integrate, and utilize knowledge in the professional environment
6	BTCE 306	Surveying	Students would be able to: • Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities • Translate the knowledge gained for the implementation ofCivil infrastructure facilities • Relate the knowledge on Surveying to the new frontiers ofscience like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing.
7	BTCE 320	Mechanics of Solids & Fluids Lab	
8	BTCE 321	Civil Engineering Drawing Lab	Student would be able to do planning, designing from givenrequirements of areas and specifications and preparation of sketch design and working drawings for: using drawing sheets and AutoCad (2-D and 3-D)
9	BTCE 322	Surveying Practical - I	Upon completion of this laboratory course students will demonstrate the ability to • Chain survey - Traversing and plotting of details. • Chain survey – Measurement of Area by offsetting. • Compass survey - Traversing with compass and calculationof Interior angles • The use of advance survey instrument, Total station, the odolite etc.
10	BTCE 341	Communication Skills –I	The students should be able to write correctly and properlywith special reference to Letter writing
11	BTCE 343	Behavioural Science -III	• Student will be able to understand and solve the problemseffectively in their personal and professional life. • Students will outline multiple divergent solutions to a problem, • Student will able to create and explore risky or controversial ideas, and synthesize ideas/expertise to generate innovations
12	BTCE 344	Foreign Language – III(French)	• les adjectifs démonstratifs • les verbes : 'ir groupe' devoir, falloir • les prépositions de lieu, de pays • l'impératif, le passé composé, forme et accord du participepassé, la négation au passé composé • les indicateurs de temps (il y a, depuis)

S.No.	Course Code	Course Title	Outcomes
15	BTCE 330	Term Paper (Evaluation)	After successful completion of this course, students will beable to • Carry out intense study on a specific topic related to currentdevelopment in their field of specialization • Collect, interpret and analyze the information • Compare and evaluate the existing solutions for a specificcases study • Develop skills of presentation and report writing

FOURTH SEMESTER

S.No.	Course Code	Course Title	Outcomes
1	BTCE 401	Numerical Analysis &Programming	On completion of this course, the students will be able to learn about fundamentals of numerical methods such as interpolation, differentiation, integration and differential equations. They will also learn the basics of programming.
2	BTCE 402	Structural Analysis - I	By learning this course, the students will be able to learn about prestressed concrete used in the field. The students will learn how the pre-tensioning and post-tensioning are carried out in the field. The dstudents students will learn different types of losses occured in pre-stressing. Students will learn design of different prestressed concrete members such as beams, slabs etc.
3	BTCE 403	Hydro Systems	A successful learner from this course will be able to: a) deal with the most actual and urgent hydraulic and environmental problems connected with water supplies and drainage systems; design and operate urban water systems, taking intoaccount: i) advanced design procedures and technological findings; ii) environmental and economic issues; and iii) construction site aspects; and b) apply basic modelling and computational techniques for addressing reliability analysis and risk assessment in civil engineering, with special emphasis on the water sector.
4	BTCE 404	Geo Informatics	The expected student learning outcomes for the GIS Optionare: An ability to apply knowledge of mathematics, science, andapplied sciences. An ability to design and conduct experiments, as well as toanalyze and interpret data. An ability to formulate or design a system, process or program to meet desired needs. An ability to function on multi-disciplinary teams. An ability to identify and solve applied science problems. An understanding of professional and ethical responsibility. An ability to communicate effectively.
5	BTCE 405	Functional Design of Buildings	Modern buildings are not mere load bearing structures. Theyhave to be provided with all facilities and amenities for the purposes for which they aremeant, be it office space, residential building, warehouses or large shopping malls. Consideration of comfort and functional requirements are significant and energy efficiency

S.No	Course Code	Course Title	Outcomes
			is now a critical factors. The course exposes the students these aspects of modern building design and construction.
6	BTCE 406	Transportation Engineering - I	Carry out surveys involved in planning and highway alignment Ø design the geometric elements of highways andexpressways
7	BTCE 420	Numerical Analysis Lab(Programming Lab)	On completion of this course, the students will be able to learn about fundamentals of numerical methods such as interpolation, differentiation, integration and differential equations. They will also learn the basics of programming.
8	BTCE 421	Material Testing Lab - I	On completion of this course, the students will be able to learn about various tests on mild steel rod, coil springs, concrete cube tests, RCC beams and different NDT tests.
9	BTCE 422	Surveying Practical - II	• Chain survey - Traversing and plotting of details. • Chain survey – Measurement of Area by offsetting. • Compass survey - Traversing with compass and calculationof Interior angles • The use of advance survey instrument, Total station, the odolite etc.
10	BTCE 441	Communication Skills -II	• Develop a resume for oneself • Ability to handle the interview process on fidently • Learn the subtle nuances of an effective group discussion
11	BTCE 443	Behavioural Science –IV	• Able to answer the question: What do I stand for? • Ability to apply a coherent set of moral principles within professional and specialized contexts • Willing to make unpopular but right decision • Committed to working for justice and peace locally and globall
		Foreign Language – IV	• imparfait, • la comparaison du verbe/du nom ; mieux/meilleur
12	BTCE 444	French	• les pronoms relatifs

FIFTH SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BTCE 501	Structural Analysis - II	By learning this course, the students will be able to learn about prestressed concrete used in the field. The students will learn how the pre-tensioning and post-tensioning are carried out in the field. The dstudents students will learn different types of losses occured in pre-stressing. Students will learn design of different prestressed concrete members such as beams, slabs etc.
2	BTCE 502	Principles of StructuralDesign	1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering,science, and mathematics 2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

			3. an ability to communicate effectively with a range of audiences
3	BTCE 503	Geotechnical Engineering - I	Specify a strategy for site investigation to identify the soil deposits and determine the depth and spatial extent within the ground.
4	BTCE 504	Transportation Engineering - II	Carry out surveys involved in planning and highway alignment Ø design the geometric elements of highways and expressways
5	BTCE 505	Hydraulic Machines	The students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels
6	BTCE 520	Material Testing Lab - II	Reproduce the basic knowledge of mathematics, science and engineering in assessing the quality and suitability of construction materials, structural element, & preparation of test reports as per the IS specification, by inculcating professional and ethical responsibility in the areas of material testing & modern instrument usage
7	BTCE 521	Hydraulic Machines Lab	• The students will be able to apply their knowledge of fluidmechanics in addressing problems in open channels. • They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions. • They will have knowledge in hydraulic machineries (pumpsand turbines).
8	BTCE 541	Communication Skills -III	• Communicate fluently and sustain comprehension of an extended discourse. • Demonstrate ability to interpret texts and observe the rulesof good writing. • Prepare and present effective presentations aided by ICT tools.
9	BTCE 543	Behavioural Science – V	• Students will Develop critical and reflective thinking abilities • Students will Demonstrate an understanding of group dynamics and effective teamwork • Student will develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others • Student will Gain knowledge and understanding of organization resources, policies, and involvement opportunities. • Student will Develop strategies to recruit, retain, and continually motivate contributing members to the organization
10	BTCE 544	Foreign Language – V(French)	• To understand and read official mail in French. • To understand and present biography of Scientist in French • Able to write, read and understand simple scientific article in French

S.No.	Course Code	Course Title	Outcomes
13	BTCE 550	Industrial Practical Training (Evaluation)	After successful completion of the course, the students willbe able to • Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observationskills. • Manage the technical content and work. • Learn the various administrative process followed in industry. • Prepare and present technical report

SIXTH SEMESTER

S.No.	Course Code	Course Title	Outcomes
1	BTCE 601	Environmental Engineering - I	Understand the impact of humans on environment and environment on humans • Be able to identify and value theeffect of the pollutants on the environment: atmosphere, water.
2	BTCE 602	Structural Concrete Design	1. Students will become familiar with the reinforced concretefabrication and construction process. 2. Students will be able to perform an industry relevant design project in a team setting.
3	BTCE 603	Geotechnical Engineering – II	Specify a strategy for site investigation to identify the soil deposits and determine the depth and spatial extent within theground.
4	BTCE 604	Computer Applicationin Civil Engineering	On successful completion of this course the students will be able to: Define the properties (viz., physical, mechanical) of rocks and failure criterion of rock mass. Use engineering rock mass classification (RMR, Q-system, RQD).
5	BTCE 605	Concrete Technology	By learning this course, students will be able to learn about different types of materials used in the manufacturing of concrete. The students will be able to learn how the concrete is manufactured in the field and what are the diferent properties of fresh and hardened concrete. In the end students will learn about different types of modern concrete used forsome special purpose.
6	BTCE 606	Building Design & Drawing	Develop any type of building drawing using CADD software.Create layout plan, sanction drawings, working drawings using concept of layers.
7	BTCE 620	Computer ApplicationsLab	In-depth understanding of various concepts of C language. • Ability to read, understand and trace the execution of programs. • Skill to debug a program. • Skill to write program code in C to solve real world problems.
8	BTCE 621	Geotechnical Engineering Lab	KNOWLEDGE OF SITE SPECIFIC FIELD INVESTIGATIONS INCLUDING COLLECTIONOF SOIL SAMPLES FOR TESTING AND OBSERVATION OF SOIL BEHAVIOR/ BUILDING DAMAGE. 2. BE ABLE TO IDENTIFY AND CLASSIFY SOIL BASED ON STANDARD GEOTECHNICAL ENGINEERING PRACTICE.

S.No	Course Code	Course Title	Outcome
			3. BE ABLE TO PERFORM LABORATORY COMPACTION AND IN-PLACE DENSITY TESTS FOR FILL QUALITY CONTROL
9	BTCE 641	Communication Skills -IV	• To communicate contextually in specific personal and professional situations with courtesy. • To inject humour in their regular interactions. • To strengthen their creative learning process through individual expression and collaborative peer activities.
10	BTCE 643	Behavioural Science –VI	• Student will able demonstrate thorough understanding of stress and its effects • Student will able to learn various coping strategies to dealstress effectively so to overcome the consequences and impact of stress on their health and wellbeing, ultimately it will enhance their performance
		Foreign Language – VI	• Le présent (révision) • Les prépositions et les verbes • Les pronoms possessives • Les verbes réciproques
11	BTCE 644	French	

SEVENTH SEMESTER

S. N o	Course Code	Course Title	Outcome
1	BTCE 701	Structural Steel Design	Students will be able to design different RCC structures such as beam, columns, slabs and foundationsand learn the behavior of different RCC structures upon action of different types of loads.
2	BTCE 702	Environmental Engineering – II	Students will be able to apply hydrologic principles in considering management of water resources to achieve social objectives.
3	BTCE 703	Water Resource Engineering	This course deals with design and planning of Water resources system.
4	BTCE 720	Environmental Engineering Lab	Students will learn about the water contamination, water purificationsetc. quality of potable water to be maintained by experiments.
5	BTCE 721	Structural DetailingLab	Structural detailing lab enables students to draw concrete structures with reinforcement and section information in detail.
6	BTCE 741	Communication Skills - V	Student Learning Outcomes: • Conduct all business activities related to the workplace with technical efficiency. • Contribute positively to the overall growth of the organization.
7	BTCE 743	Behavioural Science – VII	• Students develop the ability to identify suitable career options and tocreate a suitable career plan based on the utilization of the counseling process, assessment tools, and other resources. • Students will know how to assess their skills, interests and values. • Students will know how to make informed career choices based ontheir self- assessment. Students will know how to explore relevant career options and build skills pertinent to those of greatest interest.
		Foreign Language –VI I	Grammaire : 1. Le pronom " en " 2. La place de l'adjectif

8	BTCE 744	French	3. Le présent progressif 4. Le passé récent 5. Le futur proche (révision) 6. Le comparatif et le superlatif
9	BTCE 760	Project	On successful completion of the course students will be able to: • Demonstrate a sound technical knowledge of their selected project topic. • Undertake problem identification, formulation and solution. • Design engineering solutions to complex problems utilising a systemsapproach. • Conduct an engineering project • Communicate with engineers and the community at large in writtenan oral forms. • Demonstrate the knowledge, skills and attitudes of a professional engineer. • Write comprehensive report on project work.
10	BTCE 750	Industrial Training (Evaluation)	The students will be able to explore the preferred field of specializationand develop analytical / hardware / software / experimental / observation skills
11	**ELECTIVE-I (Any one from the Elective list)**		
	BTCE 704	Prestressed Concrete	Students will be able to gain a basic knowledge advection-dispersionprocesses in the environment.
	BTCE 705	Remote Sensing & Geographic Information Systems	By learning this course, students will be able to learn about different types of materials used in the manufacturing of concrete. The students will be able to learn how the concrete is manufactured in the field and what are the diferent properties of fresh and hardened concrete. In the end students will learn about different types of modern concrete used for some special purpose.
	BTCE 706	Advanced Structural Analysis	By learning this course, the students will be able to learn about prestressed concrete used in the field. The students will learn how thepre-tensioning and post-tensioning are carried out in the field. The dstudents students will learn different types of losses occured in pre- stressing. Students will learn design of different prestressed concrete members such as beams, slabs etc.
	BTCE 707	Hydrology & FloodControl	This course provides students with an appreciation of the potential of using masonry in the built environment. Describe conventional and innovative forms of masonry construction. Enable students to select appropriate masonry materials taking into account masonry movementand durability. Develop conceptual design approaches to masonry construction.
	BTCE 708	Environmental Pollution Control Engineering	This course deals with advanced concept of environmental pollution and its control. By learning this course, the students will be able to learn about Environmental Engineering. Students will learn how the the various agents responsible for pollution and their control.
	BTCE 709	Computer Aided Analysis & Design in Civil Engineering	This course deals with advanced concept of hydrology. Students will learn how to estimate rainfall runoff, unit hydrographs, design of hydraulic structures such as canals,pipes and dams.

EIGHTH SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BTCE 801	Construction Management & Quantity Surveying	The Bachelor of Construction Management and Quantity Surveying will provide you with access to a wide range of careerpathways in the construction industry. Opportunities include building and construction management, contract administration, site management, facilities management, building services, quantity surveying, property development, project management,cost management and general management
2	BTCE 802	Engineering Economics & Management	Ability to design and analyze airports. They will possess the skills to solve problems dealing with different airport design problems.
3	BTCE 860	Project (Dissertation)	On successful completion of the course students will be able to: • Apply critical and creative thinking in the design of engineeringprojects • Plan and manage time effectively as a team. • Consider the business context and commercial positioning of designed devices or systems. • Apply knowledge of the 'real world' situations that a professional engineer can encounter. • Use fundamental knowledge and skills in engineering and applyit effectively on a project. • Design and develop a functional product prototype while working in a team. • Use various tools and techniques to study existing systems. • Achieve precision in uses of the tools related to their experiments/fabrication. • Timely reflect on peers' technical and non-technical learning. • Orally present and demonstrate your product to peers, academics, general and industry community. Write comprehensive report on project work.
4	BTCE 841	Communication Skills - VI	Students will be able to: • Students will be able to navigate cross cultural encounters in aglobal economy. • Facilitate students to develop learning to construct and deliver messages that incorporate the appropriate use of organizing content, language, vocabulary, kinesics, eye contact, appearance,visual aids, and time constraints.
5	BTCE 843	Behavioural Science –VIII	have a great deal of insight into one's character.Understanding of positive emotions
		Foreign Language – VIII	Foreign Language-communication skills
6	BTCE 844	French	
7	BTCE 803	Finite Element Method	The students would: Learn about types and purposes of different foundation systems and structures. Have an exposure to the systematic methods for designing foundations.

8	BTCE 804	Traffic Engineering & Management	On successful completion of this course the students will be ableto: Acquire knowledge on the geometry and type of structures present in earth. Understand and describe the features formed in rocks when subjected to stress.
9	BTCE 805	Computer Applicationin Hydro Engineering	On successful completion of this course the students will be ableto: Define the properties (viz., physical, mechanical) of rocks and failure criterion of rock mass. Use engineering rock mass classification (RMR, Q-system, RQD).
10	BTCE 806	Water Resources Systems Planning & Design	This course deals with design and planning of Water resourcesystem.
11	BTCE 807	Advanced ConcreteDesign	The students will be able to apply their knowledge of steel structural mechanics in addressing design problems of steel structural engineering.
12	BTCE 808	Advanced Steel Design	This course deals with advanced design of steel structures. Students will learn to design steel structures such as: steel coulmn, trusses, pipe supoorts etc.
13	BTCE 809	Architecture & TownPlanning	This course would provide the basic knowledge on the principlesof design of architecture and town planning.
14	BTCE 810	Industrial Waste Engineering	This course would provide the basic knowledge on the principlesof design of buildings relating to the environment and climate.

| AMITY UNIVERSITY MADHYA PRADESH, GWALIOR |
| AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY |
| DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING |

B.TECH. (ECE)
PROGRAMME EDUCATIONAL OBJECTIVES

PEO - 1: To provide our graduates strong foundation and enhance skill in the field of electronics & communication engineering by strengthening their core competencies.

PEO2: To train our graduates such that they must be employable in private sector/public sector/research organizations or work as an entrepreneur.

PEO3: To prepare our graduates for providing solutions to complex and challenging problems by applying knowledge of electronics & communication engineering.

PEO4: To train our graduates who can be future leaders and work as team member in multidisciplinary environment.

PEO5: To develop professional and ethical attitude for solving global challenges and make positive impact on the society.

PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES
Bachelor of Technology (B. Tech.) ECE

Programme Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **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

[PO.4]. **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

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modernengineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **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

[PO.7]. **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

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings

[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 leaderin 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 Outcomes:
PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zest for higher studies.

PSO4.Research and Development: An ability to undertake research for the development of new ideas, technology and Engineering solutions for societal benefit.

Course Outcomes:

FIRST SEMESTER

S.No.	Course Code	Course Title	Outcome
1	BTE 101	Applied Mathematics - I	• To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have a basicunderstanding of Beta and Gamma functions. • The mathematical tools needed in evaluating multiple integrals and their usage.
2	BTE 102	Applied Physics - I –Fields & Waves	• Apply vector calculus to static electric-magnetic fields in different engineering situations. • Analyze and Apply Maxwell's equation to diverse engineering problems. • Relate semiconductor material properties to semiconductor devices.

3	BTE 103	Element of Mechanical Engineering	• Understand about the working, functions and applications of equipmentsused in daily life. Identify the broad context of Mechanical engineering problems, includingdescribing the problem conditions and identifying possible contributing factors • Understand the fundamental elements of Mechanical engineering systems, system components and processes, with a good understanding of associated safety, quality, schedule and cost considerations.
4	BTE 104	Introduction to Computers & Programming in C	On completion of the course, students are able to: • Develop their programming skills. • Be familiar with programming environment with C Program structure. • Declaration of variables and constants. • Understand operators, expressions and preprocessors. • Understand arrays , it's declaration and uses.
5	BTE 105	Electrical Science	• an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics • an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, aswell as global, cultural, social, environmental, and economic factors • an ability to communicate effectively with a range of audiences • an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
6	BTE 106	Environmental Studies - I	**Upon course completion, students will be able to understand:** The multidisciplinary nature of environmental studies, Our natural resources The ecosystem its structure and function, ecological succession,Biodiversity and its conservation and Biological classification of India.
7	BTE 120	Applied Physics Lab – I	After completion of course student will develop: Practical understanding and applications of fundamental concept of classical and modern Physics.
8	BTE 121	Element of Mechanical Engineering Lab	• Be able to apply design knowledge for Design of Cotter Joint and Knuckle Joint etc and formulate the design procedure and acquire skill of finding resisting areasagainst failure. Apply the knowledge of Design Data Hand Book and ISO standards for selection of materials, strengths, standard dimensions of design components. • Able to apply design and drafting knowledge of CAD software for drafting assembly and details of Bolted joint, Coupling, Cotter joint, Knuckle Joint etc. • Develop Logical and Analytical ability to apply Knowledge of CAD fordesign of Shaft subjected to direct and combined loading
9	BTE 122	Programming in C Lab	After Completion of this course the student would be able to • Read, understand and trace the execution of programs written in C language. • Write the C code for a given algorithm. • Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor. • Write programs that perform operations using derived data types.

S.No	Course Code	Course Title	Outcome
10	BTE 123	Electrical Science Lab	Understand the fundamentals of e.m.f, potential difference, current, resistance and energy conversions from one form to another. They shouldbe able to calculate cost of energy consumption.
11	BTE 124	Engineering Graphics Lab	• Identify and implement basic concepts of BIS conventions to sketchEngineering drawing. • Create geometric constructions with hand tools. • Construct orthographic projection and sectional view of a machine part. • Create isometric projection from multiview drawings of an object. • Sketch projection of solids and development of lateral surfaces of solids.
12	BTE 141	English	• The students should be able to : • Identify Common Errors and Rectify Them • Develop and Expand Writing Skills Through Controlled and GuidedActivities • To Develop Coherence, Cohesion and Competence in Oral Discourse through Intelligible Pronunciation.
13	BTE 143	Behavioural Science - I	• Student will Develop accurate sense of self • Student will nurture a deep understanding of personal motivation • Student will develop thorough understanding of personal and professional responsibility Student will able to analyse the emotions of others for better adjustment.
14	BTE 144	Foreign Language – I French	• articles indéfinis, articles définis, masculin et féminin des noms et desadjectifs, pluriel des noms et des adjectifs • pronoms sujets et toniques, on, c'est/il est + profession, • masculin et féminin des adjectifs de nationalité • verbes- être, avoir, aller, 'er' groupe • l'interrogation – l'intonation, est-ce que, qui est-ce ? Qu'est-ce que?L'inversion ; où, comment, quand ; quel • la négation • adjectifs possessifs

SECOND SEMESTER

S.No	Course Code	Course Title	Outcome
1	BTE 201	Applied Mathematics – II	• Upon completion of this course, students will be able to solve field problems in engineering involving PDEs. • The effective mathematical tools for the solutions of differential equations that model physical processes.
2	BTE 202	Applied Physics - II –Modern Physics	In Modern physics II applications of the foundations of relativity and quantum physics given in Modern Physics I are included. After completion of this coursethe student will be able to: • outline the main ideas and theories in the more applied areas of modern physics • solve problems in modern physics by choosing appropriate methods and assess the plausibility of the results obtained • formulate and evaluate mathematical models describing physical problems

			• explain the significance of the Swedish and English terms used in thefield
3	BTE 203	Applied Chemistry	The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. To understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to: • Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces. • Rationalise bulk properties and processes using thermodynamic considerations. • Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques • Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. • List major chemical reactions that are used in the synthesis of molecules.
4	BTE 204	Object Oriented Programming using C^{++}	At the end of this course, students will demonstrate ability to: • To apply concepts of classes and objects in real world scenarios. • Understand object-oriented programming features in C++, • Apply these features to program design and implementation, • Understand object-oriented concepts and how they are supported by C++, • Gain some practical experience of C++.
5	BTE 205	Engineering Mechanics	• Confidently tackle equilibrium equations, moments and inertia problems • Master calculator/computing basic skills to use to advantage in solvingmechanics problems. • Gain a firm foundation in Engineering Mechanics for furthering the career in Engineering
6	BTE-206	Environmental Studies - II	understand various types of environmental pollution. educate masses, in general and students, about the issues related to degradation of environment and social issues related to environment.
7	BTE 220	Applied Physics Lab – II	After completion of course student will develop: Practical understanding and applications of fundamental concept of classical and modern Physics.
8	BTE 221	Applied Chemistry Lab	The chemistry laboratory course will consist of experiments illustratingthe principles of chemistry relevant to the study of science and engineering. The students will learn to measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.

9	BTE 222	Object Oriented Programming using C++Lab	At the end of this course, students will demonstrate ability to: • knowledge of the structure and model of the C++ programming language, (knowledge) • evaluate user requirements for software functionality required to decide whether the C++ programming language can meet user requirements (analysis) • design the object-oriented programs for real world problems.
10	BTE 223	Engineering Mechanics Lab	• Understand and be able to apply Newton's laws of motion. • Understand basic dynamics concepts – force, momentum, work andenergy.
11	BTE 240	English	The student will be able to write an impressive resume and face the interview confidently.
12	BTE 243	Behavioural Science - II	• Student will be able to identify, understand, and apply contemporarytheories of leadership to a wide range of situations and interactions • Student will be able to understand and respect individual difference, soto enhance the relationship • Learn social responsibility and develop a sense of citizenship • Student will be able to identify and understand the impact of cultureon one's leadership style
13		Foreign Language – II	• expression du temps • les articles contractés, les quantités indéterminées et déterminées
14	BTE 244	French	• les adverbes de fréquences • verbes- faire, prendre, venir, pouvoir, vouloir, les verbes pronominaux • la comparaison de l'adjectif • la négation (suite) • le future proche

THIRD SEMESTER

S.NO.	Course Code	Course Title	Outcomes
1	BTE 301	Applied Mathematics - III	After completing the course, students should be able to: • Apply the fundamental concepts of Ordinary Differential Equationsand Partial Differential Equations and the basic numerical methods for their resolution. • Solve the problems choosing the most suitable method. • Understand the difficulty of solving problems analytically and theneed to use numerical approximations for their resolution. • Use computational tools to solve problems and applications of Ordinary Differential Equations and Partial Differential Equations.
2	BTE 302	Analog Electronics - I	Students will be able to design, test and examine simple circuits withtransistor, op-amp, amplifiers, oscillators etc. They will be able to test, repair, modify and take-up design exercise. They will have clear knowledge of basic circuit analysis and its functions and theirlimitations. Most importantly they will be able to recognize, understand, modify and repair majority of circuits used in professional equipment design.

3	BTE 303	Circuits & Systems	At the end of this course students will demonstrate the ability to • Understand basics electrical circuits with nodal and mesh analysis. • Appreciate electrical network theorems. • Apply Laplace Transform for steady state and transient analysis. • Determine different network functions. • Appreciate the frequency domain techniques.
4	BTE 304	Signals & Systems	The course will enable the students to study the various tools of signalanalysis and acquire confidence in studying all other communication related subjects (in particular DSP) in the subsequentsemesters.
5	BTE 305	Java programming	• Students can perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure,modularity, classes, I/O and the scope of the class members • Students can demonstrate adeptness of object oriented programming indeveloping solution to problems demonstrating usage of data abstraction, encapsulation and inheritance • Students can demonstrate ability to implement one or more patternsinvolving dynamic binding and utilization of polymorphism in the solution of problems • Students can demonstrate ability to implement multithreading in theprogramming.
6	BTE 320	Analog Electronics Lab - I	On completion of this course, the students will be able to Design, construct, and take measurement of various analog circuits tocompare Experimental results in the laboratory with theoretical analysis.
7	BTE 321	Circuits & Systems Lab	At the end of this laboratory course students will demonstrate the abilityto • Understand basics electrical circuits with nodal and mesh analysis. • Appreciate and apply electrical network theorems. • Apply Laplace Transform for steady state and transient analysis. • Determine different network functions. • Appreciate the frequency domain techniques.
8	BTE 322	Java programming Lab	• knowledge of the structure and model of the Java programming language, (knowledge) • use the Java programming language for various programming technologies (understanding) • develop software in the Java programming language, (application)
9	BTE 341	Communication Skills - I	The students should be able to write correctly and properly with specialreference to Letter writing
10	BTE 343	Behavioural Science - III	• Student will be able to understand and solve the problems effectivelyin their personal and professional life. • Students will outline multiple divergent solutions to a problem, • Student will able to create and explore risky or controversial ideas, andsynthesize ideas/expertise to generate innovations
11		Foreign Language – III	• les adjectifs démonstratifs • les verbes : 'ir groupe' devoir, falloir • les prépositions de lieu, de pays
12	BTE 344	French	• l'impératif, le passé composé, forme et accord du participe passé, lanégation au passé composé

S.No	Course Code	Course Title	Outcomes
			• les indicateurs de temps (il y a, depuis)
14	BTE 330	Term Paper (Evaluation)	After successful completion of this course, students will be able to • Carry out intense study on a specific topic related to current development in their field of specialization • Collect, interpret and analyze the information • Compare and evaluate the existing solutions for a specific cases study • Develop skills of presentation and report writing

FOURTH SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BTE 401	Digital Circuits &Systems - I	After studying this course the students would gain enough knowledge • Have a thorough understanding of the fundamental concepts and techniques used in digital electronics. • To understand and examine the structure of various number systemsand its application in digital design. • The ability to understand, analyze and design various combinationaland sequential circuits. • Ability to identify basic requirements for a design application andpropose a cost effective solution.
2	BTE 402	Communication Systems	• At the end of this course students will demonstrate the ability to • Analyze and compare different analog modulation schemes for theirefficiency and bandwidth • Analyze the behavior of a communication system in presence of noise • Investigate pulsed modulation system and analyze their system performance • Analyze different digital modulation schemes and can compute the biterror performance
3	BTE 403	Analog Electronics - II	At the end of the course, students will demonstrate the ability to: • Analyze and design Operational Amplifiers. • Analyze and design data converter circuits.
4	BTE 404	Electromagnetic FieldTheory	At the end of this course students will demonstrate the ability to: • Understand characteristics and wave propagation on high frequencytransmission lines • Carryout impedance transformation on TL • Use sections of transmission line sections for realizing circuit elements • Characterize uniform plane wave • Calculate reflection and transmission of waves at media interface • Analyze wave propagation on metallic waveguides in modal form
5	BTE 405	Operating Systems	At the end of this course students will demonstrate • The ability to learn how computers work know basic principles ofcomputer's working. • Analyze the performance of computers. • know how computers are designed and built. • Understand issues affecting modern processors (caches, pipelines etc.).

6	BTE 420	Digital Circuits & Systems Lab - I	At the end of the course the students can able to • Ability to formulate and solve problems in Digital Systems design andimplementation. • Consolidation of the design methodologies for combinational and sequential digital systems • Interpret the specifications of programmable reconfigurable device and select the appropriate for the application in hand
7	BTE 421	Communication Systems Lab	• At the end of this course students will demonstrate the ability to • Analyze and compare different analog modulation schemes for theirefficiency and bandwidth • Analyze the behavior of a communication system in presence of noise • Investigate pulsed modulation system and analyze their system performance • Analyze different digital modulation schemes and can compute the biterror performance
8	BTE 422	Analog Electronics Lab -II	At the end of the course, students will demonstrate the ability to: • Analyze and design Operational Amplifiers. • Analyze and design data converter circuits. • Understand the concepts of analog system design methods through practical domain.
9	BTE 423	Operating Systems Lab	At the end of this course students will demonstrate • The ability to learn how computers work know basic principles of computer's working. • Analyze the performance of computers. • know how computers are designed and built. • Understand issues affecting modern processors (caches, pipelines etc.).
10	BTE 441	Communication Skills - II	• Develop a resume for oneself • Ability to handle the interview process on fidently • Learn the subtle nuances of an effective group discussion
11	BTE 443	Behavioural Science - IV	• Able to answer the question: What do I stand for? • Ability to apply a coherent set of moral principles within professionaland specialized contexts • Willing to make unpopular but right decision • Committed to working for justice and peace locally and globall
		Foreign Language – IV	• imparfait, • la comparaison du verbe/du nom ; mieux/meilleur
12	BTE 444	French	• les pronoms relatifs

FIFTH SEMESTER

S.No.	Course Code	Course Title	Outcomes
1	BTE 501	Digital Circuits &Systems - II	At the end of the course, students will demonstrate the ability to: • Design synchronous and asynchronous sequential circuits • Translate real world problems into digital logic formulations. • Construct test and debug digital networks using VHDL.
2	BTE 502	Microprocessor Systems	At the end of this course students will demonstrate the ability to • Do assembly language programming • Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc. • Develop systems using different microcontrollers • Understand RISC processors and design ARM microcontroller basedsystems
3	BTE 503	Telecommunicati onNetworks	At the end of the course, students will demonstrate the ability to: • Explain the basic physical and technical settings functioning of telecommunications systems, • Describe the basic principles of tele communication system,. • Describe the development and implementation of tele communicationsystems
4	BTE 504	Digital Communications	• At the end of this course students will demonstrate the ability to • Analyze and compare different analog modulation schemes for theirefficiency and bandwidth • Analyze the behavior of a communication system in presence of noise • Investigate pulsed modulation system and analyze their system performance • Analyze different digital modulation schemes and can compute the biterror performance
5	BTE 505	Control Systems	At the end of this course students will demonstrate the ability to: • Characterize a system and find its steady state behavior • Investigate stability of a system using different tests • Design various controllers • Solve liner, non-liner and optimal control problems
6	BTE 520	Digital Circuits &Systems Lab - II	• Write a VHDL code for various combinational and sequential circuits. • Testing of Various digital designs using test bench in VHDL.
7	BTE 521	Microprocessor Systems Lab	Upon completion of this laboratory course students will demonstrate theability to • Do assembly language programming • Do interfacing design of peripherals like, I/O, UART, LCD, Keyboard,timer etc. to 8051 • Develop systems using different microcontrollers
8	BTE 522	Telecommunicati onNetworks Lab	At the end of the course, students will demonstrate the ability to: • Explain the basic physical and technical settings functioning of telecommunications systems, • Describe the basic principles of tele communication system,. • Describe the development and implementation of tele communicationsystems
9	BTE 523	Control Systems Lab	At the end of this course students will demonstrate the ability to Characterize a system and find its steady state behaviour Investigatestability of a system using different tests Design various controllers
10	BTE 541	Communication Skills - III	• Communicate fluently and sustain comprehension of an extendeddiscourse. • Demonstrate ability to interpret texts and observe the rules of good writing.

			• Prepare and present effective presentations aided by ICT tools.
11	BTE 543	Behavioural Science -V	• Students will Develop critical and reflective thinking abilities • Students will Demonstrate an understanding of group dynamics andeffective teamwork • Student will develop a range of leadership skills and abilities such aseffectively leading change, resolving conflict, and motivating others • Student will Gain knowledge and understanding of organization resources, policies, and involvement opportunities. • Student will Develop strategies to recruit, retain, and continuallymotivate contributing members to the organization
12	BTE 544	Foreign Language – V French	• le présent (révision), le passé composé (révision) • les pronoms compléments directs, les pronoms compléments indirects
	BTE 550	Practical Training (Evaluation)	After successful completion of the course, the students will be able to • Explore the preferred field of specialization and develop analytical /hardware / software / experimental / observation skills. • Manage the technical content and work. • Learn the various administrative process followed in industry. • Prepare and present technical report

SIXTH SEMESTER

S.No.	Course Code	Course Title	Outcomes
1	BTE 601	VLSI Design	At the end of the course, students will demonstrate the ability to: • Design different CMOS circuits using various logic families alongwith their circuit layout. • Use of tools for VLSI IC design.
2	BTE 602	Digital Signal Processing	• At the end of this course students will demonstrate the ability to • Represent signals mathematically in continuous and discrete time andfrequency domain • Get the response of an LSI system to different signals • Design of different types of digital filters for various applications
3	BTE 603	Microwave Engineering	At the end of the course, students will demonstrate the ability to: • Understand various microwave system components their properties. • Appreciate that during analysis/ synthesis of microwave systems, the different mathematical treatment is required compared to general circuitanalysis. • Design microwave systems for different practical application
4	BTE 604	Antenna & Wave Propagation	At the end of the course, students will demonstrate the ability to: • Understand the properties and various types of antennas. • Analyze the properties of different types of antennas and their design. • Operate antenna design software tools and come up with the design ofthe antenna of required specifications.

5	BTE 605	Measurement & Measuring Instruments	At the end of the course, students will demonstrate the ability to: • Recognize the evolution and history of units and standardsin Measurements. • Identify the various parameters that are measurable in electronicinstrumentation. • Employ appropriate instruments to measure given sets of parameters. • Practice the construction of testing and measuring set up for electronicsystems. • To have a deep understanding about instrumentation concepts whichcan be applied to Control systems. • Relate the usage of various instrumentation standards.
6	BTE 620	VLSI Design Lab	At the end of the course, students will demonstrate the ability to: • Understand the concepts of digital system design methods throughpractical domain. • Design of combinational and sequential circuits using CAD • To analyse and layout design of CMOS circuits in micron and submicron level using any platform.
7	BTE 621	Digital Signal ProcessingLab	• At the end of this course students will demonstrate the ability to • Visualize signals in continuous and discrete time and frequencydomain • Get the response of an LSI system to different signals • Design of different types of digital filters for various application
8	BTE 622	Microwave EngineeringLab	At the end of the course, students will demonstrate the ability to: • Demonstrate the characteristics of Microwave sources • Demonstrate the characteristics of directional Couplers • To test the characteristics of microwave components • To analyze the radiation pattern of antenna • To measure antenna gain CO6 Practice microwave measurementprocedures
9	BTE 623	MATLAB Lab	At the end of this course, a student would: • Learn basics of MATLAB programming. • Get introduced to numerical methods for engineering problems andwill be able to use MATLAB and Simulink to solve computational problems. • Translate mathematical methods to MATLAB code. • Break a complex task up into smaller, simpler tasks using MATLABand Simulink. • Represent mathematical objects as data structures. • Tabulate results and represent data visually. • Use MATLAB development tools to find and correct problems withcode.
10	BTE 641	Communication Skills - IV	• To communicate contextually in specific personal and professionalsituations with courtesy. • To inject humour in their regular interactions. • To strengthen their creative learning process through individualexpression and collaborative peer activities.
11	BTE 643	Behavioural Science - VI	• Student will able demonstrate thorough understanding of stress and itseffects • Student will able to learn various coping strategies to deal stress effectively so to overcome the consequences and impact of stress on their health and wellbeing, ultimately it will enhance their performance
12	BTE 644	Foreign Language – VI French	• Le présent (révision) • Les prépositions et les verbes • Les pronoms possessives • Les verbes réciproques

SEVENTH SEMESTER

S. N o.	Cou rse Co de	Course Title	Outcome
1	BTE 701	Radar & Satellite Communicatio ns	Student can visualize the architecture of different types of Radar systems and satellite systems
2	BTE 702	Data Communication s & Networking	Student can demonstrate the ability to understand the concepts of networking thoroughly
3	BTE 720	Radar & Satellite Communication s Lab	Student can implement Wireless Mic System and RF portion of satellite receiver and Radar systems
4	BTE 721	Data Communication s &Networking Lab	Students can demonstrate the ability to Study Different types of Network Topology and networking
5	BTE 722	ORCAD Lab	Students can design and simulate electronic circuits for research
6	BTE 741	Communicatio nSkills - V	Student Learning Outcomes: • Conduct all business activities related to the workplace with technical efficiency. • Contribute positively to the overall growth of the organization.
7	BTE 743	Behavioural Science - VII	• Students develop the ability to identify suitable career options and tocreate a suitable career plan based on the utilization of the counseling process, assessment tools, and other resources. • Students will know how to assess their skills, interests and values. • Students will know how to make informed career choices based ontheir self- assessment. Students will know how to explore relevant career options and build skills pertinent to those of greatest interest.
8	BTE 744	Foreign Langua ge –VII French	Grammaire : 1. Le pronom " en " 2. La place de l'adjectif 3. Le présent progressif 4. Le passé récent 5. Le futur proche (révision) 6. Le comparatif et le superlatif
9	BTE 750	Industrial Training (Evaluation)	The students will be able to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills
1 0	BTE 760	Project	On successful completion of the course students will be able to: 1. Demonstrate a sound technical knowledge of their selected projecttopic. 2. Undertake problem identification, formulation and solution. 3. Design engineering solutions to complex problems utilising a systems approach. 4. Conduct an engineering project 5. Communicate with engineers and the community at large in writtenan oral forms. 6. Demonstrate the knowledge, skills and attitudes of a professional engineer. 7. Write comprehensive report on project work.
1 1		**ELECTIVES I(Any one from each category)**	
		A (With Practical)	

		Analog CMOS ICDesign	Students will demonstrate the ability to design different CMOS circuitsusing various logic families along with their circuit layout
	BTE 703	Analog CMOS ICDesign	Students will demonstrate the ability to design different CMOS circuitsusing various logic families along with their circuit layout
	BTE 704	Optical Communicatio ns	Students will demonstrate the ability to understand the principles fiber-optic communication, the components and the bandwidth advantages
	BTE 705	Software Engineering	Students can use the Unified modeling language (UML) for the designing of software product
	BTE 723	Analog CMOS ICDesign Lab	Students can analyze and layout design of CMOS circuits in micronand submicron level using any platform
	BTE 724	Optical Communication s Lab	Students can understand the concepts of optical fibres, sources and detectors used in optical communication systems
	BTE 725	Software Engineering Lab	Students can design the proper documentation of software product
1 2	**ELECTIVES II (Any one from each category)**		
	B (Without Practical)		
	BTE 706	Mobile Communicatio ns	Students can describe the development and implementation of mobilecommunication systems
	BTE 707	Power Electronics	Students can articulate the basics of power electronic devices and express the design and control of rectifiers, inverters and power electronic converters for power control applications
	BTE 708	Bio-Medical Engineering	At the end of the course, students will demonstrate the ability to: • Have an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. • Have an ability to function on multidisciplinary teams. • Have an ability to identify, formulate, and solve engineering problems
	BTE 709	Television Principle	The student who successfully completes this course will be able to: 1. Understand and operate DV recorders/players. 2. Differentiate between various cables, jacks, and plugs in commonuse. 3. Perform the basic camera moves and compositions.
	BTE 710	Computer Architecture	At the end of this course students will demonstrate • The ability to learn how computers work know basic principles of computer's working. • Analyze the performance of computers. • know how computers are designed and built. • Understand issues affecting modern processors (caches, pipelines etc.).

EIGHTH SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BTE 801	Digital Image Processing	• Ability to examine various types of images, intensity transformations and spatial filtering. • Ability to evaluate the methodologies for image segmentation, restoration etc. • Ability to apply image processing algorithms in practical applications. • Ability to develop Fourier transform for image processing in frequency domain.
2	BTE 802	C based Embedded System Design	Students can Design interfacing of the systems with other data handling / processing systems
3	BTE 820	Digital Image Processing Lab	• Ability to implement the image processing techniques usingcolour models. • Ability to implement the image compression algorithm. • Ability to implement the various image enhancement techniques.
4	BTE 821	C based EmbeddedSystem Design Lab	Students can Implement serial communication by interfacingmicrocontroller with a computer.
5	BTE 841	Communication Skills - VI	Students will be able to: • Students will be able to navigate cross cultural encountersin a global economy. • Facilitate students to develop learning to construct and deliver messages that incorporate the appropriate use of organizing content, language, vocabulary, kinesics, eye contact, appearance, visual aids, and time constraints.
6	BTE 843	Behavioural Science - VIII	have a great deal of insight into one's character. Understanding of positive emotions
7	BTE 844	Foreign language –VIII French	Foreign Language-communication skills
8	BTE 860	Project	On successful completion of the course students will be ableto: • Apply critical and creative thinking in the design of engineering projects • Plan and manage time effectively as a team. • Consider the business context and commercial positioningof designed devices or systems. • Apply knowledge of the 'real world' situations that a professional engineer can encounter. • Use fundamental knowledge and skills in engineering andapply it effectively on a project. • Design and develop a functional product prototype while working in a team. • Use various tools and techniques to study existing systems. • Achieve precision in uses of the tools related to their experiments/fabrication. • Timely reflect on peers' technical and non-technical learning. • Orally present and demonstrate your product to peers, academics, general and industry community. • Write comprehensive report on project work.

9	ELECTIVE I (Any one of the following)		
	(Courses with Lab)		
	BTE 803	Instrumentation	• Recognize the evolution and history of units and standardsin Measurements. • Identify the various parameters that are measurable in electronic instrumentation. • Employ appropriate instruments to measure given sets of parameters.
	BTE 804	Artificial Neural Networks	At the end of the course, students will demonstrate the ability to: • Knowledge about different neural networks, their architecture and training algorithm • Concept of Fuzzy logic, Fuzzy Sets, fuzzyrules and fuzzy reasoning • Exposure to the applicability of neural networks and fuzzy logic
	BTE 805	RTOS Programming	At the end of this course students will demonstrate the ability to • Suggest design approach using advancedcontrollers to real-life situations. • Design interfacing of the systems with other data handling / processing systems. • Appreciate engineering constraints like energy dissipation, data exchange speeds etc
	BTE 806	Verilog Programming	At the end of the course, students will demonstrate the ability to: • Design synchronous and asynchronous sequential circuits using Verilog HDL. • Translate real world problems into digitallogic formulations. • Construct test and debug digital networks using Verilog
	BTE 807	Advanced Networking	At the end of the course, students will demonstrate the ability to: • Independently understand basic computernetwork technology. • Understand and explain Data Communications System and its components. • Identify the different types of network topologies and protocols. • Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of eachlayer. • Identify the different types of network devices and their functions within a network • Understand and building the skills of subnetting and routing mechanisms. • Familiarity with the basic protocols of computer networks, and how they can beused to assist in network design and

			implementation.
	BTE 808	Database Management Systems	The student will learn • Describe DBMS architecture, physical andlogical database designs, database modeling, relational, hierarchical and network models. • Identify basic database storage structuresand access techniques such as file organizations, indexing methods includingB-tree, and hashing. • Learn and apply Structured query language (SQL) for database definition anddatabase manipulation. • Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. • Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.
	BTE 809	Advanced Java Programming	The student will learn • Can develop Java Applets, Beans programming. • Can Understand Advanced Java Networking concepts and develop server side application. • Can learn Server Side Programming Concepts and create Dynamic web Application. • Know about the JDBC Principles and caninteract with back end database with java programming. • Understand the application server and alsounderstand the enterprise level applications.
	BTE 822	Instrumentation Lab	• Have knowledge, to demonstrate the designing and conducting experiments, toanalyze and interpret data. • Provides the ability to visualize and workon laboratory and multidisciplinary tasks.

	BTE 823	Artificial Neural Networks Lab	At the end of the course, students will demonstrate the ability to: • Knowledge and understanding: Understanding principles of neural networks and fuzzy logic fundamentals; • Designing of the required and related systems.
	BTE 824	RTOS Programming Lab	At the end of the course the students can able to • Write assembly language programming. • Implement serial communication by interfacing microcontroller with a computer. • Implement parallel data communication by interfacing microcontroller with an LCD
	BTE 825	Verilog Programming Lab	At the end of the course, students will demonstrate the ability to: • Write a Verilog code for various combinational and sequential circuits. • Testing of Various digital designs using test bench in Verilog.
	BTE 826	Advanced Networking Lab	At the end of the course, students will demonstrate the ability to: • To Study Different types of Network Topology • Study of Pure Aloha Protocol • Study the CSMA-CA Protocal • To analyze Data encryption and Decryption.
	BTE 827	Database Management Systems Lab	• At the end of lab session students would be able to design the Database application for the real life projects. • Students would be able to perform insertion, deletion and updation operation on Databases.
	BTE 828	Advanced Java Programming Lab	• Ability to design and develop Java Applets, Beans programming. • Ability to design and structure the ServerSide Programming Concepts. • Ability to Create and design Dynamic webApplication. • Write the structured code for JDBC (backend database). • Ability to develop and design the enterprise level applications.

| AMITY UNIVERSITY MADHYA PRADESH, GWALIOR |
| AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY |
| DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY |

B.TECH. (IT)

Programme Educational Objectives (PEO)

Graduates of the programme B Tech (Civil Engineering) will

PEO - 1: To provide graduating students with core competencies by strengthening their mathematical, scientific and basic engineering fundamentals.

PEO - 2: To train graduates in diversified and applied areas with analysis, design and synthesis of data to create novel products and solutions to meet current industrial and societal needs.

PEO - 3: To inculcate high professionalism among the students by providing technical and soft skills with ethical standards.

PEO - 4: To promote collaborative learning and spirit of team work through multidisciplinary projects and diverse professional activities.

PEO - 5: To encourage students for higher studies, research activities and entrepreneurial skills by imparting interactive quality teaching and organizing symposiums, conferences, seminars, workshops and technical discussions.

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY
PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Technology (B. Tech.) IT

Program outcomes

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **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.

[PO.4]. **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.

[PO.5]. **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.

[PO.6]. **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.

[PO.7]. **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

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices.

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[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]. 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.

[PO.12]. 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 leaderin a team, to manage projects and in multidisciplinary environments

Programme Specific Outcomes

PSO 1: Professional Skills: An 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.

PSO 2: Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO 3: Successful career and Entrepreneurship: An 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 Outcomes:

FIRST SEMESTER

Course Code	Course Title	Outcome
BTI 101	Applied Mathematics – I	· To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have abasic understanding of Beta and Gamma functions.
		· The mathematical tools needed in evaluating multiple integrals and their usage.
		· The tools of differentiation and integration of functions of a complexvariable that are used in various techniques dealing engineering problems.
		· The essential tools of matrices and linear algebra including lineartransformations, eigen values, diagonalization.
BTI 102	Applied Physics - I – Fields & Waves	After successful completion of the course students will have the knowledgeand skill to:
		· Apply vector calculus to static electric-magnetic fields in differentengineering situations.
		· Analyze and Apply Maxwell's equation to diverse engineering problems.
		· Relate semiconductor material properties to semiconductor devices.
BTI 103	Element of Mechanical Engineering	• Understand about the working, functions and applications of equipmentsused in daily life.

		Identify the broad context of Mechanical engineering problems, includingdescribing the problem conditions and identifying possible contributing factors
		• Understand the fundamental elements of Mechanical engineering systems, system components and processes, with a good understanding of associated safety, quality, schedule and cost considerations.
BTI 104	Introduction to Computers & Programming in C	On completion of the course, students are able to:
		• Develop their programming skills.
		• Be familiar with programming environment with C Program structure.
		• Declaration of variables and constants.
		• Understand operators, expressions and preprocessors.
		• Understand arrays , it's declaration and uses.
BTI 105	Applied Chemistry	The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. To understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:
		• Analyse microscopic chemistry in terms of atomic and molecular orbitalsand intermolecular forces.
		• Rationalise bulk properties and processes using thermodynamic considerations.
		• Distinguish the ranges of the electromagnetic spectrum used for excitingdifferent molecular energy levels in various spectroscopic techniques
		• Rationalise periodic properties such as ionization potential,electronegativity, oxidation states and electronegativity.
		• List major chemical reactions that are used in the synthesis of molecules.
BTI 106	Environmental Studies -I	**Upon course completion, students will be able to understand:**
		The multidisciplinary nature of environmental studies, Our natural resources The ecosystem its structure and function, ecological succession,Biodiversity and its conservation and Biological classification of India.
BTI 120	Applied Physics Lab – I	After completion of course student will develop: Practical understanding and applications of fundamental concept of classical and modern Physics.
BTI 121	Element of Mechanical Engineering Lab	• Be able to apply design knowledge for Design of Cotter Joint and Knuckle Joint etc and
		formulate the design procedure and acquire skill of finding resisting areasagainst failure.
		Apply the knowledge of Design Data Hand Book and ISO standards forselection of
		materials, strengths, standard dimensions of design components.
		• Able to apply design and drafting knowledge of CAD software for drafting assembly and
		details of Bolted joint, Coupling, Cotter joint, Knuckle Joint etc.
		• Develop Logical and Analytical ability to apply Knowledge of CAD fordesign of Shaft
		subjected to direct and combined loading
BTI 122	Programming in C Lab	After Completion of this course the student would be able to
		• Read, understand and trace the execution of programs written in C language.
		• Write the C code for a given algorithm.
		• Implement Programs with pointers and arrays, perform pointer arithmetic,

		and
		use the pre-processor.
		• Write programs that perform operations using derived data types.
BTI 123	Applied Chemistry Lab	The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
BTI 124	Engineering Graphics Lab	· Introduction to engineering design and its place in society
		· Exposure to the visual aspects of engineering design
		· Exposure to engineering graphics standards
		· Exposure to solid modelling
		· Exposure to computer-aided geometric design
		· Exposure to creating working drawings
		· Exposure to engineering communication
BTI 141	English	· The students should be able to :
		· Identify Common Errors and Rectify Them
		· Develop and Expand Writing Skills Through Controlled and GuidedActivities
		· To Develop Coherence, Cohesion and Competence in Oral Discoursethrough Intelligible Pronunciation
BTI 143	Behavioural Science - I	· The knowledge of self will be utilized by students to resolve their personal, interpersonal and life problems
		· Rather than extrinsic locus of control, students will acquire an intrinsic approach towards life
		· The heightened awareness of self, attitudes and emotions will help students to work towards removal of obstacles created by self-limitations and enhance their full potential in their education and career.
	Foreign Language – I	· To understand basic French. Able to read, write basic French
BTI 144	French	· To express basic day to day activities in French

SECOND SEMESTER

Course Code	Course Title	Outcome
BTI 201	Applied Mathematics -II	• Upon completion of this course, students will be able to solve fieldproblems in engineering involving PDEs.
		• The effective mathematical tools for the solutions of differential equations that model physical processes.
BTI 202	Applied Physics - II –Modern Physics	In Modern physics II applications of the foundations of relativity and quantum physics
		given in Modern Physics I are included. After completion of this course thestudent will
		be able to:
		• outline the main ideas and theories in the more applied areas of modernphysics
		• solve problems in modern physics by choosing appropriate methods andassess the
		plausibility of the results obtained
		• formulate and evaluate mathematical models describing physical problems
		• explain the significance of the Swedish and English terms used in the field
BTI 203	Electrical Science	• an ability to identify, formulate, and solve complex engineering problemsby applying principles of engineering, science, and mathematics
		• an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
		• an ability to communicate effectively with a range of audiences
		• an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
BTI 204	Object oriented programming using C++	At the end of this course, students will demonstrate ability to:
		• To apply concepts of classes and objects in real world scenarios.
		• Understand object-oriented programming features in C++,
		• Apply these features to program design and implementation,
		• Understand object-oriented concepts and how they are supported by C++,
		• Gain some practical experience of C++.
BTI 205	Engineering Mechanics	• Confidently tackle equilibrium equations, moments and inertia problems
		• Master calculator/computing basic skills to use to advantage in solving mechanics problems.
		• Gain a firm foundation in Engineering Mechanics for furthering the careerin Engineering
BTI 206	Environmental Studies-II	**Upon course completion, students will be able to:**
		Explain various types of environmental pollutions. Understand role of individual in abatement of environmental pollution. Explain methods to mitigate disasters. Learn various environmental protection laws. Learn roleof IT in environment and human health
BTI 220	Applied Physics Lab - II	After completion of course student will develop: Practical understanding andapplications of fundamental concept of classical and modern Physics.
BTI 221	Electrical Science Lab	Understand the fundamentals of e.m.f, potential difference, current, resistance and energy conversions from one form to another. They should be able to calculate cost of energy consumption.

Course Code	Course Title	Outcomes
BTI 222	Object oriented programming using C++ Lab	At the end of this course, students will demonstrate ability to:
		• knowledge of the structure and model of the C++ programming language,(knowledge)
		• evaluate user requirements for software functionality required to decide whether the C++ programming language can meet user requirements (analysis)
		• design the object-oriented programs for real world problems.
BTI 223	Engineering MechanicsLab	• Understand and be able to apply Newton's laws of motion.
		• Understand basic dynamics concepts – force, momentum, work and energy.
BTI 240	English	· The students should be able to :
		· Identify Common Errors and Rectify Them
		· Develop and Expand Writing Skills Through Controlled and GuidedActivities
		· To Develop Coherence, Cohesion and Competence in Oral Discoursethrough Intelligible Pronunciation
BTI 243	Behavioural science - II	Through this course,
		· Students will get aware of their personality through the use of varioustests, and utilize this information to apply in everyday life events.
		· The knowledge of socialization process will help students identify thesource of their behavior patterns and help them change destructive and problematic behaviors.
		· Students will learn to appreciate the diversity in human nature and bring it to their benefit at a workplace situation.
		· Students will learn about the societal and national identities, and be able to shape their goals in accordance with such knowledge.
	Foreign Language - II	· To understand and read official mail in French.
BTI 244	French	· To understand and present biography of Scientist in French
		· Able to write, read and understand simple scientific article in French

THIRD SEMESTER

Course Code	Course Title	Outcomes
BTI 301	Applied Mathematics –III	The objective of this course is to familiarize the prospective engineers withtechniques in multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.
		The students will learn:
		· The mathematical tools needed in evaluating multiple integrals andtheir usage.
		· The effective mathematical tools for the solutions of differential equations that model physical processes.
		· The tools of differentiation and integration of functions of a complexvariable that are used in various techniques dealing engineering problems
BTI 302	Analog Electronics	At the end of this course students will demonstrate the ability to
		• Understand the characteristics of diodes and transistors
		• Design and analyze various rectifier and amplifier circuits
		• Design sinusoidal and non-sinusoidal oscillators

		• Understand the functioning of OP-AMP and design OP-AMP basedcircuits
		• Design ADC and DAC
BTI 303	Operating Systems	At the end of the course, the students should be able to:
		Analyze various scheduling algorithms.
		Understand deadlock, prevention and avoidance algorithms.
		Compare and contrast various memory management schemes.
		Understand the functionality of file systems.
BTI 304	Data Structure Using C	Ability to choose appropriate data structures to represent data items in realworld problems.
		Ability to analyze the time and space complexities of algorithms.
		Ability to design programs using a variety of data structures such as stacks,queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees.
		Able to analyze and implement various kinds of searching and sorting techniques.
BTI 305	Database ManagementSystems	Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
		Identify basic database storage structures and access techniques such as fileorganizations, indexing methods including B-tree, and hashing.
		Learn and apply Structured query language (SQL) for database definitionand database manipulation.
		Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
		Understand various transaction processing, concurrency control mechanismsand database protection mechanisms.
BTI 320	Analog Electronics Lab	Students will be able to:
		· Design and test rectifiers, clipping circuits, clamping circuits and voltage regulators.
		· Compute the parameters from the characteristics of JFET and MOSFET devices.
		· Design, test and evaluate BJT amplifiers in CE configuration.
		· Design and test JFET/MOSFET amplifiers.
BTI 321	Data Base ManagementSystems Lab	· At the end of lab session students would be able to design the Database application for the real life projects.
		· Students would be able to perform insertion, deletion and updation operation on Databases.
BTI 322	UNIX Programming Lab-I	· Identify the basic Unix general purpose commands.
		· Apply and change the ownership and file permissions using advanceUnix commands.
		· Use the awk, grep, perl scripts.
		· Implement shell scripts and sed.
		· Apply basic of administrative task.
BTI 323	Data Structure Lab	· Ability to identify the appropriate data structure for given problem.
		· Graduate able to design and analyze the time and space complexity ofalgorithm or program.

Course Code	Course Title	Outcomes
		· Ability to effectively use compilers includes library functions, debuggers and trouble shooting.
BTI 341	Communication Skills –I	· The students should be able to :
		· Identify Common Errors and Rectify Them
		· Develop and Expand Writing Skills Through Controlled and GuidedActivities
		· To Develop Coherence, Cohesion and Competence in Oral Discoursethrough Intelligible Pronunciation
BTI 343	Behavioural Science - III	• Student will be able to understand and solve the problems effectively intheir personal and professional life.
		• Students will outline multiple divergent solutions to a problem,
		• Student will able to create and explore risky or controversial ideas, andsynthesize ideas/expertise to generate innovations
	Foreign Language – III	• les adjectifs démonstratifs
BTI 344	French	• les verbes : 'ir groupe' devoir, falloir
		• les prépositions de lieu, de pays
		• l'impératif, le passé composé, forme et accord du participe passé, la négation au passé composé
		• les indicateurs de temps (il y a, depuis)
BTI 330	Term Paper (Evaluation)	After successful completion of this course, students will be able to
		• Carry out intense study on a specific topic related to current developmentin their field of specialization
		• Collect, interpret and analyze the information
		• Compare and evaluate the existing solutions for a specific cases study
		• Develop skills of presentation and report writing

FOURTH SEMESTER

Course Code	Course Title	Outcomes
BTI 401	Theory of Automata &Computation	At the end of this course, students will be able to do the following:
		· Students will demonstrate knowledge of basic mathematical models ofcomputation and describe how they relate to formal languages.
		· Students will understand that there are limitations on what computerscan do, and learn examples of unsolvable problems.
		Students will learn that certain problems do not admit efficient algorithms,and identify such problems.
BTI 402	Digital Electronics	· At the end of this course, students will demonstrate the ability to
		Understand working of logic families and logic gates.
		Design and implement Combinational and Sequential logic circuits.
		Understand the process of Analog to Digital conversion and Digital to Analog conversion.
		Be able to use PLDs to implement the given logical problem
BTI 403	Discrete Mathematics	· For a given logic sentence express it in terms of predicates, quantifiers,and logical connectives
		· For a given a problem, derive the solution using deductive logic andprove the solution based on logical inference.
		· For a given a mathematical problem, classify its algebraic structure
		· Evaluate Boolean functions and simplify expressions using the

		properties of Boolean algebra.
		· Develop the given problem as graph networks and solve with techniques of graph theory.
BTI 404	Communication Systems	Show clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking.
		Demonstrate the ability to unambiguously explain networking as it relates tothe connection of computers, media, and devices (routing).
		Able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities. Able to identify limitations of typical communication systems.
BTI 405	Computer Graphics	· Know and be able to describe the general software architecture of programs that use 3D computer graphics.
		· Know and be able to discuss hardware system architecture for computer graphics. This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators /co-processors.
		· Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; andshading (flat, smooth, Gourand, Phong).
BTI 420	Digital Electronics Lab	After studying this course the students would gain enough knowledge.
		· To have thorough understanding of the fundamental concepts and techniques used in digital electronics.
		· To understand and examine the structure of various number systemsand its application in digital design.
		· The ability to understand, analyze and design various combinationaland sequential circuits.
		· Ability to identify basic requirements for a design application andpropose a cost-effective solution.
		· To develop skill to build and troubleshoot digital circuits.
BTI 421	Communication SystemsLab	Show clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking.
		Demonstrate the ability to unambiguously explain networking as it relates tothe connection of computers, media, and devices (routing).
		Able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities. Able to identify limitations of typical communication systems.
BTI 422	Computer Graphics Lab	· Know and be able to describe the general software architecture of programs that use 3D computer graphics.
		· Know and be able to select among models for lighting/shading: Color,ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).
BTI 441	Communication Skills -II	• Develop a resume for oneself
		• Ability to handle the interview process on fidently
		• Learn the subtle nuances of an effective group discussion
BTI 443	Behavioural Science - IV	• Able to answer the question: What do I stand for?
		• Ability to apply a coherent set of moral principles within professional andspecialized contexts
		• Willing to make unpopular but right decision
		• Committed to working for justice and peace locally and globall

Course Code	Course Title	Outcomes
BTI 444	Foreign Language – IV French	• imparfait,
		• la comparaison du verbe/du nom ; mieux/meilleur
		• les pronoms relatifs

FIFTH SEMESTER

Course Code	Course Title	Outcomes
BTI 501	VHDL Programming	At the end of the course, students will demonstrate the ability to:
		• Design synchronous and asynchronous sequential circuits
		• Translate real world problems into digital logic formulations.
		• Construct test and debug digital networks using VHDL.
BTI 502	Software Engineering	Ability to use the modeling approaches for the designing of software.
		Ability to use the testing tools and designing of test cases for testing.
		Ability to use the Unified modeling language (UML) for the designing of software product.
BTI 503	Computer Architecture	Ability to understand basic structure of computer.
		Ability to perform computer arithmetic operations.
		Ability to understand control unit operations.
		Ability to design memory organization that uses banks for different word size operations.
		Ability to understand the concept of cache mapping techniques.
		Ability to understand the concept of I/O organization.
		Ability to conceptualize instruction level parallelism
BTI 504	Data Communication &Computer Networks	· Show clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking.
		· Demonstrate the ability to unambiguously explain networking as it relates to the connection of computers, media, and devices (routing).
		· Able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities. Able to identify limitations of typical communication systems.
		· Able to differentiate among and discuss the four levels of addresses(physical, logical, port, and specific used by the Internet TCP/IP protocols.
		· Understand the concept of reliable and unreliable transfer protocol ofdata and how TCP and UDP implement these concepts
		· Developing the understanding of various advanced techniques like ISDN,ATM and wifi.
BTI 505	Java Programming	The student will learn:
		· Students can perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members
		· Students can demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance
		· Students can demonstrate ability to implement one or more patternsinvolving dynamic binding and utilization of polymorphism in the solution of problems

		· Students can demonstrate ability to implement multithreading in theprogramming.
		· To learn syntax and features of exception handling
		· Students can demonstrate the ability to implement solution to various I/O manipulation operations and the ability to create two-dimensional graphic components using Swings.
		· To demonstrate the ability to handle Events in the Programming
BTI 520	VHDL Programming Lab	• Write a VHDL code for various combinational and sequential circuits.
		• Testing of Various digital designs using test bench in VHDL.
BTI 521	Software Enginee ringLab	· Ability to design the proper documentation of software product.
		· Ability to implement the cost estimation modelling approaches.
		· Ability to use the unified modelling language as a tool.
BTI 522	Computer ArchitectureLab	Know and be able to describe the general software architecture of programsthat use 3D computer graphics.
		Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).
BTI 523	Data Communication &Computer Networks Lab	Students can demonstrate the ability to Study Different types of Network Topology and networking
BTI 524	Java Programming Lab	· knowledge of the structure and model of the Java programming language, (knowledge)
		· use the Java programming language for various programming technologies (understanding)
		· develop software in the Java programming language, (application)
		· evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
		· propose the use of certain technologies by implementing them in theJava programming language to solve the given problem (synthesis)
BTI 541	Communication Skills -III	• Communicate fluently and sustain comprehension of an extended discourse.
		• Demonstrate ability to interpret texts and observe the rules of good writing.
		• Prepare and present effective presentations aided by ICT tools.
BTI 543	Behavioural Science - V	• Students will Develop critical and reflective thinking abilities
		• Students will Demonstrate an understanding of group dynamics and effective teamwork
		• Student will develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, and motivating others
		• Student will Gain knowledge and understanding of organization resources,policies, and involvement opportunities.
		• Student will Develop strategies to recruit, retain, and continually motivatecontributing members to the organization
	Foreign Language – V	• le présent (révision), le passé composé (révision)
BTI 544	French	• les pronoms compléments directs, les pronoms compléments indirects
BTI 550	Industrial Practical Training - I (Evaluation)	After successful completion of the course, the students will be able to
		· Explore the preferred field of specialization and develop analytical /hardware / software / experimental / observation skills.
		Manage the technical content and work.

| | | Learn the various administrative process followed in industry. |
| | | Prepare and present technical report. |

SIXTH SEMESTER

Course Code	Course Title	Outcome
BTI 601	Advanced Microprocessor	At the end of this course students will demonstrate the ability to
		• Do assembly language programming
		• Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc.
		• Develop systems using different microcontrollers
		• Understand RISC processors and design ARM microcontroller based systems
BTI 602	System Programming	Demonstrate the knowledge of Systems Programming and Operating Systems 2. Formulate the Problem and develop the solution for same. 3. Compare and analyze the different implementation approach of system programming and operating system abstractions. 4. Interpret various OS functions used in Linux / Ubuntu
BTI 603	E-Commerce and ERP	Upon successful completion, Introduction to E-Commerce, the student willbe able to: Demonstrate an understanding of the foundations and importance of E-commerce Demonstrate an understanding of retailing in E-commerce by: analyzing branding and pricing strategies, using and determining the effectiveness of market research assessing the effects of disintermediation.
BTI 604	Advanced Networking	The student will be able to: · Illustrate reference models with layers, protocols and interfaces. · Summarize functionalities of different Layers. · Combine and distinguish functionalities of different Layers. · Describe and Analysis of basic protocols of computer networks, and howthey can be used to assist in network design and implementation. · Identify and describe development history of routing protocols. · Describe Subnetting and Addressing of IP V4
BTI 605	Advanced Java programming	The student will learn:
		Can develop Java Applets, Beans programming.
		Can Understand Advanced Java Networking concepts and develop serverside application.
		Can learn Server Side Programming Concepts and create Dynamic web Application.
		Know about the JDBC Principles and can interact with back end databasewith java programming.
		Understand the application server and also understand the enterprise levelapplications.
BTI 620	Microprocessor Lab	Upon completion of this laboratory course students will demonstrate the ability to
		• Do assembly language programming
		• Do interfacing design of peripherals like, I/O, UART, LCD, Keyboard, timer etc. to 8051

		• Develop systems using different microcontrollers
BTI 621	System ProgrammingLab	Demonstrate the knowledge of Systems Programming and Operating Systems 2. Formulate the Problem and develop the solution for same. 3. Compare and analyze the different implementation approach of system programming and operating system abstractions. 4. Interpret various OS functions used in Linux / Ubuntu
BTI 622	Advanced NetworkingLab	Upon successful completion of this course, a student should be able to: 1. Design and build a wireless LAN. 2. Design and implement a network security policy using access lists. 3. Use VLANs in a switched network environment. 4. Troubleshoot wireless LANs and VLANs. 5. Troubleshoot security policies such as access lists.
BTI 623	Advanced Java Programming Lab	· Ability to design and develop Java Applets, Beans programming.
		· Ability to design and structure the Server Side Programming Concepts.
		· Ability to Create and design Dynamic web Application.
		· Write the structured code for JDBC (back end database).
		· Ability to develop and design the enterprise level applications.
BTI 641	Communication Skills -IV	• To communicate contextually in specific personal and professional situations with courtesy.
		• To inject humour in their regular interactions.
		• To strengthen their creative learning process through individual expressionand collaborative peer activities.
BTI 643	Behavioural Science -VI	• Student will able demonstrate thorough understanding of stress and its effects
		• Student will able to learn various coping strategies to deal stress effectively so to overcome the consequences and impact of stress on their health and wellbeing, ultimately it will enhance their performance
	Foreign Language – VI	• Le présent (révision)
BTI 644	French	• Les prépositions et les verbes
		• Les pronoms possessives
		• Les verbes réciproques

SEVENTH SEMESTER

Course Code	Course Title	Outcome
BTI 701	Artificial Intelligence	Upon successful completion of this course student will:be able to design a knowledge based system, be familiar with terminology used in this topical area, have read and analyzed important historical and current trends addressingartificial intelligence.
BTI 702	Programming withASP.Net	After completion of the course the student will be able to use the featuresof Dot Net Framework along with the features of ASP. NET & Web Services.
BTI 720	Artificial Intellignec eLab	Students can design a knowledge based system be familiar with terminology used in this tropical area, and have read and analyzed important historical and current trends addressing artificial intelligence.
BTI 721	Programming withASP.Net Lab	• Develop dynamic web applications, create and consume web services. • Use appropriate data sources and data bindings in ASP.NET web applications
BTI 741	Communication Skills –V	Student Learning Outcomes: • Conduct all business activities related to the workplace with technical efficiency. • Contribute positively to the overall growth of the organization.
BTI 743	Behavioural Science – VII	• Students develop the ability to identify suitable career options and to create a suitable career plan based on the utilization of the counseling process, assessment tools, and other resources. • Students will know how to assess their skills, interests and values. • Students will know how to make informed career choices based on theirself- assessment. Students will know how to explore relevant career options and build skillspertinent to those of greatest interest.
BTI 744	Foreign language - VII French	Grammaire : 1. Le pronom " en " 2. La place de l'adjectif 3. Le présent progressif 4. Le passé récent 5. Le futur proche (révision) 6. Le comparatif et le superlatif
BTI 750	Practical Training - II(Evaluation)	The students will be able to explore the preferred field of specialization and develop analytical / hardware / software / experimental / observationskills
ELECTIVES (Any one from each group)		
Group I (With Practical)		
BTI 703	Software Project Management	Students will be able to: • Apply project management concepts and techniques to an IT project. • Identify issues that could lead to IT project success or failure. • Explain project management in terms of the software development process. • Describe the responsibilities of IT project managers. • Apply project management concepts through working in a group as teamleader or active team member on an IT project.
BTI 704	Advance DBMS	The student will learn Describe DBMS architecture, physical and logical database designs,

		database modeling, relational, hierarchical and network models. Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing. Learn and apply Structured query language (SQL) for database definitionand database manipulation. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.
BTI 705	Operational Research	• Knowledge and understanding - Be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type. • Cognitive skills (thinking and analysis) - Be able to build and solve Transportation Models and Assignment Models.
BTI 706	Numerical Methods &Statistical Techniques	Upon completion of the course students shall be able to: 1. Recognize the error in the number generated by the solution. 2. Compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method. 3. Apply method of interpolation and extrapolation for prediction
BTI 722	Software Project Management Lab	Identify the different project contexts and suggest an appropriate management strategy. Practice the role of professional ethics insuccessful software development. Identify and describe the key phases of project management. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.
BTI 723	Advance DBMS Lab	• At the end of lab session students would be able to design the Databaseapplication for the real life projects. • Students would be able to perform insertion, deletion and updation operation on Databases.
BTI 724	Operational Research Lab	• Knowledge and understanding - Be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type. • Cognitive skills (thinking and analysis) - Be able to build and solve Transportation Models and Assignment Models. • Communication skills (personal and academic). - Be able to design new simple models, like: CPM, MSPT to improve decision –making and develop critical thinking and objective analysis of decision problems.
BTI 725	Numerical Methods &Statistical TechniquesLab	CO1 Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations. 1. CO2 Apply various interpolation methods and finite difference concepts. 2. CO3 Work out numerical differentiation and integration whenever andwherever routine methods are not applicable.
Group II (Without Practical)		
BTI 707	Mobile Computing	• Students will able to describe the basic concepts and principles in

Course Code	Course Title	Outcome
		mobile computing • Students will able to understand the concept of Wireless LANs, PAN, Mobile Networks, and Sensor Networks • Students will able to explain the structure and components for Mobile IPand Mobility Management • Students will able to describe the important issues and concerns on security and privacy
BTI 708	Grid Computing	Student can Understand the concept of Grid Computing, Web Services, and Service-oriented architecture, Architecture for grid computing, Cluster Computing, process scheduling and load balancing, deployment of Grid,software and tools, and application execution.
BTI 709	Compiler Construction	Students can understand the basic concepts and application of Compiler Design and apply their basic knowledge Data Structure to design Symbol Table, Lexical Analyzer Intermediate Code Generation, Parser (Top Down and Bottom Up Design)
BTI 710	Information Security	After completion of course, students would be able to: 1. Apply fundamental concepts of Information Security threats and vulnerabilities to adopt right security measures and design real time scenarios 2. Implement, aintainasecurenetworkconsistingofenterpriselevelroutersandswitches. 3. Design and implement AAA and IPSec and firewall technologies anddesign network policies to securing networks 4. Design/develop/ implement the security solution for a given application
BTI 711	Marketing Management	Understand fundamental marketing concepts, theories and principles in areas of marketing policy; of market and consumer behavior; of product,distribution, promotion and pricing decisions. Understand the role of marketing as a fundamental organizational policyprocess. Analyze the interaction of marketing and environmental forces through anunderstanding of marketing decisions and practices with social, technological, economic, and political forces

EIGHTH SEMESTER

Course Code	Course Title	Outcome
BTI 801	Digital Image Processing	Student can implement the image processing techniques using colour models.
BTI 802	Real Time Systems	An ability to understand advanced concepts in theory of computer science;An ability to understand advanced concepts in applications of computer science; An ability to apply knowledge of advanced computer science to formulatethe analyze problems in computing and solve them; An ability to learn emerging concepts in theory and applications of computer science;
BTI 803	Management Information System	This course gives knowledge about the information systems which is crucial to students who plan a career in business Organization.
BTI 820	Digital Image Processing Lab	• Ability to implement the image processing techniques using colour models. • Ability to implement the image compression algorithm. • Ability to implement the various image enhancement techniques.

BTI 841	Communication Skills –VI	Students will be able to: • Students will be able to navigate cross cultural encounters in a global economy. • Facilitate students to develop learning to construct and deliver messagesthat incorporate the appropriate use of organizing content, language, vocabulary, kinesics, eye contact, appearance, visual aids, and time constraints.
BTI 843	Behavioural Science – VIII	have a great deal of insight into one's character.Understanding of positive emotions
	Foreign language - VIII	Foreign Language-communication skills
BTI 844	French	
BTI 860	Project	On successful completion of the course students will be able to: • Apply critical and creative thinking in the design of engineering projects • Plan and manage time effectively as a team. • Consider the business context and commercial positioning of designed devices or systems. • Apply knowledge of the 'real world' situations that a professional engineer can encounter. • Use fundamental knowledge and skills in engineering and apply it effectively on a project. • Design and develop a functional product prototype while working in a team. • Use various tools and techniques to study existing systems. • Achieve precision in uses of the tools related to their experiments/fabrication. • Timely reflect on peers' technical and non-technical learning. • Orally present and demonstrate your product to peers, academics, generaland industry community. • Write comprehensive report on project work.
ELECTIVES (Any one from each group)		
Group I (With Practical)		
BTI 804	Windows Programmin gin VC++	Upon successful completion of the course, the student will be able to: • Create flowcharts for simple programming problems. • Develop algorithms for simple programming problems. • Write pseudo-code as solutions to programming problems. • Demonstrate proficiency in writing structured programs using theVisual C++ programming language to resolve problems. • Incorporate the use of control structures, data manipulation, and and input/output in programs. • Express a working knowledge of arrays, sorted properties, and file processing.
BTI 805	Network Operating System	Upon successful completion of this course, students are expected to have the ability to: • Describe and explain the fundamental components of a computer operating system. • Describe and explain the fundamental components of a computer operating system. • Define, restate, discuss, and explain the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems.
BTI 806	Software Testing &Quality Assurance	After the completion of the course the students will be able to: Design and develop bug free software systems using concepts of softwaretesting. Identify, formulate, review and analyze complex engineering problems of

		testing using principles of mathematics. Create, select and apply appropriate techniques and modern engineering and IT tools for software testing. Analyze verification, validation activities, static, dynamic testing, debugging tools and techniques and importance of working in teams.
BTI 807	Linux Administration	After completing this course, students will be able to: ● evaluate and apply technology resources (Program Learning Outcome); ○ by installing, configuring, and managing a Linux server and relevant services and applications; ● understand the importance of maintaining a secure Linux server; and, ● communicate using multiple modes of communication (Program Learning Outcome).
BTI 808	VLSI Design	1. Be able to use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnect. 2. Be able to create models of moderately sized CMOS circuits that realizespecified digital functions. 3. Be able to apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality, timing, power, and parasitic effects.
ELECTIVES (Any one from each group)		
Group I (With Practical)		
BTI 809	Simulation & Modeling	• Ability to choose appropriate simulation techniques in real world problems. • Ability to analyse the different algorithms used for simulation. • Able to analyze and implement various kinds of simulation and modeligtechniques.
BTI 810	Soft Computing	
BTI 811	Data Ware housing andData Mining	• Students should be able to understand why the data warehouse in additionto database systems. • After completing this course, the student will be able to: x Apply data mining techniques and methods to large data sets. x Use data mining tools xCompare and contrast the various classifiers. • Ability to identify the association rules, classification and clusters in largedata sets. • Ability to solve real world problems in business and scientific informationusing data mining.
BTI 812	Personnel Management	1. To have an understanding of the basic concepts, functions and processesof human resource management 2. To be aware of the role, functions and functioning of human resource department of the organizations. 3. To Design and formulate variours HRM processes such as Recruitment,Selection, Training, Development,Performance appraisals and rReward Systems, CompensarionPlans and Ethical Behaviour.
BTI 813	Financial Management	On successful completion of this module, the learner will be able to: 1. Describe the financial environment within which organisations must

		operate
		2. Critically evaluate the financial objectives of various types of organisations and the respective requirements of stakeholders
		3. Discuss the function of capital markets
		4. Explain alternative sources of finance and investment opportunities andtheir suitability in particular circumstances
BTI 821	Windows Programming in C++ Lab	On successful completion of the course students will be able to: • Apply critical and creative thinking in the design of engineering projects • Plan and manage time effectively as a team. • Consider the business context and commercial positioning of designed devices or systems. • Apply knowledge of the 'real world' situations that a professional engineer can encounter. • Use fundamental knowledge and skills in engineering and apply it effectively on a project.
BTI 822	Network Operating System Lab	Upon successful completion of this course, students are expected to have the ability to: • Describe and explain the fundamental components of a computer operating system. • Describe and explain the fundamental components of a computer operating system.
BTI 823	Software Testing & Quality Assurance Lab	• Apply modern software testing processes in relation to software development and project management. • Create test strategies and plans, design test cases, prioritize and execute them. • Manage incidents and risks within a project. • Contribute to efficient delivery of software solutions and implementimprovements in thesoftware development processes. • To gain expertise in designing, implementation and development ofcomputer based systems and IT processes.
BTI 824	Linux Administr ationLab	After completing this course, students will be able carry the duties of a Unix system administer. Students will learn to do file processing, process management, IO management, queues management, networking, storage backup, account management, proper system start-up and shutting down, as well as other tasks.
BTI 825	VLSI Design Lab	This course provides the design of various digital circuits using different VLSI simulation software tools like Modelsim,Xilinx and Questa. The outcome of this course to learn VHDL and Verilog language and also learnthe usage of different tools. 1. To design and simulate list of combinational and sequestional digital circuits using Modelsim & Xilinx –VHDL language 2. To design and simulate the brawn array multiplier and ALU using Modelsim and Xilinx-Veriloglanguage

AMITY UNIVERSITY MADHYA PRADESH
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING

B.TECH. (MECHANICAL ENGINEERING)
Programme Educational Objectives

PEO 1: To enable graduates pursue successful careers in Indian & Global industrial organizations with application of engineering knowledge and skills to formulate and undertake the industrial design, development, operation and maintenance problems of mechanical systems and find viable solutions.

PEO 2: To inculcate and develop in graduates the lifelong learning aptitudes, ethics and values and leadership qualities that will enable them to serve the industry, society at the national and global levels while serving as professionals, entrepreneurs , academicians and researchers.

PEO 3: To prepare students to be able to work as members of teams on multidisciplinary projects with professional ethics and socio-economic, environmental consciousness along with technological competence.

PEO 4: To provide a sound and updated knowledge base and skill set to the students to enable them pursue higher education and cutting-edge research work at premier institutions/universities and research centers across the globe.

PEO 5: Inspiring and motivating students to apply their analytical, scientific and technical knowledge & skills for innovation in products/processes leading to improvisation in productivity of organizations/society.

PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Bachelor of Technology (B.Tech.) ME, Academic Year: 2021 – 2022

Programme Outcomes

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

[PO.2]. **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.

[PO.3]. **Design/development of solutions**: 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.

[PO.4]. **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.

[PO.5]. **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.

[PO.6]. **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.

[PO.7]. **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.

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices.

[PO.9]. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[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.

[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 Outcomes

PSO1.Professional Skills: An ability to understand the basic concepts in Mechanical Engineering and to apply them to various areas, like Automobile, power plant, Production, Manufacturing etc., in the design and implementation of complex systems.

PSO2. Problem-solving skills: An ability to solve complex Mechanical Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.

PSO3. Successful career and Entrepreneurship: An understanding of social-awareness & environmental-wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an entrepreneur.

Course Outcomes:

FIRST SEMESTER

S.No.	Course Code	Course Title	Outcome
1	BTM 101	Applied Mathematics – I	• To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have a basicunderstanding of Beta and Gamma functions. • The mathematical tools needed in evaluating multiple integrals and theirusage.
2	BTM 102	Applied Physics - I –Fields & Waves	• Apply vector calculus to static electric-magnetic fields in different engineering situations. • Analyze and Apply Maxwell's equation to diverse engineering problems. • Relate semiconductor material properties to semiconductor devices.

3	BTM 103	Element of Mechanical Engineering	• Understand about the working, functions and applications of equipmentsused in daily life. Identify the broad context of Mechanical engineering problems, includingdescribing the problem conditions and identifying possible contributing factors • Understand the fundamental elements of Mechanical engineering systems,system components and processes, with a good understanding of associated safety,quality, schedule and cost considerations.
4	BTM 104	Introduction to Computers& Programming in C	On completion of the course, students are able to: • Develop their programming skills. • Be familiar with programming environment with C Program structure. • Declaration of variables and constants. • Understand operators, expressions and preprocessors. • Understand arrays , it's declaration and uses.
5	BTM 105	Applied Chemistry	The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. To understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecularlevels. The course will enable the student to: • Analyse microscopic chemistry in terms of atomic and molecular orbitalsand intermolecular forces. • Rationalise bulk properties and processes using thermodynamic considerations. • Distinguish the ranges of the electromagnetic spectrum used for excitingdifferent molecular energy levels in various spectroscopic techniques • Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity. • List major chemical reactions that are used in the synthesis of molecules.
6	BTM 106	Environmental Studies - I	• Student will Develop accurate sense of self • Student will nurture a deep understanding of personal motivation • Student will develop thorough understanding of personal and professionalresponsibility Student will able to analyse the emotions of others for better adjustment.
7	BTM 120	Applied Physics Lab – I	After completion of course student will develop: Practical understanding andapplications of fundamental concept of classical and modern Physics.
8	BTM 121	Element of Mechanical Engineering Lab	• Be able to apply design knowledge for Design of Cotter Joint and KnuckleJoint etc and formulate the design procedure and acquire skill of finding resisting areasagainst failure. Apply the knowledge of Design Data Hand Book and ISO standards forselection of materials, strengths, standard dimensions of design components. • Able to apply design and drafting knowledge of CAD software for draftingassembly and details of Bolted joint, Coupling, Cotter joint, Knuckle Joint etc. • Develop Logical and Analytical ability to apply Knowledge of CAD fordesign of Shaft subjected to direct and combined loading

9	BTM 122	Programming in C Lab	After Completion of this course the student would be able to • Read, understand and trace the execution of programs written in C language. • Write the C code for a given algorithm. • Implement Programs with pointers and arrays, perform pointer arithmetic,and use the pre-processor. • Write programs that perform operations using derived data types.
10	BTM 123	Applied Chemistry Lab	The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. Thestudents will learn to measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
11	BTM 124	Engineering Graphics Lab	• Identify and implement basic concepts of BIS conventions to sketch Engineering drawing. • Create geometric constructions with hand tools. • Construct orthographic projection and sectional view of a machine part. • Create isometric projection from multiview drawings of an object. • Sketch projection of solids and development of lateral surfaces of solids.
12	BTM 141	English	• The students should be able to : • Identify Common Errors and Rectify Them • Develop and Expand Writing Skills Through Controlled and Guided Activities • To Develop Coherence, Cohesion and Competence in Oral Discourse through Intelligible Pronunciation.
13	BTM 143	Behavioural Science - I	• Student will Develop accurate sense of self • Student will nurture a deep understanding of personal motivation • Student will develop thorough understanding of personal and professionalresponsibility Student will able to analyse the emotions of others for better adjustment.
		Foreign Language – I	• articles indéfinis, articles définis, masculin et féminin des noms et des adjectifs, pluriel des noms et des adjectifs
14	BTM 144	French	• pronoms sujets et toniques, on, c'est/il est + profession,
			• masculin et féminin des adjectifs de nationalité • verbes- être, avoir, aller, 'er' groupe • l'interrogation – l'intonation, est-ce que, qui est-ce ? Qu'est-ce que? L'inversion ; où, comment, quand ; quel • la négation • adjectifs possessifs

SECOND SEMESTER

S.No	Course Code	Course Title	Outcome
1	BTM 201	Applied Mathematics - II	• Upon completion of this course, students will be able to solve fieldproblems in engineering involving PDEs. • The effective mathematical tools for the solutions of differential equations that model physical processes.
2	BTM 202	Applied Physics - II –Modern Physics	In Modern physics II applications of the foundations of relativity andquantum physics given in Modern Physics I are included. After completion of this course thestudent will be able to: • outline the main ideas and theories in the more applied areas of modernphysics • solve problems in modern physics by choosing appropriate methods andassess the plausibility of the results obtained • formulate and evaluate mathematical models describing physical problems • explain the significance of the Swedish and English terms used in the field
3	BTM 203	Electrical Science	• an ability to identify, formulate, and solve complex engineering problemsby applying principles of engineering, science, and mathematics • an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, aswell as global, cultural, social, environmental, and economic factors • an ability to communicate effectively with a range of audiences • an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, andsocietal contexts
4	BTM 204	Object oriented programming usingC++	At the end of this course, students will demonstrate ability to: • To apply concepts of classes and objects in real world scenarios. • Understand object-oriented programming features in C++, • Apply these features to program design and implementation, • Understand object-oriented concepts and how they are supported by C++, • Gain some practical experience of C++.
5	BTM 205	Engineering Mechanics	• Confidently tackle equilibrium equations, moments and inertia problems • Master calculator/computing basic skills to use to advantage in solvingmechanics problems. • Gain a firm foundation in Engineering Mechanics for furthering the career in Engineering
6	BTM 206	Environmental Studies-II	understand various types of environmental pollution. educate masses, in general and students, about the issues related to degradation of environment and social issues related to environment.
7	BTM 220	Applied Physics Lab - II	After completion of course student will develop: Practical understanding andapplications of fundamental concept of classical and modern Physics.
8	BTM 221	Electrical Science Lab	Understand the fundamentals of e.m.f, potential difference, current, resistance and energy conversions from one form to another. They should beable to calculate cost of energy consumption.

| 9 | BTM 222 | Object oriented programming usingC++ Lab | At the end of this course, students will demonstrate ability to:
• knowledge of the structure and model of the C++ programming language,(knowledge)
• evaluate user requirements for software functionality required to decidewhether the C++ programming language can meet user requirements |

S.No	Course Code	Course Title	Outcomes
			(analysis) • design the object-oriented programs for real world problems.
10	BTM 223	Engineering Mechanics Lab	• Understand and be able to apply Newton's laws of motion. • Understand basic dynamics concepts – force, momentum, work andenergy.
11	BTM 240	English	The student will be able to write an impressive resume and face the interview confidently.
12	BTM 243	Behavioural science -II	• Student will be able to identify, understand, and apply contemporarytheories of leadership to a wide range of situations and interactions • Student will be able to understand and respect individual difference, so toenhance the relationship • Learn social responsibility and develop a sense of citizenship • Student will be able to identify and understand the impact of culture onone's leadership style
13		Foreign Language - II	• expression du temps • les articles contractés, les quantités indéterminées et déterminées
14	BTM 244	French	• les adverbes de fréquences • verbes- faire, prendre, venir, pouvoir, vouloir, les verbes pronominaux • la comparaison de l'adjectif • la négation (suite)

THIRD SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BTM 301	Numerical Analysis & Programming	CO1-Students will be aware of the use of numerical methods in scientificcomputing. CO2-Studnets will become familiar with calculation and interpretation oferrors in numerical methods. CO3-Students will become familiar with numerical interpolation and approximation of functions. CO4-Students will become familiar with numerical integration and differentiatio
2	BTM 302	Thermodynamics	• After completing this course, the students will get a good understanding ofvarious practical power cycles and heat pump cycles. • They will be able to analyze energy conversion in various thermal devicessuch as combustors, air coolers, nozzles, diffusers, steam turbines and reciprocating compressors • They will be able to understand phenomena occurring in high speed compressible flows.
3	BTM 303	Mechanics of Solids	Analyze the behavior of the solid bodies subjected to various types of loading; Apply knowledge of materials and structural elements to the analysis ofsimple structures; Undertake problem identification, formulation and solution using a range ofanalytical methods

4	BTM 304	Material Science &Metallurgy	After completing this course, the students will be able to understand metallic engineering alloys, semiconductors and superconductors, ceramics,plastics and composites.
5	BTM 305	Mechanics of Fluids	CO 1-Students will be able to understand basic knowledge of the definitionand the fundamental concepts of fluid mechanics including continuum, velocity field , surface tension, flow visualization etc. CO 2-Students will able to apply the basic equation of fluid statics to determine forces on planer and curved surfaces that are submerged in astatic fluid. CO 3-Students will able to use conservation laws in integral form and applythem to determine forces and moments on surfaces of various shapes and simple machines CO 4-Students will able to use Euler s and Bernoulli s equations and theconservation of mass to determine velocities, pressures, and accelerations for incompressible andin viscid fluids
6	BTM 306	Electronics	PO1 Apply basic science and mathematics to analyze complex engineeringproblems. PO2 Gather requirement specifications, design and test electronic systems.PO3 Apply EDA tools to design linear and digital IC systems. PO4 Specify, design and test power supplies for electronic systems including battery management, and power amplifiers.
7	BTM 320	Mechanics of Solids & Fluids Lab	Students who have undergone the course will be able to understand the theory of elasticity including strain/displacement and Hooke's law relationships; mechanical properties. Be able to calculate fluid propertiesand various kinds of losses occur in flow.
8	BTM 321	Machine Drawing Lab	At the end of the course students are able to : • Helping the student in drafting their technical ideas • Creating knowledge about the various practices with regard to the dimensioning, sectioning and development of views. • Understanding the importance of the linking functional and visualizationaspects in the preparation of the part drawings • Preparation of the part or assembly drawings as per the conventions. • Interpretation of machine drawings that in turn help the students in thereparation of the production drawings
9	BTM 322	Programming Lab - I(Numerical Analysis)	After Completion of this course the student would be able to • Read, understand and trace the execution of programs written in C language. • Write the C code for a given algorithm. • Implement Programs with pointers and arrays, perform pointer arithmetic,and use the pre-processor. • Write programs that perform operations using derived data types.
10	BTM 323	Electronics Lab	Students who successfully complete the course will be able to: 1. functionally test and debug electronic circuits 2. use SPICE to simulate electronic circuits 3. analyze and experimentally characterize electric circuits in the frequencydomain 4. communicate effectively through written lab reports and technical memos, with emphasis on critical discussion of results

11	BTM 341	Communication Skills – I	The students should be able to write correctly and properly with specialreference to Letter writing
12	BTM 343	Behavioural Science –III	• Student will be able to understand and solve the problems effectively intheir personal and professional life. • Students will outline multiple divergent solutions to a problem, • Student will able to create and explore risky or controversial ideas, andsynthesize ideas/expertise to generate innovations
13		Foreign Language - III	• les adjectifs démonstratifs • les verbes : 'ir groupe' devoir, falloir
14	BTM 344	French	• les prépositions de lieu, de pays • l'impératif, le passé composé, forme et accord du participe passé, lanégation au passé composé • les indicateurs de temps (il y a, depuis)
	BTM 330	Term Paper (Evaluation)	After successful completion of this course, students will be able to • Carry out intense study on a specific topic related to current developmentin their field of specialization • Collect, interpret and analyze the information • Compare and evaluate the existing solutions for a specific cases study • Develop skills of presentation and report writing

FOURTH SEMESTER

S.No.	Course Code	Course Title	Outcomes
1	BTM 401	Kinematics & Dynamics of Machines	At the completion of this course, students should be able to know • Basic mechanisms, velocity and acceleration of simple mechanisms • Drawing the profile of cams and its analysis • Gear train calculations, Gyroscopes • Inertia force analysis and flywheels • Balancing of rotating and reciprocating masses
2	BTM 402	Heat & Mass Transfer	• After completing the course, the students will be able to formulate and analyze a heat transfer problem involving any of the three modes of heat transfer • The students will be able to obtain exact solutions for the temperature variation using analytical methods where possible or employ approximatemethods or empirical correlations to evaluate the rate of heat transfer • The students will be able to design devices such as heat exchangers and also estimate the insulation needed to reduce heat losses where necessary.
3	BTM 403	Manufacturing Machines	Course Outcome: Upon completion of this course, students will be able to understand thedifferent conventional and unconventional manufacturing methods employed for making different products.
4	BTM 404	Theory of Metal Forming	• Student should be able to select appropriate manufacturing processes foradvanced components with characterization of work pieces. • Student should be able to understand Various Advanced manufacturing metal forming Processes Student should be able to understand to select proper Advanced Manufacturing process for welding, casting and forging
5	BTM 405	Electrical Machines	• To understand and analyze basic electric and magnetic circuits. • To study the working principles of electrical machines and power converters. • To introduce the components of low voltage electrical installations.

S.N	Course Code	Course Title	Outcomes
6	BTM 406	Principles of Computer Graphics	• To prepare students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental,social, political, ethical, health and safety, manufacturability, and sustainability • To prepare students to use the techniques, skills, and modern engineeringtools necessary for engineering practice • To prepare for actual work situations through practical training in a newstate-of-the-art computer designed CAD laboratory using engineering
7	BTM 420	Kinematics & Dynamics of MachinesLab	Students who have undergone the course will be able to understand the measurement of mechanical properties of materials and will be able tocharacterize the dynamic behavior of mechanical systems.
8	BTM 421	Manufacturing Machines Lab	Students who have undergone the course will be able to understand themeasurement of Mechanical machines and operations.
9	BTM 422	Electrical Machine sLab	• Get an exposure to common electrical components and their ratings. • Make electrical connections by wires of appropriate ratings. • Understand the usage of common electrical measuring instruments. • Understand the basic characteristics of transformers and electrical machines. • Get an exposure to the working of power electronic converters.
10	BTM 423	Principles of Computer Graphics Lab	• Introduction to engineering design and its place in society • Exposure to the visual aspects of engineering design • Exposure to engineering graphics standards • Exposure to solid modeling • Exposure to computer-aided geometric design • Exposure to creating working drawings • Exposure to engineering communication
11	BTM 441	Communication Skills - II	• Develop a resume for oneself • Ability to handle the interview process on fidently • Learn the subtle nuances of an effective group discussion
12	BTM 443	Behavioural Science –IV	• Able to answer the question: What do I stand for? • Ability to apply a coherent set of moral principles within professional andspecialized contexts • Willing to make unpopular but right decision • Committed to working for justice and peace locally and globall
13	BTM 444	Foreign Language - IV French	• imparfait, • la comparaison du verbe/du nom ; mieux/meilleur • les pronoms relatifs

FIFTH SEMESTER

S.N	Course Code	Course Title	Outcomes
1	BTM 501	Machine Design – I	Upon completion of this course, students will get an overview of the design methodologies employed for the design of variousmachine components.
2	BTM 502	Metrology	Upon completion of this course, students will be able to the tooling needed for manufacturing, the dimensional accuracy and tolerances of products, assembly of different components and the application of optimization methods in manufacturing.

3	BTM 503	Measurements &Controls	After completing this course, the students will be able to • Identify and select proper measuring instrument for specificapplication. • Illustrate working principle of measuring instruments. • Explain calibration methodology and error analysis related tomeasuring instruments. • Mathematically model and analyze system/process for standard input responses.
4	BTM 504	Relational Database Management System	At the end of this course the students should be able to: · Demonstrate an understanding of the elementary & advancedfeatures of DBMS & RDBMS · Develop a clear understanding of the conceptual frameworksand definitions of specific terms that are integral to the Relational Database Management Systems · Attain a good practical understanding of the SQL · Develop clear concepts about Relational Model.
5	BTM 505	Microprocesso rSystem	Upon completing this course the student should: a. Be able to name the basic components of any computersystem. b. Be able to explain the difference between von Neumannand Harvard architecture. c. Be able to write short programs using either op-codes ormnemonics. d. Be able to explain the difference between a low-level language and a high-level language.
6	BTM 520	Machine Design Lab – I	After completion of course student will develop practical understanding and applications of fundamental concept of frequency and time period of vibrations under free vibration, critical speed of shaft, functioning of governor, cams & followers and gyroscopic couples.
7	BTM 521	Metrology Lab	Student will become familiar with the different instruments thatare available for linear, angular, roundness and roughness measurements they will be able to select and use the appropriate measuring instrument according to a specific requirement (in terms of accuracy, etc.)
8	BTM 522	Measurements &Controls Lab	Students will be able to select proper measuring instrument andknow requirement of calibration, errors in measurement etc.
9	BTM 523	Microprocesso rSystem Lab	1 To familiarize with the assembly level programming2 Design circuits for various applications using microcontrollers
10	BTM 524	Programming Lab -II (MAT Lab)	1 Ability to express programming & simulation for engineeringproblems. 2 Ability to find importance of this software for Lab Experimentation. 3 Articulate importance of software's in research by simulationwork. 4 In-depth knowledge of providing virtual instruments on LabVIEW Environment. 5 Ability to write basic mathematical ,electrical ,electronic problems in Matlab.

S.No	Course Code	Course Title	Outcomes
11	BTM 525	Relational Database Management SystemLab	At the end of this course the students should be able to: · Demonstrate an understanding of the elementary & advancedfeatures of DBMS & RDBMS · Develop a clear understanding of the conceptual frameworksand definitions of specific terms that are integral to the Relational Database Management Systems · Attain a good practical understanding of the SQL · Develop clear concepts about Relational Model.
12	BTM 541	Communicatio nSkills - III	• Communicate fluently and sustain comprehension of an extended discourse. • Demonstrate ability to interpret texts and observe the rules ofgood writing. • Prepare and present effective presentations aided by ICT tools.
13	BTM 543	Behavioural Science –V	• Students will Develop critical and reflective thinking abilities • Students will Demonstrate an understanding of group dynamics and effective teamwork • Student will develop a range of leadership skills and abilitiessuch as effectively leading change, resolving conflict, and motivating others • Student will Gain knowledge and understanding of organization resources, policies, and involvement opportunities. • Student will Develop strategies to recruit, retain, and continually motivate contributing members to the organization
14		Foreign Language -V	• le présent (révision), le passé composé (révision) • les pronoms compléments directs, les pronoms complémentsindirects
	BTM 544	French	
	BTM 550	Industrial Practical Training (Evaluation)	After successful completion of the course, the students will beable to • Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. • Manage the technical content and work. • Learn the various administrative process followed in industry. • Prepare and present technical report.

SIXTH SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BTM 601	Management of Manufacturing Systems	Upon completion of this course, students will be able to the tooling needed for manufacturing, assembly of different components and the application of optimization methods in manufacturing.
2	BTM 602	Machine Design – II	Upon completing this course, the students will be able to designtransmission systems for engines and machines.
3	BTM 603	Fluid Power Systems	Upon the completion of this course students will be able to apply basic principles to fluid flow problems and to evaluate performance of hydraulic machines (turbines and pumps).

4	BTM 604	Metal Cutting &Tool Design	Upon completion of this course, students will be able to the tooling needed for manufacturing, assembly of different components and the application of optimization methods in manufacturing.
5	BTM 605	IC Engine & Gas Turbine	• Understand working and performance of IC Engines throughthermodynamic cycles. • Understand combustion phenomena in SI and CI engines andfactors influencing combustion chamber design. • Outline emission formation mechanism of IC engines, its effects and the legislation standards. • Understand working principles of instrumentation used for engine performance and emission parameters. • Evaluate methods for improving the IC engine performance. • Understand the latest developments in IC Engines and alternate fuels
6	BTM 606	Computer Networks	After completing this course the student must demonstrate theknowledge and ability to: 1. Independently understand basic computer network technology. 2. Understand and explain Data Communications System andits components. 3. Identify the different types of network topologies and protocols. 4. Enumerate the layers of the OSI model and TCP/IP. Explainthe function(s) of each layer
7	BTM 620	Machine Design Lab - II	The students will able to design transmission systems for engines and machines.
8	BTM 621	Fluid Power Systems Lab	After the completion of course student will be able to measure the performance of pumps and turbines. Students will be able to understand the cavitation and water hammering
9	BTM 622	Metal Cutting &Tool Design Lab	Upon completion of this course, students will be able to the tooling needed for manufacturing, assembly of different components and the application of optimization methods in manufacturing.
10	BTM 623	Computer Aided Drafting & DesignLab	At the end of the course, the student will be able to: Master theusage of Autocad commands for drawing 2D & 3D building drawings required for different civil engg applications. Introduction to computer aided drafting Software for CAD – Introduction to different softwares Practice exercises on CAD software Drawing of plans of buildings using software a) Single storied buildings b) multi storied buildings
11	BTM 641	Communicatio nSkill – IV	• To communicate contextually in specific personal and professional situations with courtesy. • To inject humour in their regular interactions. • To strengthen their creative learning process through individual expression and collaborative peer activities.
12	BTM 643	Behavioural Science – VI	• Student will able demonstrate thorough understanding of stress and its effects • Student will able to learn various coping strategies to deal stress effectively so to overcome the consequences and impact of stress on their health and wellbeing, ultimately it will

S.No	Course Code	Course Title	Outcome
13	BTM 644	Foreign Language - French	• Le présent (révision) • Les prépositions et les verbes • Les pronoms possessives • Les verbes réciproques

Previous row content (continuation): enhance their performance

SEVENTH SEMESTER

S.No	Course Code	Course Title	Outcome
1	BTM 701	Operations Research	• To familiarize students with the basic concepts, models andstatements of the operations research theory. • Know principles of construction of mathematical models ofconflicting situations and mathematical analysis methods of operations research; • Be able to choose rational options in practical decision-making problems using standard• mathematical models of operations research; • Have skills in analysis of operations research objectives, mathematical methods and• computer systems.
2	BTM 702	Computer Aided Manufacturing	• Understand the importance of CAD/CAM principles in the Product development. • Develop programs related to manufacturing using codes. • Analyze the importance of networking in manufacturing environment.
3	BTM 703	Mechatronics	• Identify the elements of mechatronics system. • Select suitable sensors, actuators and controllers to meet specific requirements. • Demonstrate intelligent mechatronics system for engineeringapplications.
4	BTM 720	Operations Research (Programming) Lab	• Solve the problems using special solution algorithms. • Use CPM and PERT techniques, to plan, schedule, and control project activities. • Analyse the general nonlinear programming problems. • Formulate the nonlinear programming models.
5	BTM 721	Computer Aided Manufacturing Lab	• On successful completion of the course, the student will beable to, • Explain lifecycle of a product and the role of computer-aidedManufacturing (CAM) in product development. • Describe the concepts of geometric and solid modeling. • Visualize geometric models through animation and transformthem into real world systems.
6	BTM 722	Mechatronics Lab	On successful completion of the course, the student will be able to describe mechatronic systems and overview of control systems & actuators. To differentiate between various sensors,transducers and actuators and their applications. To relate various signal conditioning units, amplifiers, logic gates and their role in programmable logic controllers.
7	BTM 741	CommunicationSkills – V	Student Learning Outcomes: • Conduct all business activities related to the workplacewith technical efficiency. • Contribute positively to the overall growth of the

			organization.
8	BTM 743	Behavioural Science – VII	• Students develop the ability to identify suitable career options and to create a suitable career plan based on the utilization of the counseling process, assessment tools, and other resources. • Students will know how to assess their skills, interests andvalues. • Students will know how to make informed career choices based on their self- assessment. Students will know how to explore relevant career options andbuild skills pertinent to those of greatest interest.
9		Foreign Languag e -VII	Grammaire : 1. Le pronom " en " 2. La place de l'adjectif
	BTM 744	French	3. Le présent progressif 4. Le passé récent 5. Le futur proche (révision) 6. Le comparatif et le superlatif
12	BTM 750	Industrial Training (Evaluation)	After successful completion of the course, the students will beable to 1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. 2. Manage the technical content and work. 3. Learn the various administrative process followed in industry. 4. Prepare and present technical report.
13	BTM 760	Project (Dissertation)	1. Demonstrate a sound technical knowledge of their selectedproject topic. 2. Undertake problem identification, formulation and solution. 3. Design engineering solutions to complex problems utilisinga systems approach. 4. Conduct an engineering project 5. Communicate with engineers and the community at large inwritten an oral forms. 6. Demonstrate the knowledge, skills and attitudes of a professional engineer. 7. Write comprehensive report on project work.
14	**ELECTIVES (Any one from each category)**		
	A (With Practical)		
	BTM 704	Automotive Engineering	Upon completion of this course, students will understand the function of each automobile component and also have a clear idea about the overall vehicle performance.
	BTM 705	Computer Aided Designing	Upon completion of this course, the students can use computerand CAD software for modeling mechanical components.
	BTM 723	Automotive Engineering Lab	• Ability to dismantle and assemble the automobile components • Understand different types of frames used in various Automobiles • Understand the petrol engine fuel system.
	BTM 724	Computer Aided Designing Lab	• To develop different types of surfaces with the help of different curves • Suggest whether the given component is safe or not for theapplied loading conditions • Select suitable manufacturing method for different

15			mechanical components using CAM software.
			ELECTIVES (Any one from each category)
			B (Without Practical)
	BTM 706	Marketing Management	• This course is taught with both strategic and managerial focus. • Through cases, discussions, exercises and activities, participants would be given opportunities to perform the roleof a marketing manager. • At the end of this course, participants should have acquiredanalytical skills in solving marketing related problems and challenges and be familiar with the strategic marketing management process.
	BTM 707	Solar Energy	• Ability to recognize the need of renewable energy technologies and their role in the Greece and world energy demand. • Ability to distinguish between the sustainable energy sourcesand fossil energy sources with emphasis on wind and photovoltaic systems. • Knowledge of the operating principles of renewable energy production from various renewable sources, especially.
	BTM 708	Power Plant Practices	After completion of this course, the students should be able to: • Discuss the energy resources and energy conversion methodsavailable for the production of electric power in India. • Determine the efficiency and output of a modern Rankine cycle steam power plant from given data, including superheat,reheat, regeneration, and irreversibility • Calculate the heat rate, fan power consumption, flame temperature and combustion air requirements of conventionalsteam generators (boilers). • Select the heat transfer tubes needed for condensers and feedwater heaters • Explain the blade shapes, and calculate work output of typical turbine stages.
	BTM 709	Combustion Engine Emissions	• Differentiate among different internal combustion engine designs • Recognize and understand reasons for differences among operating characteristics of different engine types and designs • Given an engine design specification, predict performance and fuel economy trends with good accuracy • Based on an in-depth analysis of the combustion process, predict concentrations of primary exhaust pollutants • Exposure to the engineering systems needed to set-up and runengines in controlled laboratory environments • Develop skills to run engine dynamometer experiments. • Differentiate among different internal combustion engine designs • Recognize and understand reasons for differences among operating characteristics of different engine types and designs

EIGHTH SEMESTER

S.No.	Course Code	Course Title	Outcomes
1	BTM 801	Quality Control &Quality Assurance	To pass this subject the student will be able to: • Explain the different meanings of the quality concept and its

			influence. • Describe, distinguish and use the several techniques and quality management tools. • Explain and distinguish the normalization, homologation andcertification activities. • Identify the elements that are part of the quality measuring process in the industry.
2	BTM 802	Refrigeration & Air-conditioning	A student will have a good understanding of the working principles of refrigeration and air-conditioning systems.
3	BTM 820	Refrigeration & Air-conditioning Lab	After completion of course student will be able to evaluate theperformance of refrigerator and air conditioning system.
4		**Electives (Any one from following with Practical)**	
5	BTM 803	Advanced Methodsof Manufacturing	• Student should be able to select appropriate manufacturing processes for advanced components with characterization of work pieces. • Student should be able to understand Various Advanced manufacturing metal forming Processes Student should be able to understand to select proper Advanced Manufacturing process for welding, casting and forging
6	BTM 804	Gear Technology	• Transmission through Gears: mechanism, gear trains, classification and analysis, familiarity with gear standardization. • Power transmission through gear train, mechanism and materials. • Gear set design, gear train and gear teeth.
7	BTM 805	Artificial Intelligence & Robotics	Upon completion of this course, students will get an overviewof artificial intelligence applicationsand the use of micro- sensors and microprocessors
8	BTM 821	Advanced Methodsof Manufacturing Lab	• Student should be able to understand selection of latest additive manufacturing processes • Student should be able to understand and select various measurement techniques in micro machining processes
9	BTM 822	Gear TechnologyLab	On successful completion of the course, the student will be ableto, • Explain the basic principles of gears. • Demonstrate the design process of commonly used gears. • Recognize the standards used in design of gears. • Analyze the force acting on the gears.
10	BTM 823	Artificial Intelligence & Robotics Lab	After study this course, students will be able to design robots and machine which are able to understand human and its working style and strategies.
11	BTM 841	CommunicationSkills - VI	Students will be able to: • Students will be able to navigate cross cultural encounters in aglobal economy. • Facilitate students to develop learning to construct and delivermessages that incorporate the appropriate use of organizing content, language, vocabulary, kinesics, eye contact, appearance, visual aids, and time constraints.
12	BTM 843	Behavioural Science - VIII	have a great deal of insight into one's character. Understanding of positive emotions
13		Foreign Language -VIII	Foreign Language-communication skills
14	BTM 844	French	
15	BTM 860	Project (Dissertation)	On successful completion of the course students will be able to: • Apply critical and creative thinking in the design of

			engineering projects
			• Plan and manage time effectively as a team. • Consider the business context and commercial positioning ofdesigned devices or systems. • Apply knowledge of the 'real world' situations that a professional engineer can encounter. • Use fundamental knowledge and skills in engineering and apply it effectively on a project. • Design and develop a functional product prototype while working in a team. • Use various tools and techniques to study existing systems. • Achieve precision in uses of the tools related to their experiments/fabrication. • Timely reflect on peers' technical and non-technical learning.

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BCA
Programme Educational Objectives

Graduates of the programme BCA will

PEO 1: Graduates will demonstrate proficiency in computer science and application development, enabling them to secure employment in diverse sectors of the information technology industry.

PEO 2: Graduates will develop strong problem-solving and analytical skills to design, implement, and evaluate computer-based solutions.

PEO 3: Graduates will possess effective communication skills and the ability to work collaboratively as part of a team.

PEO 4: Graduates will adhere to ethical principles and professional standards, recognizing the social implications of computing, and demonstrating responsibility in their roles.

Programme Outcomes:

[PO.1].Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. 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

[PO.4]. 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

[PO.5].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

[PO.6]. 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

[PO.7]. 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

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms

of the engineering practices

[PO.9]. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multi disciplinary settings

[PO.10].Communication:Communicateeffectivelyoncomplexengineeringactivitieswiththeengineeringcommunity and with society at large, such as, being able to comprehend and write effective reports anddesigndocumentation,makeeffectivepresentations,andgiveandreceiveclearinstructions

[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 multi disciplinary 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 Outcomes

PSO1.Professional Skills: An 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.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An 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 OUTCOMES

FIRST SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BCA 101	Mathematics - I	Students completing this course will be able to: • Understand the basic principles of sets and operations in sets. • Demonstrate an understanding of functions and be able to determine their properties. • Compute the expression for the derivative of a function using the rules of differentiation including the power rule, product rule, and quotient rule and chain rule. • Evaluate integrals of rational functions using different methods. • Solve basic application problems described by second order linear differential equations with constant coefficients. • Perform matrix algebra.
2	BCA 102	Discrete Mathematical Structures with Applications to CS	• For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives • For a given a problem, derive the solution using deductive logicand prove the solution based on logical inference. • For a given a mathematical problem, classify its algebraic structure • Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra. • Develop the given problem as graph networks and solve with techniques of graph theory.

				At the end of this course, students are able to
3	BCA1 03	Computer Fundamentals & Programming Concepts		- Understanding about Computer System. - Identify all parts of the computer system and functioning of computer - Knowledge about software, its type and its uses. - Work efficiently in word processing, spreadsheet andpresentation software.
4	BCA1 04	Digital Electronic		- At the end of this course, students will demonstrate the ability to - Understand working of logic families and logic gates. - Design and implement Combinational and Sequential logic circuits. - Understand the process of Analog to Digital conversion and Digital to Analog conversion. - Be able to use PLDs to implement the given logical problem.
5	BCA 105	Principles of Management		- At the end of this course, students will understand managementprinciples for organizational setup. - Understand the types of organizational structures and design. - Design and implement the management processes for specific organization. - Understand the relevance of computer applications in different functional areas of managent.
6	BCA 106	Environmental Studies-I		- The multidisciplinary nature of environmental studies, including its definition, scope and need for public awareness. - Our natural resources including renewable and non-renewable resources comprising of forest, water, mineral, food, energy and land resources. - The ecosystem, their structure and function, energy flow, bio-geochemical cycles, community ecology, ecological succession, ecological pyramids, forest, grassland, aquatic and tundra ecosystem. - Biodiversity and its conservation. - Ecosystem diversity, species diversity and genetic diversity. - Biological classification of India. - Value of biodiversity. - Biodiversity at global national and local level. - Conservation of biodiversity. - Characteristic of ideal ecosystem. - Study of an artificial ecosystem.
7	BCA1 20	C Programming Lab		- To formulate the algorithms for simple problems - To translate given algorithms to a working and correct program - To be able to correct syntax errors as reported by the compilers - To be able to identify and correct logical errors encountered atrun time - To be able to write iterative as well as recursive programs - To be able to represent data in arrays, strings and structures andmanipulate them through a program
8	BCA1 40	English		- The students should be able to : - Identify Common Errors and Rectify Them - Develop and Expand Writing Skills Through Controlled and Guided Activities - To Develop Coherence, Cohesion and Competence in Oral Discourse through Intelligible Pronunciation.
9	BCA1 43	Behavioural Science - I		Student will Develop accurate sense of self

			• Student will nurture a deep understanding of personal motivation
			• Student will develop thorough understanding of personal and professional responsibility
			• Student will able to analyse the emotions of others for better adjustment.
10	BCA 144 BCA 145	Foreign Language - IFrench German	• articles indéfinis, articles définis, masculin et féminin des nomset des adjectifs, pluriel des noms et des adjectifs
			• pronoms sujets et toniques, on, c'est/il est + profession,
			• masculin et féminin des adjectifs de nationalité
			• verbes- être, avoir, aller, 'er' groupe
			• l'interrogation – l'intonation, est-ce que, qui est-ce ? Qu'est-ceque? L'inversion ; où, comment, quand ; quel
			• la négation
			• adjectifs possessifs

SECOND SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BCA201	Mathematics - II	• Understand the arithmetical properties of the rational and real numbers.
			• Calculate the limit of a function at a point algebraically
			• Use the definition of continuity to determine if a function is continuous at a point, on an open or on a closed interval
			• Determine convergence and divergence of infinite sequences andseries.
			• Identify the extrema of a function on an interval and classify themas minima, maxima or saddles using the first derivative test.
			• Understand the consequences of Rolle's theorem and the MeanValue theorem for differentiable functions
2	BCA202	Data & File Structures Using C	• Ability to choose appropriate data structures to represent data items in real world problems.
			• Ability to analyze the time and space complexities of algorithms.
			• Ability to design programs using a variety of data structures suchas stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees.
			• Able to analyze and implement various kinds of searching and sorting techniques.
3	BCA203	Computer Architecture & Assembly Language	• Ability to understand basic structure of computer.
			• Ability to perform computer arithmetic operations.
			• Ability to understand control unit operations.
			• Ability to design memory organization that uses banks for different word size operations.
			• Ability to understand the concept of cache mapping techniques.
			• Ability to understand the concept of I/O organization.
4	BCA 204	Production & Operations Management	• Understand the basic principles of production and operation management for organization.
			• Understand the functioning of supply chain management and quality assurance.
5	BCA205	Systems Analysis &Design	• Analyze the asymptotic performance of algorithms.
			• Write rigorous correctness proofs for algorithms.
			• Demonstrate a familiarity with major algorithms and data structures.
			• Apply important algorithmic design paradigms and methods of

			analysis.
			• Synthesize efficient algorithms in common engineering design situations
6	BCA 206	Environmental Studies-II	• Explain various types of environmental pollutions. • Understand role of individual in abatement of environmental pollution. • Explain methods to mitigate disasters. • Learn various environmental protection laws. • Learn role of IT in environment and human health.
7	BCA 220	Data Structures & Microprocessors Lab	• Ability to choose appropriate data structures to represent data items in real world problems. • Ability to analyze the time and space complexities of algorithms. • Ability to design programs using a variety of data structures suchas stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees. • Able to analyze and implement various kinds of searching and sorting techniques.
8	BCA 240	English	The student will be able to write an impressive resume and face the interview confidently.
9	BCA 243	Behavioural Science - II	▪ Student will be able to identify, understand, and apply contemporarytheories of leadership to a wide range of situations and interactions ▪ Student will be able to understand and respect individual difference,so to enhance the relationship ▪ Learn social responsibility and develop a sense of citizenship ▪ Student will be able to identify and understand the impact of cultureon one's leadership style
10	BCA 244 BCA 245	Foreign Language - IIFrench German	▪ expression du temps ▪ les articles contractés, les quantités indéterminées et déterminées ▪ les adverbes de fréquences ▪ verbes- faire, prendre, venir, pouvoir, vouloir, les verbespronominaux ▪ la comparaison de l'adjectif ▪ la négation (suite) ▪ le future proche

THIRD SEMESTER

S.N	Course Code	Course Title	Outcomes
1	BCA 301	Computer Oriented Statistical & OptimizationMethods	Students completing this course will be able to: Learn the statistical and optimization methods, in particular, with reference to frequency distribution and measures of central tendency, measures of dispersion, skew ness and kurtosis, · learn theory of probability, linear programming problems, transportation, assignment and game problems. · learn important theorems, different formulae and practical applications of these statistical and optimization methods in the field of Computer Sciences and Applications.
2	BCA 302	Object Oriented Programming ConceptsUsing C++	• To apply concepts of classes and objects in real world scenarios. • Understand object-oriented programming features in C++, • Apply these features to program design and implementation, • Understand object-oriented concepts and how they are supportedby C++, • Gain some practical experience of C++.
3	BCA 303	Database Management	• Describe DBMS architecture, physical and logical database

		Systems	designs, database modeling, relational, hierarchical and network models. • Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing. • Learn and apply Structured query language (SQL) for database definition and database manipulation. • Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. • Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.
4	BCA 304	Operating Systems	• Analyze various scheduling algorithms. • Understand deadlock, prevention and avoidance algorithms. • Compare and contrast various memory management schemes. Understand the functionality of file systems
5	BCA 305	Accounting & Financial Management	After completing three years for BCA program, students would gain a thorough grounding in the fundamentals of Commerce and Finance. The commerce and finance focused curriculum offers a number of specializations and practical exposures which would equip the student to face the modern-day challenges in commerce and business.
6	BCA 320	C++ & DBMS Lab	• At the end of lab session students would be able to design the Database application for the real life projects. • Students would be able to perform insertion, deletion and updation operation on Databases.
7	BCA 341	Communication Skills - I	The students should be able to write correctly and properly with special reference to Letter writing
8	BCA 343	Behavioural Science - III	▪ Student will be able to understand and solve the problems effectivelyin their personal and professional life. ▪ Students will outline multiple divergent solutions to a problem, ▪ Student will able to create and explore risky or controversial ideas,and synthesize ideas/expertise to generate innovations
9	BCA 344 BCA 345	Foreign Language - IIIFrench German	▪ les adjectifs démonstratifs ▪ les verbes : 'ir groupe' devoir, falloir ▪ les prépositions de lieu, de pays ▪ l'impératif, le passé composé, forme et accord du participe passé, lanégation au passé composé ▪ les indicateurs de temps (il y a, depuis)
10	BCA 360	Summer Project – I (Evaluation)	After successful completion of the course, the students will be able to 1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. 2. Manage the technical content and work. 3. Learn the various administrative process followed in industry. 4. Prepare and present technical report

FOURTH SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BCA 401	Computer Oriented Numerical Methods	• The objective of this course is to familiarize the students withnumerical techniques. It aims to equip the students with standard

			concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
			• Numerical techniques to solve simultaneous linear equations, interpolation and extrapolation.
			• Numerical techniques of differential and integral. Solution of ordinary differential equation by numerical techniques.
2	BCA 402	Software Engineering	• Ability to design the proper documentation of software product.
			• Ability to implement the cost estimation modelling approaches.
			• Ability to use the unified modelling language as a tool.
3	BCA 403	Computer Graphics	• Know and be able to describe the general software architecture of programs that use 3D computer graphics.
			• Know and be able to discuss hardware system architecture for computer graphics. This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators /co-processors.
			• Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).
4	BCA 404	Programming in VisualBasic	Demonstrate knowledge of programming terminology and how applied using Visual Basic (e.g., variables, selection statements, repetition statements, etc.) ☐ Develop a Graphical User Interface (GUI) based on problem description ☐ Develop an Event Planning Chart based on problem description so as to define the processing that is to occur based on specific events
5	BCA 405	Design & Analysis ofAlgorithms	• Analyze the asymptotic performance of algorithms.
			• Write rigorous correctness proofs for algorithms.
			• Demonstrate a familiarity with major algorithms and data structures.
			• Apply important algorithmic design paradigms and methods ofanalysis.
			• Synthesize efficient algorithms in common engineering design situations.
6	BCA 420	Computer Graphics &Visual Basic Lab	• Analyze the asymptotic performance of algorithms.
			• Write rigorous correctness proofs for algorithms.
			• Demonstrate a familiarity with major algorithms and data structures.
			• Apply important algorithmic design paradigms and methods ofanalysis.
			• Synthesize efficient algorithms in common engineering design situations.
7	BCA 441	Communication Skills –IV	• Develop a resume for oneself
			• Ability to handle the interview process on fidently
			• Learn the subtle nuances of an effective group discussion
8	BCA 443	Behavioural Science - IV	• Able to answer the question: What do I stand for?
			• Ability to apply a coherent set of moral principles within professional and specialized contexts
			• Willing to make unpopular but right decision
			• Committed to working for justice and peace locally and globall
9	BCA 444 BCA 445	Foreign Language - IVFrench German	• imparfait,
			• la comparaison du verbe/du nom ; mieux/meilleur
			• les pronoms relatifs
10			☐

FIFTH SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BCA 501	Computer Communications &Networking	- Show clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching,circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking. - Demonstrate the ability to unambiguously explain networking as it relates to the connection of computers,media, and devices (routing). - Able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities. Able to identify limitations of typical communication systems. - Able to differentiate among and discuss the four levelsof addresses (physical, logical, port, and specific used by the Internet TCP/IP protocols. - Understand the concept of reliable and unreliable transfer protocol of data and how TCP and UDP implement these concepts - Developing the understanding of various advanced techniques like ISDN,ATM and wifi.
2	BCA 502	Java Programming	- Students can perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members - Students can demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance - Students can demonstrate ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solution of problems - Students can demonstrate ability to implement multithreading in the programming. - To learn syntax and features of exception handling - Students can demonstrate the ability to implement solution to various I/O manipulation operations and the ability to create two-dimensional graphic components using Swings. - To demonstrate the ability to handle Events in the Programming
3	BCA 503	Systems Software	After successful completion of this course, student will be able to – understand fundamentals of language processing and grammar – apply knowledge of compilation and code optimization steps tomimic a simple compiler – demonstrate the working of various system software like assembler, loader, linker, editor and device driver
4	BCA 504	UNIX Operating System & ShellProgramming	- Analyze various scheduling algorithms. - Understand deadlock, prevention and avoidancealgorithms.

			• Compare and contrast various memory managementschemes. • Understand the functionality of file systems**.**
5	BCA 520	Java & Unix Programming Lab	• Identify the basic Unix general purpose commands. • Apply and change the ownership and file permissionsusing advance Unix commands. • Use the awk, grep, perl scripts. • Implement shell scripts and sed. • Apply basic of administrative task.
6	BCA 541	Communication Skills - III	• Communicate fluently and sustain comprehension of anextended discourse. • Demonstrate ability to interpret texts and observe the rules of good writing. • Prepare and present effective presentations aided by ICTtools.
7	BCA 543	Behavioural Science - V	▪ Students will Develop critical and reflective thinking abilities ▪ Students will Demonstrate an understanding of group dynamics and effective teamwork ▪ Student will develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, andmotivating others ▪ Student will Gain knowledge and understanding of organization resources, policies, and involvement opportunities. ▪ Student will Develop strategies to recruit, retain, and continually motivate contributing members to the organization
8	BCA 544 BCA 545	Foreign Language - V French German	• le présent (révision), le passé composé (révision) • les pronoms compléments directs, les pronoms compléments indirects • les marqueurs chronologiques • les articulateurs logiques
9	BCA 560	Summer Project – II (Evaluation)	After successful completion of the course, the students will be able to 1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. 2. Manage the technical content and work. 3. Learn the various administrative process followed in industry. Prepare and present technical report.

SIXTH SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BCA 601	Multimedia & its Applications	• Able to understand the concepts of multimedia and itsframework. • Able to implement the digital representation of audio and videos. • Able to understand the how we perform video and image compression using multimedia.
2	BCA 602	Web Technologies	• Understand different components in web technology and to know about CGI and CMS. • Develop interactive Web pages using HTML/XHTML. • Present a professional document using Cascaded StyleSheets. • Construct websites for user interactions using JavaScript and JQuery. • Develop Web applications using PHP.
3	BCA 603	Introduction to Open Source Technologies (PHP, MySql)	
4	BCA 620	Multimedia & Web Technologies Lab	• Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's. • Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and otherweb services. • Get introduced in the area of Online Game programming.
5	BCA 621	Introduction to Open Source Technologies (PHP, MySql) Lab	• Ability to create client-server application for real world problems. • Ability to apply Regular Expression, CGI and Database. • Ability to apply GUI Programming in real world problems.
6	BCA 641	Communication Skills - IV	• To communicate contextually in specific personal andprofessional situations with courtesy. • To inject humour in their regular interactions. • To strengthen their creative learning process through individual expression and collaborative peer activities.
7	BCA 643	Behavioural Science - VI	• Student will able demonstrate thorough understanding of stress and its effects • Student will able to learn various coping strategies to deal stress effectively so to overcome the consequencesand impact of stress on their health and wellbeing, ultimately it will enhance their performance.
8	BCA 644 BCA 645	Foreign Language - VI French German	• Le présent (révision) • Les prépositions et les verbes • Les pronoms possessives • Les verbes réciproques
9	BCA 660	Project Work	On successful completion of the course students will be able to: 1. Demonstrate a sound technical knowledge of their selected project topic. 2. Undertake problem identification, formulation andsolution. 3. Design engineering solutions to complex problems

			utilising a systems approach.
			4. Conduct an engineering project
			5. Communicate with engineers and the community at largein written an oral forms.
			6. Demonstrate the knowledge, skills and attitudes of a professional engineer.
			Write comprehensive report on project work.

FIRSSEMESTER:

S. N o.	Course Code	Course Name	Course Outcome
1	BCA 101	Computer Fundamentals and OfficeAutomation	At the end of this course, students are able to • Understanding about Computer System. • Identify all parts of the computer system and functioning of computer • Knowledge about software, its type and its uses. • Work efficiently in word processing, spreadsheetand presentation software.
2	CSE 104	Programming for Problem Solving	The student will learn • To formulate simple algorithms for arithmetic and logical problems. • To translate the algorithms to programs (in C language). • To test and execute the programs and correct syntaxand logical error • To implement conditional branching, iteration and recursion. • To decompose a problem into functions and synthesize a complete program using divide and conquer approach. • To use arrays, pointers and structures to formulate algorithms and programs. • To apply programming to solve matrix addition and multiplication problems and searching and sorting problems. • To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration
3	MAT 102	Mathematics – I	Students completing this course will be able to: • Understand the basic principles of sets and operations in sets. • Demonstrate an understanding of functions and be able to determine their properties. • Compute the expression for the derivative of a function using the rules of differentiation including the power rule, product rule, and quotient rule and chain rule. • Evaluate integrals of rational functions using different methods. • Solve basic application problems described by second order linear differential equations with constant coefficients. • Perform matrix algebra.
4	ECE 306	Digital Electronics and Logic Design	• At the end of this course, students will demonstratethe ability to • Understand working of logic families and logic gates. • Design and implement Combinational andSequential logic circuits. • Understand the process of Analog to Digital conversion and Digital to Analog conversion. • Be able to use PLDs to implement the given logicalproblem.
5	BCH 110	Principles of Management	• At the end of this course, students will understandmanagement principles for organizational setup. • Understand the types of organizational structures anddesign. • Design and implement the management processes

			for specific organization. • Understand the relevance of computer applicationsin different functional areas of managent.
6	BCA 121	Office Automation Lab	At the end of this course, students are able to • Understanding about Computer System. • Identify all parts of the computer system and functioning of computer • Knowledge about software, its type and its uses. • Work efficiently in word processing, spreadsheetand presentation software.
7	CSE 124	Programming for Problem SolvingLab	• To formulate the algorithms for simple problems • To translate given algorithms to a working and correct program • To be able to correct syntax errors as reported by thecompilers • To be able to identify and correct logical errors encountered at run time • To be able to write iterative as well as recursive programs • To be able to represent data in arrays, strings and structures and manipulate them through a program • To be able to declare pointers of different types anduse them in defining self- referential structures. • To be able to create, read and write to and from simple text files.
8	ECE 326	Digital Electronics and Logic DesignLab	After studying this course the students would gain enough knowledge. • To have thorough understanding of the fundamentalconcepts and techniques used in digital electronics. • To understand and examine the structure of variousnumber systems and its application in digital design. • The ability to understand, analyze and design variouscombinational and sequential circuits. • Ability to identify basic requirements for a designapplication and propose a cost-effective solution. • To develop skill to build and troubleshoot digital circuits.
9	BCU 141	Communication Skills – I	The students should be able to : • Identify Common Errors and Rectify Them • Develop and Expand Writing Skills Through Controlled andGuided Activities • To Develop Coherence, Cohesion and Competence in OralDiscourse through Intelligible Pronunciation.

			Upon course completion, students will be able to understand:
1 0	EVS 142	Environmental Studies – I	- The multidisciplinary nature of environmental studies, including its definition, scope and need for public awareness. - Our natural resources including renewable and non- renewable resources comprising of forest, water, mineral, food, energy and land resources. - The ecosystem, their structure and function, energy flow, bio-geochemical cycles, community ecology, ecological succession, ecological pyramids, forest, grassland, aquatic and tundra ecosystem. - Biodiversity and its conservation. - Ecosystem diversity, species diversity and genetic diversity. - Biological classification of India. - Value of biodiversity. - Biodiversity at global national and local level.

			• Conservation of biodiversity. • Characteristic of ideal ecosystem. • Study of an artificial ecosystem.
11	BSU 143	Behavioural Science – I	• Student will Develop accurate sense of self • Student will nurture a deep understanding of personal motivation • Student will develop thorough understanding of personaland professional responsibility • Student will able to analyse the emotions of others for better adjustment.
12	FLU 144	French – I	1. articles indéfinis, articles définis, masculin et féminin desnoms et des adjectifs, pluriel des noms et des adjectifs 2. pronoms sujets et toniques, on, c'est/il est + profession, 3. masculin et féminin des adjectifs de nationalité 4. verbes- être, avoir, aller, 'er' groupe 5. l'interrogation – l'intonation, est-ce que, qui est-ce ? Qu'est-ce que? L'inversion ; où, comment, quand ; quel 6. la négation 7. adjectifs possessifs

SECOND SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	MAT 202	Mathematics – II	Students completing this course will be able to: • Understand the arithmetical properties of the rational and real numbers. • Calculate the limit of a function at a point algebraically • Use the definition of continuity to determine if a function is continuous at a point, on an open or on a closed interval • Determine convergence and divergence of infinite sequences and series. • Identify the extrema of a function on an interval and classify them as minima, maxima or saddles usingthe first derivative test. • Understand the consequences of Rolle's theorem and the Mean Value theorem for differentiable functions
2	CSE 204	Object Oriented Programming UsingC++	At the end of this course, students will demonstrate ability to: • To apply concepts of classes and objects in real world scenarios. • Understand object-oriented programming features inC++, • Apply these features to program design and implementation, • Understand object-oriented concepts and how theyare supported by C++, • Gain some practical experience of C++.
3	CSE 402	Computer Organization and Architecture	• Ability to understand basic structure of computer. • Ability to perform computer arithmetic operations. • Ability to understand control unit operations. • Ability to design memory organization that uses banks for different word size operations. • Ability to understand the concept of cache mappingtechniques. • Ability to understand the concept of I/O organization. • Ability to conceptualize instruction level parallelism
4	BME 103	Production & Operations Management	☐ Understand the basic principles of production and operation management for organization. ☐ Understand the functioning of supply chain management and quality assurance.
5	CSE 505	Introduction to Web Technologies	The student will be able to ☐ Understand different components in web technologyand to know about CGI and CMS. ☐ Develop interactive Web pages using HTML/XHTML. ☐ Present a professional document using Cascaded Style Sheets. ☐ Construct websites for user interactions using JavaScript and JQuery. ☐ Develop Web applications using PHP.
6	CSE 224	Object Oriented Programming UsingC++ Lab	At the end of this course, students will demonstrate ability to: • knowledge of the structure and model of the C++ programming language, (knowledge) • evaluate user requirements for software

			functionalityrequired to decide whether the C++ programming

			language can meet user requirements (analysis)
			• design the object-oriented programs for real world problems.
7	CSE 525	Web Technologies Lab	At the end of the course, students should be able to: • Design and implement dynamic websites with goodaesthetic sense of designing and latest technical know-how's. • Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce andother web services. • Get introduced in the area of Online Game programming
8	BCU 241	Communication Skills – II	The students should be able to : • Apply Verbal and Non-Verbal Communication Techniques in the Professional Environment
9	EVS 242	Environmental Studies – II	Upon course completion, students will be able to: • Explain various types of environmental pollutions. • Understand role of individual in abatement of environmental pollution. • Explain methods to mitigate disasters. • Learn various environmental protection laws. • Learn role of IT in environment and human health.
10	BSU 243	Behavioural Science – II	▪ Student will be able to identify, understand, and apply contemporary theories of leadership to a wide range of situations and interactions ▪ Student will be able to understand and respect individual difference, so to enhance the relationship ▪ Learn social responsibility and develop a sense of citizenship ▪ Student will be able to identify and understand the impact of culture on one's leadership style
11	FLU 244	French – II	• l'expression du temps • les articles contractés, les quantités indéterminéeset déterminées • les adverbes de fréquences • verbes- faire, prendre, venir, pouvoir, vouloir, lesverbes pronominaux • la comparaison de l'adjectif • la négation (suite) • le future proche

S. No.	Course Code	Course Name	Course Outcome
1	MAT 302	Computer Oriented Statistical & Optimization Methods	Students completing this course will be able to: • Learn the statistical and optimization methods, in particular, with reference to frequency distribution and measures of central tendency, measures of dispersion, skew ness and kurtosis, · learn theory ofprobability, linear programming problems, transportation, assignment and game problems. · learn important theorems, different formulae and practical applications of these statistical and optimization methods in the field of Computer Sciences and Applications.
2	CSE 401	Discrete Mathematics	• For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives • For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference. • For a given a mathematical problem, classify its algebraic structure • Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra. • Develop the given problem as graph networks and solve with techniques of graph theory.
3	CSE 202	Data Structures through C++	• Ability to choose appropriate data structures to represent data items in real world problems. • Ability to analyze the time and space complexities ofalgorithms. • Ability to design programs using a variety of data structures such as stacks, queues, hash tables, binarytrees, search trees, heaps, graphs, and B-trees. • Able to analyze and implement various kinds of searching and sorting techniques.
4	CSE 304	Database Management Systems	The student will learn • Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models. • Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing. • Learn and apply Structured query language (SQL) for database definition and database manipulation. • Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. • Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.
5	CSE 404	Operating Systems	At the end of the course, the students should be able to: • Analyze various scheduling algorithms. • Understand deadlock, prevention and avoidance algorithms. • Compare and contrast various memory managementschemes. • Understand the functionality of file systems.
6	CSE 222	Data Structures through C++ Lab	• Ability to identify the appropriate data structure forgiven problem. • Graduate able to design and analyze the time and

			space complexity of algorithm or program. • Ability to effectively use compilers includes libraryfunctions, debuggers and trouble shooting.
7	CSE 324	Database Management Systems Lab	• At the end of lab session students would be ableto design the Database application for the real life projects. • Students would be able to perform insertion, deletion and updation operation on Databases.
8	CSE 424	Operating Systems Lab	• Identify the basic Unix general purpose commands. • Apply and change the ownership and file permissions using advance Unix commands. • Use the awk, grep, perl scripts. • Implement shell scripts and sed. • Apply basic of administrative task.
9	BCU 341	Communication Skills –III	The students should be able to write correctly and properly with special reference to Letter writing.
10	BSU343	Behavioural Science – III	▪ Student will be able to understand and solve the problems effectively in their personal and professional life. ▪ Students will outline multiple divergent solutions to a problem, ▪ Student will able to create and explore risky or controversial ideas, and synthesize ideas/expertise to generate innovations.
11	FLU 344	French – III	• lesadjectifsdémonstratifs • lesverbes:'irgroupe'devoir,falloir • lesprépositionsdelieu,depays • l'impératif,lepassé composé,forme et accordduparticipe passé,lanégationaupassécomposé • les indicateursdetemps(il ya,depuis)

FOURTH SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	MAT 401	Computer Oriented Numerical Methods	After successful completion of this course, students will be able to • Students will be able to perform numericcomputations. • Students will be able to perform simultaneous linearequation and polynomial interpolation. • Students will be able to solve numerical differentiation and numerical solution of differentialequations.
2	CSE 601	Data Communication and ComputerNetworks	• Show clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking. • Demonstrate the ability to unambiguously explain networking as it relates to the connection of computers, media, and devices (routing). • Able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities. Able to identify limitations of typical communication systems. • Able to differentiate among and discuss the four levels of addresses (physical, logical, port, and specific used by the Internet TCP/IP protocols. • Understand the concept of reliable and unreliable transfer protocol of data and how TCP and UDP implement these concepts • Developing the understanding of various advanced techniques like ISDN,ATM and wifi.
3	CSE 602	Quantitative Aptitude	The student will be able: • Understand the basic concepts of QUANTITATIVE ABILITY • Understand the basic concepts of LOGICAL REASONING Skills • Acquire satisfactory competency in use of VERBAL REASONING • Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability. • Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.
4	CSE 604	Problem Solving Techniques – I	• Able to understand the concepts of data structure, data type and array data structure. • Able to implement linked list data structure to solvevarious problems. • Able to understand and apply various data structuresuch as stacks, queues, trees and graphs to solve various computing problems using C/C++ - programming language. • To apply concepts and techniques for implementation.
5	CSE 403	Java Programming	The student will learn • Students can perform object oriented programming

			solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members • Students can demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance • Students can demonstrate ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solution of problems • Students can demonstrate ability to implement multithreading in the programming. • To learn syntax and features of exception handling • Students can demonstrate the ability to implement solution to various I/O manipulation operations and the ability to create two-dimensional graphic components using Swings. • To demonstrate the ability to handle Events in the Programming
6	CSE 624	Problem Solving Techniques Lab – I	Able to write the program using different data structures. • Able to implement linked list data structure to solve various problems. • Able to apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C/C++ -programming language. • To apply concepts and techniques for implementation.
7	CSE 423	Java Programming Lab	• knowledge of the structure and model of the Java programming language, (knowledge) • use the Java programming language for various programming technologies (understanding) • develop software in the Java programming language, (application) • evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis) • propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
8	BCU 441	Communication Skills – IV	• Develop a resume for oneself • Ability to handle the interview process confidently • Learn the subtle nuances of an effective group discussion
9	BSU 443	Behavioural Science – IV	• Able to answer the question: What do I stand for? • Ability to apply a coherent set of moral principles within professional and specialized contexts • Willing to make unpopular but right decision • Committed to working for justice and peace locally and globally
10	FLU 444	French – IV	• l'imparfait, • la comparaison du verbe/du nom ; mieux/meilleur • les pronoms relatifs

FIFTH SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	BSI 601	E-Commerce	After Completion of the subject student should able to • Understand the basic concepts and technologies used in the field of management information systems; • Have the knowledge of the different types of management information systems; • Understand the processes of developing and implementinginformation systems; • Be aware of the ethical, social, and security issues of information systems;
2	BSI 602	Management InformationSystems	LO1. Understand the leadership role of Management Information Systems in achieving business competitive advantage through informed decision making. LO2. Analyze and synthesize business information and systems tofacilitate evaluation of strategic alternatives. LO3. Effectively communicate strategic alternatives to facilitate decision making.
3	CSE 603	Internet of Things (IOT)	• Ability to develop IOT application.
4	CSE 605	Software Engineering	• Ability to use the modeling approaches for the designing of software. • Ability to use the testing tools and designing of test cases for testing. • Ability to use the Unified modeling language (UML) for the designing of software product.
5	CSE 623	Internet of Things (IOT) Lab	• Ability to develop IOT application
6	CSE 625	Software Engineering Lab	• Ability to design the proper documentation of software product. • Ability to implement the cost estimation modelling approaches. • Ability to use the unified modelling language as a tool.
7	BCU 541	Communication Skills – V	• Communicate fluently and sustain comprehension of an extendeddiscourse. • Demonstrate ability to interpret texts and observe the rules of good writing. • Prepare and present effective presentations aided by ICT tools.
8	BSU 543	Behavioural Science – V	• Students will Develop critical and reflective thinking abilities • Students will Demonstrate an understanding of group dynamics and effective teamwork • Student will develop a range of leadership skills and abilities suchas effectively leading change, resolving conflict, and motivating others • Student will Gain knowledge and understanding of organizationresources, policies, and involvement opportunities. • Student will Develop strategies to recruit, retain, and continuallymotivate contributing members to the organization
9	FLU 544	French – V	• le présent (révision),lepassé composé(révision) • lespronomscomplémentsdirects,lespronomscompléments indirects • lesmarqueurschronologiques • lesarticulateurslogiques

SIXTH SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	BCA 601	Multimedia & its Applications	• Able to understand the concepts of multimedia andits framework. • Able to implement the digital representation of audioand videos. • Able to understand the how we perform video andimage compression using multimedia.
2	CSE 302	Python Programming	• Ability to create client-server application for real world problems. • Ability to apply Regular Expression, CGI and Database. • Ability to apply GUI Programming in real world problems.
3	CSE 704	Data Analytics	**Upon completion of the course, the students will be ableto:** • Work with big data tools and its analysis techniques • Analyze data by utilizing clustering andclassification algorithms • Learn and apply different mining algorithms and recommendation systems for large volumes of data • Perform analytics on data streams • Learn NoSQL databases and management.
4	BCA 621	Multimedia Lab	• Ability to create animation for different objects using multimedia devices. • Ability to perform audio and video compression. • Ability to create multimedia based application forreal world problem.
5	CSE 322	Python Programming Lab	• Ability to create client-server application for real world problems. • Ability to develop multithreaded application. • Ability to create web application for real world problem.
6	CSE 724	Data Analytics Lab	• Implement statistical analysis techniques for solvingpractical problems. • Perform statistical analysis on variety of data. • Perform appropriate statistical tests using R and visualize the outcome.
7	BCU 641	Communication Skills – VI	• To communicate contextually in specific personal and professional situations with courtesy. • To inject humour in their regular interactions. • To strengthen their creative learning process throughindividual expression and collaborative peer activities.
8	BSU 643	Behavioural Science – VI	• Student will able demonstrate thorough understanding of stress and its effects • Student will able to learn various coping strategies to deal stress effectively so to overcome the consequences and impact of stress on their health and wellbeing, ultimately it will enhance their performance.
9	FLU 644	French – VI	• Le présent (révision) • Lesprépositionset lesverbes • Lespronomspossessifs

			• Les verbes réciproques

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BCA

Programme Outcomes:

PO1. Engineering 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 toassess 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:

PSO1.Professional Skills: An 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.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3. Successful career and Entrepreneurship: An 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 OUTCOMES

FIRST SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BCA 101	Mathematics - I	Students completing this course will be able to: • Understand the basic principles of sets and operations in sets. • Demonstrate an understanding of functions and be able to determine their properties. • Compute the expression for the derivative of a function using the rules of differentiation including the power rule, product rule, and quotient rule and chain rule. • Evaluate integrals of rational functions using different methods. • Solve basic application problems described by second order linear differential equations with constant coefficients. • Perform matrix algebra.
2	BCA 102	Discrete Mathematical Structures with Applications to CS	• For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives • For a given a problem, derive the solution using deductive logicand prove the solution based on logical inference. • For a given a mathematical problem, classify its algebraic structure • Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra. • Develop the given problem as graph networks and solve with techniques of graph theory.

				At the end of this course, students are able to
3	BCA1 03	Computer Fundamentals & Programming Concepts		• Understanding about Computer System. • Identify all parts of the computer system and functioning of computer • Knowledge about software, its type and its uses. • Work efficiently in word processing, spreadsheet andpresentation software.
4	BCA1 04	Digital Electronic		• At the end of this course, students will demonstrate the ability to • Understand working of logic families and logic gates. • Design and implement Combinational and Sequential logic circuits. • Understand the process of Analog to Digital conversion and Digital to Analog conversion. • Be able to use PLDs to implement the given logical problem.
5	BCA 105	Principles of Management		• At the end of this course, students will understand managementprinciples for organizational setup. • Understand the types of organizational structures and design. • Design and implement the management processes for specific organization. • Understand the relevance of computer applications in different functional areas of managent.
6	BCA 106	Environmental Studies-I		• The multidisciplinary nature of environmental studies, including its definition, scope and need for public awareness. • Our natural resources including renewable and non-renewable resources comprising of forest, water, mineral, food, energy and land resources. • The ecosystem, their structure and function, energy flow, bio-geochemical cycles, community ecology, ecological succession, ecological pyramids, forest, grassland, aquatic and tundra ecosystem. • Biodiversity and its conservation. • Ecosystem diversity, species diversity and genetic diversity. • Biological classification of India. • Value of biodiversity. • Biodiversity at global national and local level. • Conservation of biodiversity. • Characteristic of ideal ecosystem. • Study of an artificial ecosystem.
7	BCA1 20	C Programming Lab		• To formulate the algorithms for simple problems • To translate given algorithms to a working and correct program • To be able to correct syntax errors as reported by the compilers • To be able to identify and correct logical errors encountered atrun time • To be able to write iterative as well as recursive programs • To be able to represent data in arrays, strings and structures andmanipulate them through a program
8	BCA1 40	English		• The students should be able to : • Identify Common Errors and Rectify Them • Develop and Expand Writing Skills Through Controlled and Guided Activities • To Develop Coherence, Cohesion and Competence in Oral Discourse through Intelligible Pronunciation.
9	BCA1 43	Behavioural Science - I		• Student will Develop accurate sense of self

			• Student will nurture a deep understanding of personal motivation • Student will develop thorough understanding of personal and professional responsibility • Student will able to analyse the emotions of others for better adjustment.
10	BCA 144 BCA 145	Foreign Language - IFrench German	• articles indéfinis, articles définis, masculin et féminin des nomset des adjectifs, pluriel des noms et des adjectifs • pronoms sujets et toniques, on, c'est/il est + profession, • masculin et féminin des adjectifs de nationalité • verbes- être, avoir, aller, 'er' groupe • l'interrogation – l'intonation, est-ce que, qui est-ce ? Qu'est-ceque? L'inversion ; où, comment, quand ; quel • la négation • adjectifs possessifs

SECOND SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BCA201	Mathematics - II	• Understand the arithmetical properties of the rational and real numbers. • Calculate the limit of a function at a point algebraically • Use the definition of continuity to determine if a function is continuous at a point, on an open or on a closed interval • Determine convergence and divergence of infinite sequences andseries. • Identify the extrema of a function on an interval and classify themas minima, maxima or saddles using the first derivative test. • Understand the consequences of Rolle's theorem and the MeanValue theorem for differentiable functions
2	BCA202	Data & File Structures Using C	• Ability to choose appropriate data structures to represent data items in real world problems. • Ability to analyze the time and space complexities of algorithms. • Ability to design programs using a variety of data structures suchas stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees. • Able to analyze and implement various kinds of searching and sorting techniques.
3	BCA203	Computer Architecture & Assembly Language	• Ability to understand basic structure of computer. • Ability to perform computer arithmetic operations. • Ability to understand control unit operations. • Ability to design memory organization that uses banks for different word size operations. • Ability to understand the concept of cache mapping techniques. • Ability to understand the concept of I/O organization.
4	BCA 204	Production & Operations Management	• Understand the basic principles of production and operation management for organization. • Understand the functioning of supply chain management and quality assurance.
5	BCA205	Systems Analysis &Design	• Analyze the asymptotic performance of algorithms. • Write rigorous correctness proofs for algorithms. • Demonstrate a familiarity with major algorithms and data structures. • Apply important algorithmic design paradigms and methods of

			analysis.
			• Synthesize efficient algorithms in common engineering design situations
6	BCA 206	Environmental Studies-II	• Explain various types of environmental pollutions. • Understand role of individual in abatement of environmental pollution. • Explain methods to mitigate disasters. • Learn various environmental protection laws. • Learn role of IT in environment and human health.
7	BCA 220	Data Structures & Microprocessors Lab	• Ability to choose appropriate data structures to represent data items in real world problems. • Ability to analyze the time and space complexities of algorithms. • Ability to design programs using a variety of data structures suchas stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees. • Able to analyze and implement various kinds of searching and sorting techniques.
8	BCA 240	English	The student will be able to write an impressive resume and face the interview confidently.
9	BCA 243	Behavioural Science - II	▪ Student will be able to identify, understand, and apply contemporarytheories of leadership to a wide range of situations and interactions ▪ Student will be able to understand and respect individual difference,so to enhance the relationship ▪ Learn social responsibility and develop a sense of citizenship ▪ Student will be able to identify and understand the impact of cultureon one's leadership style
10	BCA 244 BCA 245	Foreign Language - IIFrench German	▪ expression du temps ▪ les articles contractés, les quantités indéterminées et déterminées ▪ les adverbes de fréquences ▪ verbes- faire, prendre, venir, pouvoir, vouloir, les verbespronominaux ▪ la comparaison de l'adjectif ▪ la négation (suite) ▪ le future proche

THIRD SEMESTER

S.N	Course Code	Course Title	Outcomes
1	BCA 301	Computer Oriented Statistical & OptimizationMethods	Students completing this course will be able to: Learn the statistical and optimization methods, in particular, with reference to frequency distribution and measures of central tendency, measures of dispersion, skew ness and kurtosis, · learn theory of probability, linear programming problems, transportation, assignment and game problems. · learn important theorems, different formulae and practical applications of these statistical and optimization methods in the field of Computer Sciences and Applications.
2	BCA 302	Object Oriented Programming ConceptsUsing C++	• To apply concepts of classes and objects in real world scenarios. • Understand object-oriented programming features in C++, • Apply these features to program design and implementation, • Understand object-oriented concepts and how they are supportedby C++, • Gain some practical experience of C++.
3	BCA 303	Database Management	• Describe DBMS architecture, physical and logical database

		Systems	designs, database modeling, relational, hierarchical and network models.
			• Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing. • Learn and apply Structured query language (SQL) for database definition and database manipulation. • Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. • Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.
4	BCA 304	Operating Systems	• Analyze various scheduling algorithms. • Understand deadlock, prevention and avoidance algorithms. • Compare and contrast various memory management schemes. Understand the functionality of file systems
5	BCA 305	Accounting & Financial Management	After completing three years for BCA program, students would gain a thorough grounding in the fundamentals of Commerce and Finance. The commerce and finance focused curriculum offers a number of specializations and practical exposures which would equip the student to face the modern-day challenges in commerce and business.
6	BCA 320	C++ & DBMS Lab	• At the end of lab session students would be able to design the Database application for the real life projects. • Students would be able to perform insertion, deletion and updation operation on Databases.
7	BCA 341	Communication Skills - I	The students should be able to write correctly and properly with special reference to Letter writing
8	BCA 343	Behavioural Science - III	▪ Student will be able to understand and solve the problems effectivelyin their personal and professional life. ▪ Students will outline multiple divergent solutions to a problem, ▪ Student will able to create and explore risky or controversial ideas,and synthesize ideas/expertise to generate innovations
9	BCA 344 BCA 345	Foreign Language - IIIFrench German	▪ les adjectifs démonstratifs ▪ les verbes : 'ir groupe' devoir, falloir ▪ les prépositions de lieu, de pays ▪ l'impératif, le passé composé, forme et accord du participe passé, lanégation au passé composé ▪ les indicateurs de temps (il y a, depuis)
10	BCA 360	Summer Project – I (Evaluation)	After successful completion of the course, the students will be able to 1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. 2. Manage the technical content and work. 3. Learn the various administrative process followed in industry. 4. Prepare and present technical report

FOURTH SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BCA 401	Computer Oriented Numerical Methods	• The objective of this course is to familiarize the students withnumerical techniques. It aims to equip the students with standard

			concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline. • Numerical techniques to solve simultaneous linear equations, interpolation and extrapolation. • Numerical techniques of differential and integral. Solution of ordinary differential equation by numerical techniques.
2	BCA 402	Software Engineering	• Ability to design the proper documentation of software product. • Ability to implement the cost estimation modelling approaches. • Ability to use the unified modelling language as a tool.
3	BCA 403	Computer Graphics	• Know and be able to describe the general software architecture of programs that use 3D computer graphics. • Know and be able to discuss hardware system architecture for computer graphics. This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators /co-processors. • Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).
4	BCA 404	Programming in VisualBasic	Demonstrate knowledge of programming terminology and how applied using Visual Basic (e.g., variables, selection statements, repetition statements, etc.) ☐ Develop a Graphical User Interface (GUI) based on problem description ☐ Develop an Event Planning Chart based on problem description so as to define the processing that is to occur based on specific events
5	BCA 405	Design & Analysis ofAlgorithms	• Analyze the asymptotic performance of algorithms. • Write rigorous correctness proofs for algorithms. • Demonstrate a familiarity with major algorithms and data structures. • Apply important algorithmic design paradigms and methods ofanalysis. • Synthesize efficient algorithms in common engineering design situations.
6	BCA 420	Computer Graphics &Visual Basic Lab	• Analyze the asymptotic performance of algorithms. • Write rigorous correctness proofs for algorithms. • Demonstrate a familiarity with major algorithms and data structures. • Apply important algorithmic design paradigms and methods ofanalysis. • Synthesize efficient algorithms in common engineering design situations.
7	BCA 441	Communication Skills –IV	• Develop a resume for oneself • Ability to handle the interview process on fidently • Learn the subtle nuances of an effective group discussion
8	BCA 443	Behavioural Science - IV	• Able to answer the question: What do I stand for? • Ability to apply a coherent set of moral principles within professional and specialized contexts • Willing to make unpopular but right decision • Committed to working for justice and peace locally and globall
9	BCA 444 BCA 445	Foreign Language - IVFrench German	• imparfait, • la comparaison du verbe/du nom ; mieux/meilleur • les pronoms relatifs
10			☐

FIFTH SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BCA 501	Computer Communications &Networking	- Show clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching,circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking. - Demonstrate the ability to unambiguously explain networking as it relates to the connection of computers,media, and devices (routing). - Able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities. Able to identify limitations of typical communication systems. - Able to differentiate among and discuss the four levelsof addresses (physical, logical, port, and specific used by the Internet TCP/IP protocols. - Understand the concept of reliable and unreliable transfer protocol of data and how TCP and UDP implement these concepts - Developing the understanding of various advanced techniques like ISDN,ATM and wifi.
2	BCA 502	Java Programming	- Students can perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members - Students can demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance - Students can demonstrate ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solution of problems - Students can demonstrate ability to implement multithreading in the programming. - To learn syntax and features of exception handling - Students can demonstrate the ability to implement solution to various I/O manipulation operations and the ability to create two-dimensional graphic components using Swings. - To demonstrate the ability to handle Events in the Programming
3	BCA 503	Systems Software	After successful completion of this course, student will be able to – understand fundamentals of language processing and grammar – apply knowledge of compilation and code optimization steps tomimic a simple compiler – demonstrate the working of various system software like assembler, loader, linker, editor and device driver
4	BCA 504	UNIX Operating System & ShellProgramming	- Analyze various scheduling algorithms. - Understand deadlock, prevention and avoidancealgorithms.

			• Compare and contrast various memory managementschemes. • Understand the functionality of file systems.
5	BCA 520	Java & Unix Programming Lab	• Identify the basic Unix general purpose commands. • Apply and change the ownership and file permissionsusing advance Unix commands. • Use the awk, grep, perl scripts. • Implement shell scripts and sed. • Apply basic of administrative task.
6	BCA 541	Communication Skills - III	• Communicate fluently and sustain comprehension of anextended discourse. • Demonstrate ability to interpret texts and observe the rules of good writing. • Prepare and present effective presentations aided by ICTtools.
7	BCA 543	Behavioural Science - V	▪ Students will Develop critical and reflective thinking abilities ▪ Students will Demonstrate an understanding of group dynamics and effective teamwork ▪ Student will develop a range of leadership skills and abilities such as effectively leading change, resolving conflict, andmotivating others ▪ Student will Gain knowledge and understanding of organization resources, policies, and involvement opportunities. ▪ Student will Develop strategies to recruit, retain, and continually motivate contributing members to the organization
8	BCA 544 BCA 545	Foreign Language - V French German	• le présent (révision), le passé composé (révision) • les pronoms compléments directs, les pronoms compléments indirects • les marqueurs chronologiques • les articulateurs logiques
9	BCA 560	Summer Project – II (Evaluation)	After successful completion of the course, the students will be able to 1. Explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills. 2. Manage the technical content and work. 3. Learn the various administrative process followed in industry. Prepare and present technical report.

SIXTH SEMESTER

S.No	Course Code	Course Title	Outcomes
1	BCA 601	Multimedia & its Applications	• Able to understand the concepts of multimedia and itsframework. • Able to implement the digital representation of audio and videos. • Able to understand the how we perform video and image compression using multimedia.
2	BCA 602	Web Technologies	• Understand different components in web technology and to know about CGI and CMS. • Develop interactive Web pages using HTML/XHTML. • Present a professional document using Cascaded StyleSheets. • Construct websites for user interactions using JavaScript and JQuery. • Develop Web applications using PHP.
3	BCA 603	Introduction to Open Source Technologies (PHP, MySql)	
4	BCA 620	Multimedia & Web Technologies Lab	• Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's. • Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and otherweb services. • Get introduced in the area of Online Game programming.
5	BCA 621	Introduction to Open Source Technologies (PHP, MySql) Lab	• Ability to create client-server application for real world problems. • Ability to apply Regular Expression, CGI and Database. • Ability to apply GUI Programming in real world problems.
6	BCA 641	Communication Skills - IV	• To communicate contextually in specific personal andprofessional situations with courtesy. • To inject humour in their regular interactions. • To strengthen their creative learning process through individual expression and collaborative peer activities.
7	BCA 643	Behavioural Science - VI	• Student will able demonstrate thorough understanding of stress and its effects • Student will able to learn various coping strategies to deal stress effectively so to overcome the consequencesand impact of stress on their health and wellbeing, ultimately it will enhance their performance.
8	BCA 644 BCA 645	Foreign Language - VI French German	• Le présent (révision) • Les prépositions et les verbes • Les pronoms possessives • Les verbes réciproques
9	BCA 660	Project Work	On successful completion of the course students will be able to: 1. Demonstrate a sound technical knowledge of their selected project topic. 2. Undertake problem identification, formulation andsolution. 3. Design engineering solutions to complex problems

			utilising a systems approach. 4. Conduct an engineering project 5. Communicate with engineers and the community at largein written an oral forms. 6. Demonstrate the knowledge, skills and attitudes of a professional engineer. Write comprehensive report on project work.

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR

AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

MCA/M.Sc. (IT)
Programme Educational Objectives

Post graduates of the programme MCA will

PEO 1: Enhancing skills encompassing strategic planning, meticulous analysis, innovative design, proficient coding, rigorous testing, seamless implementation, and consistent maintenance for creating software tailored to real-time system requirements.

PEO 2: To excel in problem solving and programming skills in computing fields of IT industries.

PEO 3: To practice effectively as individuals and as team members in multidisciplinary projects involving technical, managerial, economic and social constraints.

PEO 4: To foster students' capacity to establish their independent ventures across diverse domains within Computer Applications.

PEO 5: To prepare the students to pursue higher studies in computing and related fields and to work in the fields of teaching and research.

Programme Outcomes :

PO1. Engineering 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 toassess 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 needfor 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 toengage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes:

PSO1. Professional Skills: Design and evaluate solutions for complex computing problems withappropriate consideration.

PSO2. Problem-solving skills: Use research-based knowledge and research methods foranalysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PSO3. Successful career and Entrepreneurship: Inculcate employability and entrepreneurskills among students who can develop customized solutions for small to large Enterprises.

Course Outcomes:

FIRST SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	MSI 101	Computer Oriented Numerical &Statistical Methods	• The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline. • The students will learn: The basic ideas of statistics including measures of central tendency, correlation and regression. • The statistical methods of studying data samples. • Numerical techniques to solve simultaneous linear equations, interpolation and extrapolation. • Numerical techniques of differential and integral. • Solution of ordinary differential equation by numerical techniques.
2	CSM 101	Advanced Data Structures andAlgorithm Design	• Analyze the asymptotic performance of algorithms. • Derive and solve recurrences describing the performance of divide-and-conquer algorithms. • Find optimal solution by applying various methods. • Apply pattern matching algorithms to find particular pattern. • Differentiate polynomial and non-polynomial problems. • Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. • Illustrate the methods for data recovery, evidence collection and data seizure.

			• Summarize duplication and preservation ofdigital evidence.
3	CSM 102	Distributed Operating System	After learning the course the students should be able to: • List the principles of distributed systems and describe the problems and challenges associated with these principles. • Understand Distributed Computing techniques, Synchronous and Processes. • Apply Shared Data access and Files concepts. • Design a distributed system that fulfills requirements with regards to key distributed systems properties. • Understand Distributed File Systems and Distributed Shared Memory. • Apply Distributed web-based system. • Understand the importance of security in distributed systems
4	CSM 103	Advanced Database Management System	The students will learn: • Exposure for students to write complex queries including full outer joins, self-join, sub queries, and set theoretic queries. • Knowhow of the file organization, Query Optimization, Transaction management, and database administration techniques
5	CSM 104	Data Compression	• Solve the problems associated with differentsource coding techniques. • Implement the compression techniques to compress the different raw data. • Summarize the concepts associated speech,image and video compression. • Recognize the usage data compression in telecommunication engineering and to solve the corresponding problems.
6	CSM 105	Artificial Intelligence & Machine Learning	At the end of this course, students will learn: • About Artificial Intelligence and intelligentagents, history of Artificial Intelligence • Building intelligent agents (search, games, logic, constraint satisfaction problems) • Machine Learning and its basics • Applications of AI and ML
7	CSM 121	Advanced Data Structures andAlgorithm Design Lab	At the end of this course, students will demonstrate ability to: • Identify the problem given and design the algorithm using various algorithm design techniques. • Implement various algorithms in a high level language. • Analyze the performance of various algorithms. • Compare the performance of different algorithms for same problem.
8	CSM 123	Advanced Database Management System Lab	The students will learn: • Exposure for students to write complex queries including full outer joins, self-join, sub queries, and set theoretic queries. • Knowhow of the file organization, Query

S. No.	Course Code	Course Name	Course Outcome
9	CSM 125	Artificial Intelligence & Machine Learning Lab	Learner will learn • Basics of R • To analyse Data in terms of Graphical View. • To programming for data visualisation • To work on Rstudio.

SECOND SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	MSI 201	Advanced Computer Networks	• Illustrate reference models with layers, protocols and interfaces. • Summarize functionalities of different Layers. • Combine and distinguish functionalities of different Layers. • Describe and Analysis of basic protocols of computer networks, and how they can be usedto assist in network design and implementation. • Identify and describe development history ofrouting protocols. • Describe Subnetting and Addressing of IP V4. • Identify the different types of network devicesand their functions within a network.
2	CSM 201	Automata Theory and CompilerDesign	At the end of this course, students will be able to do the following: • Students will demonstrate knowledge of basic mathematical models of computation and describe how they relate to formal languages. • Students will understand that there are limitations on what computers can do, and learn examples of unsolvable problems. • Students will learn that certain problems do not admit efficient algorithms, and identify such problems.
3	CSM 203	Soft Computing Techniques	• Discuss the various aspects of uncertainty in real life and inability of conventional computing to handle them. • Relate real life problem contexts to soft computing paradigms tools • Design and use fuzzy sets and numbers in the context of various domains. • Design fuzzy rule based system for a controlapplication like washing machine. • Identify the problems suitable for solutionusing neural networks • Train a perceptron network over a given input/output pattern information. • Design a genetic model for a given problemwith huge state space. • Apply GA tools and solution to a problem tofind an amicable solution for the same. • Design soft computing models to solve

Optimization, Transaction management, and database administration techniques

			reallife problems

S. No.	Course Code	Course Name	Course Outcome
4	CSM 204	Image Processing and Pattern Recognition	• Ability to examine various types of images, intensity transformations and spatial filtering. • Ability to evaluate the methodologies for image segmentation, restoration etc. • Ability to apply image processing algorithms in connection with pattern recognition methods. • Ability to develop Fourier transform for image processing in frequency domain.
5	CSM 205	Software Project Management	Students who complete this course will be able to: • Design a project management plan using different project management life cycles. • Find a suitable project management life cyclemodel for effective project execution. • Analyse the risks associated with the projects.
6	CSM 206	Introduction to Python Programming	• Ability to create client-server application forreal world problems. • Ability to apply Regular Expression, CGI andDatabase. • Ability to apply GUI Programming in real world problems
7	MSI 221	Advanced Computer NetworksLab	
8	CSM 224	Image Processing and Pattern Recognition Lab	• Ability to implement the image processing techniques using colour models. • Ability to implement the image compressionalgorithm. • Ability to implement the various image enhancement techniques with pattern recognition.
9	CSM 225	Software Project Management Lab	• Students will be assigned with a course project in which they will furnish a report by exercising their knowledge about Software Project Management.
10	CSM 226	Introduction to Python Programming Lab	• Ability to create client-server application forreal world problems. • Ability to develop multithreaded application. • Ability to create web application for real world problem.

THIRD SEMESTER:

S. No.	Course Code	Course Name	Course Outcome

1	MSI 301	Techniques of Operation Research	Upon completion of this course, you will be able to: • Formulate a real-world problem as a mathematical programming model • Implement and solve the model in EXCELand LINDO • Understand the theoretical workings of the simplex method for linear programming and perform iterations of it by hand • Understand the relationship between a linear program and its dual, including strong duality and complementary slackness • Perform sensitivity analysis to determine the direction and magnitude of change of a

			model's optimal solution as the data change • Solve specialized linear programming problems like the transportation and assignment problems • Solve network models like the shortest path, minimum spanning tree, and maximum flow problems • Understand the applications of, basic methods for, and challenges in integer programming • Understand how to model and solve problems using dynamic programming • Model a dynamic system as a queuing model and compute important performance measures • Learn optimality conditions for single- and multiple-variable unconstrained and constrained nonlinear optimization problems, and corresponding solution methodologies
2	CSM 301	Cyber Security and Digital Forensics	• Able to know the brief fundamentals of hardware and software component. • Learn PC-based partition such as DOS partition, apple partition and its analysis. • Able to understand hard disk technology. • Well aware from the internal process of operating system. • Have an idea of memory management and disk management.
3	CSM 302	Socket Programming and Network Security	• Develop programs using TCP Sockets. • Use Socket Options. • Develop Macros for including Objects In MIB
4	CSM 303	Parallel Computing	• Be proficient at programming multiple parallel machines in more than one special programming language or programming system • Be able to descriptively compare the performance of different programs and methods on one machine • Demonstrate advanced knowledge of the elements of parallel programming, parallel communication and system implementation • Recall the history of parallel systems, principles of parallel algorithms and describe the developments in the field of parallel computing.
5	CSM 304	Data Mining and Data Analysis	
6	CSM 322	Socket Programming and Network Security Lab	Learner will be able to: • Understand network programming • Create and run socket program on an open source OS • Implement Infrastructure, scripts as a Service.
7	CSM 323	Parallel Computing Lab	• Memorize parallel processing approaches • Describe different parallel processing platforms involved in achieving High Performance Computing. • Discuss different design issues in parallel programming • Develop efficient and high performance parallel programming • Learn parallel programming using message

S. No.	Course Code	Course Name	Course Outcome
			• passing paradigm using open source APIs. • Design algorithms suited for Multicore processor and GPU systems using
8	CSM 324	Data Mining and Data Analysis Lab	
9	CSM 306	Semantic Web and KnowledgeManagement	• To learn Web Intelligence • To learn Knowledge Representation for theSemantic Web • To learn Ontology Engineering • To learn Semantic Web Applications, Services and Technology • To learn Social Network Analysis and semantic web
10	CSM 307	Research Methodology	
11	CSM 308	Real-Time Systems	
12	CSM 309	Mobile and Pervasive Computing	• Students will able to describe the basic concepts and principles in mobile computing • Students will able to understand the conceptof Wireless LANs, PAN, Mobile Networks, and Sensor Networks • Students will able to explain the structure and components for Mobile IP and MobilityManagement • To get clear idea about WAP architecture andsecurity. • Be able to learn speech application in pervasive computing. • Become familiar with different voice standards. • Identify user interface issues in pervasive computing.
13	CSM 310	Service Oriented Architecture	**Upon successful completion of this course, the students will be able to:** • Understand XML technologies • Understand service orientation, benefits ofSOA • Understand web services and WS standards • Use web services extensions to develop solutions • Understand and apply service modeling, service oriented analysis and design for application development

FOURTH SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	MMP 460	DISSERTATION (20-22 WEEKS)	Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication.

Course Outcomes:

FIRST SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	MCA 101	Mathematical Foundation ofComputer Science	• The students would be able to define Partial Order relations and also will be able to solve problems based on the same. • The students would be able to learn Algebraic Structures and their types. • The students will be able to analyse difference between CNF, DNF, PCNF and PDNF and will be able to convert simple propositions into normal forms. • The students will be able to explain Graphs, their types and will able to solvedifferent problems based on algorithms of Graph Theory. • Students will be able to explain about Regular expressions, Regular Languageetc. • Student would be able to solve problemson NFA, DFA and their conversions.
2	MCA 102	Computer Architecture &System Design	• Ability to understand basic structure ofcomputer. • Ability to perform computer arithmeticoperations. • Ability to understand control unit operations. • Ability to design memory organization that uses banks for different word size

			operations. • Ability to understand the concept of cache mapping techniques. • Ability to understand the concept of I/Oorganization. • Ability to conceptualize instruction level parallelism
3	CSM 104	Data Compression	• Solve the problems associated with different source coding techniques. • Implement the compression techniques tocompress the different raw data. • Summarize the concepts associatedspeech, image and video compression. • Recognize the usage data compression in telecommunication engineering and to solve the corresponding problems.
4	MCA 103	Problem Solving TechniquesUsing C	The student will learn • To formulate simple algorithms for arithmetic and logical problems. • To translate the algorithms to programs(in C language). • To test and execute the programs and correct syntax and logical error • To implement conditional branching, iteration and recursion. • To decompose a problem into functions and synthesize a complete program using divide and conquer approach. • To use arrays, pointers and structures to formulate algorithms and programs. • To apply programming to solve matrix addition and multiplication problems and searching and sorting problems. • To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration
5	MCA 104	Data Base Management Systems	The student will learn • Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models. • Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing. • Learn and apply Structured query language (SQL) for database definition

			and database manipulation. • Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
6	MCA 105	Operating Systems	At the end of the course, the students shouldbe able to: • Analyze various scheduling algorithms. • Understand deadlock, prevention and avoidance algorithms. • Compare and contrast various memorymanagement schemes. • Understand the functionality of file systems.
7	MCA 123	Problem Solving TechniquesUsing C Lab	• To formulate the algorithms for simpleproblems • To translate given algorithms to a working and correct program • To be able to correct syntax errors as reported by the compilers • To be able to identify and correct logicalerrors encountered at run time • To be able to write iterative as well as recursive programs • To be able to represent data in arrays, strings and structures and manipulate them through a program • To be able to declare pointers of differenttypes and use them in defining self- referential structures. • To be able to create, read and write to and from simple text files.
8	MCA 124	Data Base Management Systems Lab	• At the end of lab session students would be able to design the Databaseapplication for the real life projects. • Students would be able to perform insertion, deletion and updation operation on Databases.
9	MCA 125	Operating Systems Lab	Upon the completion of Operating Systems practical course, the student will be able to: • Understand and implement basic services and functionalities of the operatingsystem using system calls. • Use modern operating system calls and synchronization libraries in software/ hardware interfaces. • Understand the benefits of thread over process and implement synchronized

			programs using multithreading concepts.
			• Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
			• Implement memory management schemes and page replacement schemes.
			• Simulate file allocation and organization techniques.
			• Understand the concepts of deadlock in operating systems and implement them in multiprogramming system.

SECOND SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	MCA 201	Information Systems Analysis & Design	• Gather data to analyses and specify the requirements of a system. • Design system components and environments. • Build general and detailed models that assist programmers in implementing a system. • Design a database for storing data and a user interface for data input and output,as well as controls to protect the system and its data.
2	MCA 202	Graph Theory	Upon Completion of the course, the students should be able to: • Write precise and accurate mathematicaldefinitions of objects in graph theory. • Use mathematical definitions to identify and construct examples and to distinguishexamples from non-examples. • Validate and critically assess a mathematical proof. • Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory. • Reason from definitions to construct mathematical proofs.

3	MCA 203	Multimedia & Its Applications	The student will be able to Understand different multimedia technologies like audio and video including multimedia devices.

4	MCA 204	Computer Networks	• Show clear understanding of the basic concepts of data communications including the key aspects of networking and their interrelationship, packet switching, circuit switching and cell switching as internal and external operations, physical structures, types, models, and internetworking. • Demonstrate the ability to unambiguously explain networking as itrelates to the connection of computers, media, and devices (routing). • Able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities. Able to identify limitations of typical communicationsystems. • Able to differentiate among and discuss the four levels of addresses (physical, logical, port, and specific used by the Internet TCP/IP protocols. • Understand the concept of reliable and unreliable transfer protocol of data and how TCP and UDP implement these concepts • Developing the understanding of various advanced techniques like ISDN,ATM and wifi.
5	MCA 205	Object-Oriented Programming With C++	• After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.
6	MCA 206	Web Technology	The student will be able to • Understand different components in webtechnology and to know about CGI and CMS. • Develop interactive Web pages using HTML/XHTML. • Present a professional document using Cascaded Style Sheets. • Construct websites for user interactionsusing JavaScript and JQuery. • Develop Web applications using PHP.
7	MCA 223	Multimedia & Its Applications Lab	The student will be able to • Understand practical applications of different multimedia technologies like audio and video including multimedia

S. No.	Course Code	Course Name	Course Outcome
			devices.
8	MCA 224	Computer Networks Lab	After completing this course student can understand the ability to unambiguously explain networking as it relates to the connection of computers, media, and devices (routing).
9	MCA 225	Object-Oriented Programming With C++ Lab	After completing this course student can easily identify the basic difference between the programming approaches like procedural and object oriented.
10	MCA 226	Web Technology Lab	At the end of the course, students should be able to: • Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's. • Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services. • Get introduced in the area of Online Game programming.

THIRD SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	MCA 301	Statistics and Numerical Techniques	
2	CSM 301	Cyber Security and Digital Forensics	• Able to know the brief fundamentals ofhardware and software component. • Learn PC-based partition such as DOSpartition, apple partition and its analysis. • Able to understand hard disk technology. • Well aware from the internal process ofoperating system. • Have an idea of memory management and disk management.
3	CSM 305	IoT and Sensor Networks	The student will learn • Understand key IoT concepts on sensornetwork. • Understand routing in wireless sensor network. • How IOT work on data link and network layer.
4	MCA 302	Data Structures Using C	

5	CSM 105	Artificial Intelligence & Machine Learning	At the end of this course, students will learn: • about Artificial Intelligence and intelligent agents, history of Artificial Intelligence

S. No.	Course Code	Course Name	Course Outcome
			• Building intelligent agents (search, games, logic, constraint satisfaction problems) • Machine Learning and its basics • Applications of AI and ML
6	CSM 206	Introduction to Python Programming	Students who complete this course will be able to • design a project management plan using different project management life cycles. • find a suitable project management life cycle model for effective project execution. • analyze the risks associated with the projects.
7	CSM 325	IoT and Sensor Networks Lab	The student will learn • Understand key IoT concepts on sensor network and implementation of IOT devices with the help of different -2 sensors.
8	MCA 322	Data Structures Using C Lab	
9	CSM 125	Artificial Intelligence & Machine Learning Lab	Learner will learn • basics of R • to analyse Data in terms of Graphical View. • do programming for data visualisation • 4. to work on Rstudio.
10	CSM 226	Introduction to Python Programming Lab	• Ability to create client-server applicationfor real world problems. • Ability to develop multithreaded application. • Ability to create web application for realworld problem.

FOURTH SEMESTER:

S. N o.	Course Code	Course Name	Course Outcome
1	MCA 401	Formal Language & AutomataTheory	At the end of this course, students will be able to do the following: • Students will demonstrate knowledge of basic mathematical models of computationand describe how they relate to formal languages. • Students will understand that there are

			limitations on what computers can do, andlearn examples of unsolvable problems. • Students will learn that certain problems donot admit efficient algorithms, and identify such problems.
2	MCA 402	Cryptography & Network Security	At the end of the course students should be able to: • Analyze the vulnerabilities in any computing system and hence be able to design a security solution. • Identify the security issues in the network and resolve it. • Evaluate security mechanisms using rigorous approaches, including theoretical • Compare and Contrast different IEEE standards and electronic mail security
3	MCA 403	Analysis & Design of Algorithms	• Analyze the asymptotic performance of algorithms. • Write rigorous correctness proofs for algorithms. • Demonstrate a familiarity with major algorithms and data structures. • Apply important algorithmic design paradigmsand methods of analysis. • Synthesize efficient algorithms in common engineering design situations.
4	MCA 404	Java Programming	The student will learn • Students can perform object oriented programming solution and develop solutions to problems demonstrating usage of control structure, modularity, classes, I/O and the scope of the class members • Students can demonstrate adeptness of object oriented programming in developing solution to problems demonstrating usage of data abstraction, encapsulation and inheritance • Students can demonstrate ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solutionof problems • Students can demonstrate ability to implement multithreading in the programming. • To learn syntax and features of exception handling • Students can demonstrate the ability to implement solution to various I/O manipulation operations and the ability to create two- dimensional graphic components using Swings. • To demonstrate the ability to handle Events in

			the Programming

5	MCA 405	Software Engineering	- Ability to use the modeling approaches for thedesigning of software. - Ability to use the testing tools and designing oftest cases for testing. - Ability to use the Unified modeling language (UML) for the designing of software product.
6	MCA 406	Introduction to Computer Graphics	- Know and be able to describe the general software architecture of programs that use 3D computer graphics. - Know and be able to discuss hardware system architecture for computer graphics. This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators /co- processors. - Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).
7	MCA 423	Analysis & Design of AlgorithmsLab	- To write programs in java to solve problems using divide and conquer strategy. - To write programs in java to solve problems using backtracking strategy. - To write programs in java to solve problems using greedy and dynamic programming techniques
8	MCA 424	Java Programming Lab	- knowledge of the structure and model of the Java programming language, (knowledge) - use the Java programming language for various programming technologies (understanding) - develop software in the Java programming language, (application) - evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis) - propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
9	MCA 425	Software Engineering Lab	- Ability to design the proper documentation ofsoftware product. - Ability to implement the cost estimation modelling approaches. - Ability to use the unified modelling language as a tool.

FIFTH SEMESTER:

S. N o.	Course Code	Course Name	Course Outcome
1	MCA 501	Introduction to E-Commerce	
2	MCA 502	Cloud Computing and Virtualization	• Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing • Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc. • Explain the core issues of cloud computing such as security, privacy, and interoperability. • Provide the appropriate cloud computing solutions and recommendations according to the applications used. • Collaboratively research and write a research paper, and present the research online.
3	CSM 304	Data Mining and Data Analysis	
4	MCA 503	Unix and Shell Programming	
5	CSM 204	Image Processing and Pattern Recognition	• Ability to examine various types of images, intensity transformations and spatial filtering. • Ability to evaluate the methodologies for imagesegmentation, restoration etc. • Ability to apply image processing algorithms inconnection with pattern recognition methods. • Ability to develop Fourier transform for image processing in frequency domain.
6	MCA 504	Introduction to Microprocessor	
7	MCA 522	Cloud Computing and Virtualization Lab	Learner will be able to... • Appreciate cloud architecture • Create and run virtual machines on open sourceOS • implement Infrastructure , storage as a Service. • Install and appreciate security features for cloud
8	CSM 324	Data Mining and Data Analysis Lab	
9	MCA 523	Unix and Shell Programming Lab	• Identify the basic Unix general purpose commands. • Apply and change the ownership and file permissions using advance Unix commands. • Use the awk, grep, perl scripts. • Implement shell scripts and sed. • Apply basic of administrative task.

10	CSM 224	Image Processing and Pattern Recognition Lab	• Ability to implement the image processing techniques using colour models. • Ability to implement the image compression algorithm.

			• Ability to implement the various image enhancement techniques with pattern recognition.
11	MCA 505	Semantic Web	• To learn Web Intelligence • To learn Knowledge Representation for the Semantic Web • To learn Ontology Engineering • To learn Semantic Web Applications, Servicesand Technology • To learn Social Network Analysis and semantic web
12	MCA 506	Object Oriented Analysis and Design Using UML	At the end of the course, the student should be able to: • Design and implement projects using OO concepts. • Use the UML analysis and design diagrams. • Apply appropriate design patterns. • Create code from design.

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING

M Tech (Structural Engineering)
Programme Educational Objectives

Graduates of the programme M Tech Structural Engineering will

PEO 1: Graduates of the program will have in-depth knowledge to identify and formulate challenging problems in Structural Engineering, apply appropriate research methodologies, use modern engineering tools and provide technically sound, economical and sustainable solutions.

PEO 2: Graduates will have ability for higher studies and undertake high value research on Structural Engineering and other related issues.

PEO 3: Graduate of program will actively engage in a professional career as a Structural Consultant and has sound analytical and lateral thinking ability to engage in lifelong learning for professional advancement to cope up with multidisciplinary and changing technologies in Structural Engineering.

PEO 4: Graduates of the program will have sense of social responsibility, will demonstrate ability to communicate and

PEO 5: Graduates of the programme will work effectively as a team member in an ethical way, and will play leadership roles in their profession, public services and community.

Programme Outcomes :

PO1. Engineering 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 toassess 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 needfor 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 toengage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds.

Course Outcomes:

FIRST SEMESTER:

S. N o.	Course Code	Course Name	Course Outcome
1	CEM 101	Numerical Analysis and ComputerProgramming	On completion of this course, the students will be able to learn about fundamentals of numerical methods such as interpolation, differentiation, integration and differential equations. They will also learn the basics of programming.

2	CEM 102	Concrete Technology	On completion of this course, the students will be able to learn the manufacture, properties, types and effect of different agencies on properties of concrete.
3	CEM 103	Advanced Structural Analysis	On completion of this course, the students will be able to learn the advanced concepts of structural analysis such as Force methods, Displacement methods, solution of symmetrical and anti-symmetrical problems, stiffness of plane and space frames solution of problems.
4	CEM 121	Numerical Analysis and ComputerProgramming Lab	On completion of this course, the students will be able to learn about fundamentals of numerical methods such as interpolation, differentiation, integration and differential equations. They will also learn the basics of programming.
5	CEM 122	Concrete Technology Lab	On completion of this course, the students will be able to learn the manufacture, properties, types and effect of different agencies on properties of concrete.
6	CEM 123	Advanced Structural Analysis Lab	On completion of this course, the students will be able to learn the advanced concepts of structural analysis such as Force methods, Displacement methods, solution of symmetrical and anti-symmetrical problems, stiffness of plane and space frames solution of problems.

7	CEM 104	Structural Dynamics And EarthquakeResistant Building	On completion of this course, the students will be able to learn the concepts of engineering seismology, earthquake resistant design of buildings, seismic strengthening procedures etc.
8	CEM 105	Bridge Engineering	On completion of this course, the students will be able to learn the concepts of bridge engineering piers, abutments, R.C. bridges, Prestressed bridges, their construction and design.
9	CEM 106	Advanced Elasticity And Plasticity	On completion of this course, the students will be able to learn the behavior of curved bars and thick walled cylinder on pure bending, general stress and strain equations, Saint Venant's theory, 2-D plastic flow etc.

SECOND SEMESTER:

S. N o.	Course Code	Course Name	Course Outcome
1	CEM 201	Advanced Steel Structure	On completion of this course, the students will be able to learn about tension and compression steel members, plate girders, design of bridges, continuous beams and frames.
2	CEM 202	Advanced Foundation Engineering	On completion of this course, the students will be able to learn about advanced concepts of foundation engineering including pile and shallow foundation, cofferdams and machine foundation and soil exploratio
3	CEM 203	Finite Element Method	On completion of this course, the students will be able to learn about fundamentals of finite element method, its procedures, static analysis and Gaussian elimination.
4	CEM 222	Advanced Foundation EngineeringLab	On completion of this course, the students will be able to learn about advanced concepts of foundation engineering including pile and shallow foundation, cofferdams and machine foundation and soil exploration
5	CEM 223	Finite Element Method Lab	On completion of this course, the students will be able to learn about fundamentals of finite element method, its procedures, static analysis and Gaussian elimination.
6	CEM 224	Structural Engineering Lab	On completion of this course, the students will be able to learn about tension and compression steel members, plate girders, design of bridges, continuous beams and frames.
7	CEM 205	Optimization Techniques	On completion of this course, the students will be able to learn about fundamentals of linear programing, sensitivity analysis, simulation and sequencing.
8	CEM 206	Design of Pre-Stressed Structures	On completion of this course, the students will be able to learn about different systems of pre-stressing, pre-tensioned and post tensioned concrete, losses in pre-stressed concrete.
9	CEM 207	Experimental Stress Analysis	On completion of this course, the students will be able to learn about different methods of measurement of strains, stresses and vibrations. They will also learn photoelasticity and different measurement devices.

THIRD SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	CEM 301	Research Methodology	On completion of this course, the students will be able to learn about different research methodologies, research modeling and design. They will learn how to use computer in their research.
2	CEM 302	Advanced RCC Design	On completion of this course, the students will be able to learn about construction of flat slab, yield line theory, virtualwork method and deep beam construction.
3	CEM 303	High Rise Buildings Analysis	On completion of this course, the students will be able to learn about high rise building analysis, analysis of torsion in buildings, shear walls and beam-column joints for ductility
4	CEM 322	Advanced RCC Design Lab	On completion of this course, the students will be able to learn about construction of flat slab, yield line theory, virtual work method and deep beam construction.
5	CEM 324	Building Design Project Lab UsingSoftware	On completion of this course, the students will be able to learn about high rise building analysis, analysis of torsion in buildings, shear walls and beam-column joints for ductility.
6	CEM 325	Structural Material Testing Lab-II	On completion of this course, the students will be able to learn about various tests on mild steel rod, coil springs, concrete cube tests, RCC beams and different NDT tests.
7	CEM 306	Analysis of Plate and Shells	On completion of this course, the students will be able to learn about bending of plates, uniformly loaded circular plates, Navier solution for simply supported rectangular plates and design of spherical domes with/without lanterns at top.
8	CEM 307	Reliability Based Civil EngineeringDesign	On completion of this course, the students will be able to learn about probability theory for reliability based civil engineering design, resistance distribution, structural reliability.
9	CEM 308	Evaluation and Retrofitting of Building	On completion of this course, the students will be able to learn about deterioration of concrete buildings, structural health monitoring of buildings, surface repair and retrofitting techniques and seismic rehabilitation of existing buildings.

FOURTH SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	MMP 460	DISSERTATION (20-22 WEEKS)	Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M. Tech. (Computer Science and Engineering)

Programme Educational Objectives

Post Graduates of the programme M.Tech. (Computer Science and Engineering) will:

PEO 1: Show proficiency in various domains of Computer Science and Engineering, with expertise particularly in one of the emerging specializations.

PEO 2: Display the necessary understanding in advanced realms of Computer Science and Engineering, showcasing problem-solving skills essential for success in research-focused industry and academics.

PEO 3: Demonstrate the communication, teamwork, and leadership abilities necessary to operate efficiently within diverse, dynamic teams.

PEO 4: Cultivate a capacity for self-directed and lifelong learning to stay updated with swiftly advancing technologies.

PEO 5: Adhere to ethical principles and human values within their professional endeavors.

Programme Outcomes :

PO1. Engineering 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 toassess 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. 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.

PO12. 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

.

Program Specific Outcomes:

PSO1. Professional Skills: Apply knowledge of recent computing technologies, skills andcurrent tools of computer science and engineering.

PSO2. Problem-solving skills: Ability to explore research gaps, analyze and carry out researchin the specialized/emerging areas.

PSO3. Successful career and Entrepreneurship: Design software systems, components, orprocesses to meet identified needs within economic, environmental and social constraints.

Course Outcomes:

FIRST SEMESTER:

S. N o.	Course Code	Course Name	Course Outcome
1	CSM 101	Advanced Data Structures and Algorithm Design	- Analyze the asymptotic performance of algorithms. - Derive and solve recurrences describing the performance of divide-and-conquer algorithms. - Find optimal solution by applying various methods. - Apply pattern matching algorithms to find particular pattern. - Differentiate polynomial and non-polynomial problems. - Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. - Illustrate the methods for data recovery, evidence collection and data seizure. - Summarize duplication and preservation of digital evidence.
2	CSM 102	Distributed Operating System	After learning the course the students should be ableto: - List the principles of distributed systems and describe the problems and challenges associated withthese principles. - Understand Distributed Computing techniques, Synchronous and Processes. - Apply Shared Data access and Files concepts. - Design a distributed system that fulfills requirementswith regards to key distributed systems properties. - Understand Distributed File Systems and DistributedShared Memory. - Apply Distributed web-based system. - Understand the importance of security in distributedsystems
3	CSM 103	Advanced Database Management System	The students will learn: - Exposure for students to write complex queries including full outer joins, self-join, sub queries, and set theoretic queries. - Knowhow of the file organization, Query Optimization, Transaction management, and database administration

			techniques
4	CSM 104	Data Compression	• Solve the problems associated withdifferent source coding techniques. • Implement the compression techniques to compress the different raw data. • Summarize the concepts associated speech, image and video compression. • Recognize the usage data compression in telecommunication engineering and to solve the corresponding problems.
5	CSM 105	Artificial Intelligence & Machine Learning	At the end of this course, students will learn: • about Artificial Intelligence and intelligentagents, history of Artificial Intelligence • Building intelligent agents (search, games,logic, constraint satisfaction problems) • Machine Learning and its basics • Applications of AI and ML
6	CSM 106	Discrete Structure	• For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives • For a given a problem, derive the solution using deductive logic and prove the solution based on logical inference. • For a given a mathematical problem, classify its algebraic structure • Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra. • Develop the given problem as graph networks and solve with techniques of graph theory.
7	CSM 121	Advanced Data Structures and Algorithm Design Lab	At the end of this course, students will demonstrate ability to: • Identify the problem given and design the algorithmusing various algorithm design techniques. • Implement various algorithms in a high level language. • Analyze the performance of various algorithms. • Compare the performance of different algorithmsforsame problem.
8	CSM 123	Advanced Database Management System Lab	The students will learn: • Exposure for students to write complex queries including full outer joins, self-join, sub queries, and set theoretic queries. • Knowhow of the file organization, Query Optimization, Transaction management, and database administration techniques
9	CSM 125	Artificial Intelligence & Machine Learning Lab	Learner will learn • basics of R • to analyse Data in terms of Graphical View. • do programming for data visualisation • 4. to work on Rstudio.

SECOND SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	CSM 201	Automata Theory and Compiler Design	At the end of this course, students will be able to do the following: ϒ Students will demonstrate knowledge of basic mathematical models of computation and describe how they relate to formal languages. ϒ Students will understand that there are limitations on what computers can do, and learn examples of unsolvable problems. ϒ Students will learn that certain problems do not admit efficient algorithms, and identify such problems.
2	CSM 202	Ad Hoc and Sensor Networks	Upon successful completion of this unit, studentsshould be able to: ☐ Students will be able to describe an adhoc network and analyze various technologies associated with it. ☐ Students will be able to analyze various transport layer and analyze various protocols associated with it. ☐ Students will apply this knowledge to analyze adhoc & sensor based networks and compute various parameters associated with it
3	CSM 203	Soft Computing Techniques	• Discuss the various aspects of uncertainty in real life and inability of conventional computing to handle them. • Relate real life problem contexts to soft computing paradigms tools • Design and use fuzzy sets and numbers in the context of various domains.

			• Design fuzzy rule based system for a control application like washing machine. • Identify the problems suitable for solution using neural networks • Train a perceptron network over a given input/output pattern information. • Design a genetic model for a given problem with huge state space. • Apply GA tools and solution to a problem tofind an amicable solution for the same. • Design soft computing models to solve real lifeproblems
4	CSM 204	Image Processing and Pattern Recognition	• Ability to examine various types of images, intensitytransformations and spatial filtering. • Ability to evaluate the methodologies for image segmentation, restoration etc. • Ability to apply image processing algorithms in connection with pattern recognition methods. • Ability to develop Fourier transform for image processing in frequency domain.

5	CSM 205	Software Project Management	Students who complete this course will be able to
			   o design a project management plan usingdifferent project management lifecycles.
			   o find a suitable project management lifecycle model for effective projectexecution.
			   o analyse the risks associated with the projects.

6	CSM206	Introduction to Python Programming	
7	CSM 224	Image Processing and Pattern Recognition Lab	• Ability to implement the image processing techniques using colour models. • Ability to implement the image compression algorithm. • Ability to implement the various image enhancementtechniques with pattern recognition.
8	CSM 225	Software Project Management Lab	Students will be assigned with a course projectin which they will furnish a report by exercising their knowledge about Software Project Management.
9	CSM226	Introduction to Python ProgrammingLab	Ability to create client-server application for real world problems. . Ability to develop multithreaded application. Ability to create web application for real world problem.

THIRD SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	CSM 301	Cyber Security and Digital Forensics	Able to know the brief fundamentals of hardware and software component. Learn PC-based partition such as DOS partition, applepartition and its analysis. Able to understand hard disk technology. Well aware from the internal process of operating system. Have an idea of memory management and disk management.
2	CSM 302	Socket Programming and NetworkSecurity	• Develop programs using TCP Sockets. • Use Socket Options. • Develop Macros for including Objects In MIB
3	CSM 303	Parallel Computing	• Be proficient at programming multiple parallel machines in more than one special programming language or programming system • Be able to descriptively compare the performance of different programs and methods on one machine • Demonstrate advanced knowledge of the elements of parallel programming, parallel communication and system implementation • ☐ Recall the history of parallel systems, principles of parallel algorithms and describe the developments in thefield of parallel computing.
4	CSM 304	Data Mining and Data Analysis	
5	CSM 305	IoT and Sensor Networks	The student will learn • Understand key IoT concepts on sensor network. • Understand routing in wireless sensor network. • How IOT work on data link and network layer.
6	CSM 322	Socket Programming and NetworkSecurity Lab	Learner will be able to... • Understand network programming • Create and run socket program on an open source OS

			• Implement Infrastructure, scripts as a Service.
7	CSM 323	Parallel Computing Lab	• Memorize parallel processing approaches • Describe different parallel processing platforms involvedin achieving High Performance Computing. • Discuss different design issues in parallel programming • Develop efficient and high performance parallel programming • Learn parallel programming using message passing paradigm using open source APIs. • Design algorithms suited for Multicore processor and GPU systems using
8	CSM 324	Data Mining and Data Analysis Lab	
9	CSM 325	IoT and Sensor Networks Lab	**Course Outcomes:** The student will learn • Understand key IoT concepts on sensor network and implementation of IOT devices with the help of different -2 sensors.
10	CSM 306	Semantic Web and Knowledge Management	• To learn Web Intelligence • To learn Knowledge Representation for the SemanticWeb • To learn Ontology Engineering • To learn Semantic Web Applications, Services andTechnology • To learn Social Network Analysis and semantic web
11	CSM 307	Research Methodology	
12	CSM 308	Real-Time Systems	
13	CSM 309	Mobile and Pervasive Computing	• Students will able to describe the basic concepts and principles in mobile computing • Students will able to understand the concept of Wireless LANs, PAN, Mobile Networks, and SensorNetworks • Students will able to explain the structure and components for Mobile IP and Mobility Management • To get clear idea about WAP architecture and security. • Be able to learn speech application in pervasive computing. • Become familiar with different voice standards. • Identify user interface issues in pervasive computing.
14	CSM 310	Service Oriented Architecture	**Upon successful completion of this course, the students will be able to:** • Understand XML technologies • Understand service orientation, benefitsof SOA • Understand web services and WS standards • Use web services extensions to developsolutions • Understand and apply service modeling, service oriented analysis and design for

S. No.	Course Code	Course Name	Course Outcome
			application development

FOURTH SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	MMP 460	DISSERTATION (20-22 WEEKS)	Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the formof a research report written by the student

AMITY UNIVERSITY MADHYA PRADESH, GWALIOR
AMITY SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

M.TECH. (ECE)

PEO - 1: To provide our postgraduates strong foundation and enhance skill in the field of electronics & communication engineering by strengthening their core competencies.

PEO2: To train our postgraduates such that they must be employable in private sector/public sector/research organizations or work as an entrepreneur.

PEO3: To prepare our postgraduates for providing solutions to complex and challenging problems by applying knowledge of electronics & communication engineering.

PEO4: To train our postgraduates who can be future leaders and work as team member in multidisciplinary environment.

PEO5: To develop professional and ethical attitude for solving global challenges and make positive impact on the society.

Programme Outcomes :

PO1. Engineering 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 toassess 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:

PSO1. Professional Skills: An ability to apply the knowledge to understand, analyze and develop complex Engineering solutions in the field of Electronic Devices, Electronics Networks, Analog and Digital circuits, and Telecommunication Communication networks.

PSO2. Problem-solving skills: An ability to apply standard practices and strategies in hardware and software project development using necessary hardware skills and open-ended programming environments to deliver a quality product in multidisciplinary domain.

PSO3. Successful career and Entrepreneurship: An ability to employ modern technology and software platforms in creating innovative career paths in Industry, as an Entrepreneur and a zestfor higher studies.

PSO3.Research and Development: An ability to undertake research for the development ofnew ideas, technology and Engineering solutions for societal benefit.

Course Outcomes:

FIRST SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	ECM 101	Advanced Digital Communication	At the end of this course students will demonstrate the ability to • Understand and analyze the signal flow in a digital communication system. • Analyze error performance of a digital communication system in presence of noise and other interferences. • Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency. • Perform the time and frequency domain analysis of the signals in a digital communication system. • Analyze Performance of spread spectrum communication system.
2	ECM 102	Audio Signal Processing	At the end of this course students will demonstrate the

			ability to • Understand and analyze the concepts of Audio Signal Processing. • Analyze Linear Prediction in Narrowband and Wideband Coding. • Analyze the performance of a Psychoacoustic Principles. • Understand the concept of Analysis-Synthesis Framework for M-band Filter Banks. • Understand the concept ofLossless Audio Coding
3	ECM 103	Stochastic Methods	At the end of this course students will demonstrate the ability to • Illustrate and formulate fundamental probability distribution and density functions, as well as functions of random variables. • Explain the concepts of expectation and conditionalexpectationand describe their properties. • Analyze continuous and discrete-time random processes. • Explain the concepts of stationary and wide-sense stationarityand appreciate their significance. • Apply the theory of stochastic processes to analyzelinear systems. • Apply the above knowledge to solve basic problemsin queuing networks.
4	ECM 121	Advanced Digital Communication Lab	Upon completion of this laboratory course students will demonstrate the ability to • Analyze and compare different digital modulation schemes for their efficiency and bandwidth. • Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency. • Understand the basic concept of Companderand Expander. • Analyze different digital modulation schemes and can compute the bit errorperformance.
5	ECM 122	Audio Signal Processing Lab	Upon completion of this laboratory course students will demonstrate the ability to • Analyze and compare different audio signalprocessing techniques. • Handling audio files in MATLAB software. • Analyze the audio signals using Short-term Fourier Transform (STFT) in the time-frequency domain. • Understand the basic concept of Up-samplingand down-sampling of audio file.

			• Analyze the powerspectral density of different types of audio signals.
6	ECM 124	Lab Using Labview Software /MATLAB	Upon completion of this laboratory course students will demonstrate the ability to • Express programming & simulation for engineering problems. • Find importance of this software for Lab Experimentation. • Articulate importance of software's in research by simulation work. • In-depth knowledge of providing virtual instruments on LabVIEW Environment. • Observe the characteristics of different DC motors using Lab View software.
7	ECM 105	Low Power VLSI Design	At the end of this course students will demonstrate the ability to • Analyze the need for low power VLSI circuits. • Understand dynamic and static powerdissipation and factors affecting them. • Recognize Role of simulation possible at various levels of design. • Define Relationship of probability while calculating power dissipation of circuits. • Apply Power reduction techniques possible at circuit,logic level. • Analyze Clock as a major source of power dissipation and distinguish various methods to reduce it.
8	ECM 106	Advanced Instrumentation & SystemDesign	At the end of this course students will demonstrate the ability to • Understand the static and dynamic characteristics of transducer system. • Find importance of Transducers for Biomedical Application. • Articulate importance of data acquisition onPC and sampling fundamentals. • In-depth knowledge of Development of Virtual Instrument using GUI, Real-time systems • Role of transducers in Instrumentation • In-depth knowledge of providing virtual instruments on LabVIEW Environment.
9	ECM 107	Wireless Communication	At the end of this course students will demonstrate the ability to • Discuss the cellular system design and technicalchallenges.

			• Analyze the Mobile radio propagation, fading, diversity concepts and the channel modeling.
			• Analyze the design parameters, link design, smart antenna, beam forming and MIMO systems.
			• Analyze Multiuser Systems, CDMA, WCDMA network planning and OFDM Concepts.
			• Summarize the principles and applications of wireless systems and standards.

SECOND SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	ECM 201	Computer Communication & Networks	At the end of this course students will demonstrate the ability to • Have agood understanding of the OSI Reference Model and in particularhave a good knowledgeof Layers 1-3. • Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies. • Have a basic knowledge of the use of cryptography and network security. • Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols. • Have an understanding of the issues surrounding Mobile and Wireless Networks. • Have a working knowledge of datagram and internet socket programming.
2	ECM 202	Advanced Microwave Engineering	At the end of this course students will demonstrate the ability to • Identify and describe principle and operation ofadvanced microwave devices and circuits. • Students are able to analyze where and how advanced microwave components are used. • Design microwavecircuits using basicmicrowave components and devices. • Construct applicationbased circuitsusingmicrowave diodes/transistors etc.
3	ECM 203	Advanced Information Theory & Coding	At the end of this course students will demonstrate the ability to • Calculate the information content of a random variable from its probability distribution. • Relate the joint, conditional, and marginal entropies of variables in terms of their coupled probabilities. • Define channel capacities and properties using

			Shannon's Theorems. • construct efficient codes for data on imperfect communication channels. • Generalize the discrete concepts to continuoussignals on continuous channels. • To obtain an understanding of the theoretical principles of source coding. • Describe the information resolution,compression, and efficient coding properties.
4	ECM 221	Computer Communication & Networks Lab	Upon completion of this laboratory course students will demonstrate the ability to • Understand fundamental underlying principles of computer networking • Understand details and functionality of layered network architecture. • Apply mathematical foundations to solve computational problems in computer networking. • Analyze performance of various communication protocols. • Compare routing algorithms. • Practice packet /file transmission between nodes.
5	ECM 222	Advanced Microwave EngineeringLab	At the end of this laboratory course students will demonstrate the ability to • Identify and describe principle and operation ofadvanced microwave devices and circuits. • Students can analyze where and how advancedmicrowave components are used. • Design microwavecircuits using basicmicrowave components and devices. • Construct application-based circuitsusingmicrowave diodes/transistors etc.
6	ECM 224	CDMA Lab using Qualnet	Upon completion of this laboratory course students will demonstrate the ability to • Express programming & simulation for engineering problems. • Find importance of this software for Lab Experimentation. • Articulate importance of software's in researchby simulation work. • In-depth knowledge of different Antenna models for wireless networks onQualnet software. • Develop a Wireless network scenario using Qualnetsoftware.
7	ECM 205	Advanced Optical Communication	At the end of the course, students will demonstrate the ability to: • Understand the principles fiber-opticcommunication, the components and the bandwidth

S.No.	Course Code	Course Name	Course Outcome
			advantages. ☐ Understand the properties of the optical fibers and opticalcomponents. ☐ Understand operation of lasers, LEDs, anddetectors. ☐ Analyze system performance of opticalcommunicationsystems. ☐ Design optical networks and understand non-lineareffects in opticalfibers. ☐ Discuss the basic applications of optical amplifiersand widely used networks like SONET/SDH. ☐ Understand principles and concepts of WavelengthDivision Multiplexing. (WDM)
8	ECM 206	Satellite Communication	At the end of this course students will demonstrate the ability to • Visualize the Network architectures and access control protocolsof VSAT System. • State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple accessschemes. • Understand the concept of Low Earth Orbit and Non – Geostationary Satellite System. • Solve numerical problems related to orbital motion and design of link budget for the given parameters and conditions.
9	ECM 207	MEMS & IC Integration	At the end of this course students will demonstrate the ability to • Acquire knowledge about MEMS & Micro Sensors, Pressure sensors with embedded electronics. • Understand various micro fabrication technologies. • Gather knowledge of characterization tools. • Acquire knowledge about Device Applications • Understand the concept of MEMS system-level design methodology.

THIRD SEMESTER:

S. N o.	Course Code	Course Name	Course Outcome
1	ECM 301	Antenna Theory & Design	At the end of this course students will demonstrate the ability to • Define overall needs and constraintsof RF systems and antenna. • The ability to develop and assess alternative RF system designs based on technicalcriteria. • The technical ability to analyze a prescribed communication sub-system Analyze and attract the vital resources required toeffectively use a RF system.

			• To identify and solve the technical requirements of the communication system and its impact on the global society. • Evaluate the opportunities involving technology, a product or a service required for developing a startup idea
2	ECM 302	Image Processing & Pattern Recognition	At the end of this course students will demonstrate the ability to • Identify and describe operation of different smoothing and sharpening filters. • Students are able to analyze the different segmentation techniques. • Students are able to apply different de-noisingmodels to recover original image. • Identifydifferent pattern recognition methodsand apply them in problem areas.
3	ECM 303	Research Methodology	At the end of this course students will demonstrate the ability to • Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling. • Have basic knowledge on qualitative research techniques. • Have adequate knowledge on measurement & scaling techniques as well as the quantitative data analysis. • Have basic awareness of data analysis-and hypothesis testing procedures.
4	ECM 321	Antenna Technology Lab	At the end of this laboratory course students will demonstrate the ability to • Define overall needs and constraintsof RF systems and antenna. • The ability to develop and assess alternative RF system designs based on technicalcriteria. • The technical ability to analyze a prescribed communication sub-system Analyze and attract the vital resources required toeffectively use aRF system. • Understand the Design and implementation of different Microstrip patch antenna on HFSS.
5	ECM 322	Advanced Image Processing Lab	At the end of this course students will demonstrate the ability to ☐ Identify To study about the basic image processing tools. ☐ Simulate all programs using MATLAB. ☐ Identify and describe operation of different smoothing and sharpening filters. ☐ Students are able to analyze the different segmentation techniques.

			• Students are able to apply different de-noisingmodels to recover original image. Identifydifferent pattern recognition methods and apply them in problem areas
6	ECM 324	Semiconductor Device Physics & Modeling Lab (using SILVACO)	At the end of this course students will demonstrate the ability to ☐ Identify SILVACO softwarefor semiconductordevice physics & modeling lab ☐ Simulate all programs using SILVACO software. ☐ Identify and describe the I-V characteristics ofHBT. ☐ Students are able to analyze anddesign an optically controlled MOSFET with Gaussian doping.
7	MAM 309	Optimization Techniques	At the end of this course students will demonstrate the ability to • Describe clearly a problem, identify its parts and analyze the individual functions. • Feasibility study for solving an optimization problem. • Becoming a mathematical translation of the verbal formulation of an optimization problem. • To design algorithms, the repetitive use of which will lead reliably to finding an approximate solution. • Evaluate and measure the performance of an algorithm. • Discovery, study and solve optimization problems. • Understand optimization techniques using algorithms. • Investigate, study, develop, organize and promote innovative solutions for various applications
8	ECM 305	Project Management	At the end of this course students will demonstrate the ability to • Manage the scope, cost, timing, and quality of the project, at all times focused on project success as defined by project stakeholders. • Align the project to the organization's strategic plans and business justification throughout its lifecycle. Identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders. • Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.

S.No.	Course Code	Course Name	Course Outcome
9	ECM 306	Reliability Engineering	At the end of this course students will demonstrate the ability to • Understand Network Modelling and ReliabilityEvaluation of Simple Systems. • Identify Probability Distributions in ReliabilityEvaluation. • Identify General Modelling Concept for Discrete Markov Chains
10	CSM 311	Cluster & Grid Computing	At the end of this course students will demonstrate the ability to • Understand the concept of Grid Computing, Web Services, and Service-oriented architecture, Architecture for grid computing, Cluster Computing, process scheduling and load balancing. • Understand the concept of Parallel Programming with MPI, Resource management and scheduling. • Understand the concept of deployment of Grid, software and tools, and application execution.

FOURTH SEMESTER:

S.No.	Course Code	Course Name	Course Outcome
1	MMP 460	DISSERTATION (20-22 WEEKS)	Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the formof a research report written by the student

M.TECH. (MECHANICAL ENGINEERING)

PEO 1:   To enable postgraduates pursue successful careers in Indian & Global industrial organizations with application of engineering knowledge and skills to formulate and undertake the industrial design, development, operation and maintenance problems of mechanical systems and find viable solutions.

PEO 2:   To inculcate and develop in postgraduates the lifelong learning aptitudes, ethics and values and leadership qualities that will enable them to serve the industry, society at the national and global levels while serving as professionals, entrepreneurs , academicians and researchers.

PEO 3:   To prepare students to be able to work as members of teams on multidisciplinary projects with professional ethics and socio-economic, environmental consciousness along with technological competence.

PEO 4:   To provide a sound and updated knowledge base and skill set to the students to enable them pursue higher education and cutting-edge research work at premier institutions/universities and research centers across the globe.

PEO 5:   Inspiring and motivating students to apply their analytical, scientific and technical knowledge & skills for innovation in products/processes leading to improvisation in productivity of organizations/society.

Programme Outcomes :

PO1. Engineering 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 toassess

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 needfor 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:

PSO1.Professional Skills: The graduates shall have the domain knowledge, interdisciplinary research capability, analytical, logical and technical competency to develop innovative productsin the areas of social concern.

PSO2. Problem-solving skills: The graduates shall be equipped with professional, ethical and communicational skills to be successful team builders in meeting out the demands of the industry.

PSO3. Successful career and Entrepreneurship: The graduates shall be aspiring mechanical engineers with good values, having the ambition of lifelong learning and transferring the knowledge to the society.

Course Outcomes:

FIRST SEMESTER:

S. N o.	Course Code	Course Name	Course Outcome
1	MEM 101	Numerical Method & Programming	• Students will be able to define different mathematical problems of algebraic & transcendental equations, interpolation & approximation, linear equations, numerical equation & differentiation and differential equations. (Level 1 define and memorize) • Students will be able to compare different methods of solution of mathematical problems of algebraic & transcendental equations, interpolation & approximation, linear equations, numerical equation & differentiation and differential equations. (Level 2 compare and contrast) • Students will be able to apply acquired knowledge of various methods learnt in real life problems. (Level 3 apply) • Students will be able to analyze various

			mathematical and analytical methods of algebraic & transcendental equations, interpolation & approximation, linear equations, numerical equation & differentiation and differential equations. (Level 4 Analyze)
			• Students will be able to evaluate various methods in order to arrive upon the best technique to solve agiven problem. (Level 5 Evaluate)
			• Students will be able to formulate newer laws and principles based upon the methods studied during this course and will be able to take individual case studies bases upon them. (Level 6 Synthesis)
2	MEM 102	Advanced Manufacturing Processes	• Student will be able to define and state the various advanced manufacturing processes terminologies and their underlying principles
			• Students will be able to classify the types of advanced manufacturing and machining processes, their evolution and need.
			• Students will be able to apply the understanding and knowledge to select the latest and proper advanced manufacturing process for metal forming, casting, machining or additive manufacturing.
			• Students will be able to analyze the various process parameters of advanced manufacturing processes, rapid prototyping and types of generative manufacturing processes
			• Students will be able to analyze the processes and evaluate the role of each process parameter during various advanced manufacturing processes
3	MEM 103	Theory of Metal Forming	• Students will be able to learn the stress strain characteristics of materials, mechanics of different processes like rolling, forging, extrusion, drawing, bending and different high speed forming techniques.
			• Students will be able to differentiate between various forming process on the basis of their principles and stress-strain characteristics.
			• Students will be able apply the acquired knowledge in real life problem solution related to forming techniques.
			• Students will be able to analyze the different bulk metal forming process mechanics using different analysis approach and calculate the force, power requirements etc.
			• Students will be able to evaluate the effect of process parameters on the process mechanics during bulk metal forming.
			• Students will be able to Design a system taking into consideration the concepts of ease of forging, rolling, extrusion, drawing, etc.
4	MEM 104	Operation Management	• Students will be able to describe the concepts of productivity, planning, scheduling and operations management, MRP & CRP concepts, inventory types and its objectives.
			• Students will be able to identify the elements of

			operations management and discuss their effects to enhance productivity and quality.
			• Students will be able to apply the decision models to various real time problems.
			• Students will be able to analyze problems using different forecasting techniques, compare various planning, controlling and scheduling techniques.
			• Students will be able to develop a balanced line of production & scheduling and sequencing techniques
			• Students will be able to develop aggregate capacity plans and Master Production Schedule in operation environments and formulate suitable quality control measures in quality circles to TQM.
5	MEM 122	Advanced Manufacturing Lab-I	• Student will be able to learn the preparation of various jobs using various manufacturing process
			• Student will be able to differentiate between various jigs and fixtures and their uses in industry
			• Student will be able to apply some of the manufactures process directly in the industry for preparation of complicated jobs.
			• Student will be able to identify and explain the various machining operations and their applications.
			• The student will be trained to implement similar features in preparation of jobs can be extendedto implement in the preparation of complicated jobs.
6	MEM 123	Theory of Metal Forming Lab	• Students will be able to understand the stress strain concept for different types of materials.
			• Student will be able to explain the characteristics and forces developed in rolling, forging, drawing, bending, etc.
			• Student will be able to demonstrate the working of common machine such as universal testing machine, bending machine, etc.
			• Student will be able to design and develop different components for the real life project.
7	MEM 124	Work Shop Practice Lab	• Students will be able to understand the working of machine tools such as lathe, shaper, planner, s milling and grinding.
			• Student will be able to explain the features and applications of lathe, milling, drilling and grinding machines.
			• Student will be able to demonstrate the working of common machine tools like lather, shaper,

| | | | miller and grinding. |
| | | | • Student will be able to design and developed different machine tools for the real life project. |

SECOND SEMESTER:

S. N o.	Course Code	Course Name	Course Outcome
1	MEM 201	Optimization Techniques	Upon completion of the course, students will have: • Describe clearly a problem, identify its parts and analyze the individual functions. • Feasibility study for solving an optimization problem. • Becoming a mathematical translation of the verbal formulation of an optimization problem. • To design algorithms, the repetitive use of which willlead reliably to finding an approximate solution
2	MEM 202	Casting Technologies	The students will able to understand and apply the principlesof metal casting processes and develop analytical relation between input and output process parameters. They will also be able to analyze and apply the concept ofcooling rate of materials in metal casting.
3	MEM 203	Materials Management	On completion of this course, the students will be able to meet: • Identifying the scope for integrating materials management function over the logistics and supply chain operations. • Integrate the organization wide materials requirement to develop an overall plan (MRP). • Identify, study, compare, and evaluate alternatives, select and relate with a good supplier. • Apply various purchasing method and inventory controlling techniques into practice. • Analyzing the materials in storage, handling, packaging, shipping distributing and standardizing. CO6. Integrate important materials functions to both products and services & use MRP, ERP & PLM managing materials
4	MEM 204	Product Design & Development	A student passing this module should be able to: • Identify and analyse the product design and development processes in manufacturing industry. • Define the components and their functions of product design and development processes and theirrelationships from concept to customer over whole product lifecycle. • Analyse, evaluate and apply the methodologies forproduct design, development and management. • Undertake a methodical approach to the managementof product development to satisfy customer needs. • Carry out cost and benefit analysis through variouscost models. • Be familiar with the design protection and Intellectual Property.

S. No.	Course Code	Course Name	Course Outcome
5	MEM 225	Computer Aided Design Lab	• To develop different types of surfaces with the helpof different curves • Suggest whether the given component is safe or notfor the applied loading conditions • Select suitable manufacturing method for differentmechanical components using CAM software.
6	MEM 226	Advanced Manufacturing Lab - II	• Student should be able to select appropriate manufacturing processes for advanced components with characterization of work pieces. • Student should be able to understand Various Advanced manufacturing metal forming Processes • Student should be able to understand to select proper Advanced Manufacturing process for welding, casting and forging.

THIRD SEMESTER:

S. N o.	Course Code	Course Name	Course Outcome
1	MEM 301	Research Methodology	After the completion of course students would be able to doliterature study, case study, structured surveys, interviews, focus groups, participatory approaches, narrative analysis, cost-benefit analysis, scenario methodology and technologyforesight.
2	MEM 302	Unconventional Machining	After completion of course, the student shall understand theprinciple of working, mechanism of metal removal in the various unconventional machining process. The student is able to identify the process parameters, their effect and applications of different processes.
3	MEM 303	Computer Integrated Manufacturing	• Understand the importance of CAD/CAM principlesin the Product development. • Develop programs related to manufacturing using codes. • Analyze the importance of networking in manufacturing environment.
4	MEM 322	Unconventional Machining Lab	Upon completion of this course, students will be able to conduct experiments on various unconventional machining.
5	MEM 323	Computer Integrated Manufacturing Lab	On successful completion of the course, the student will be able to • Explain lifecycle of a product and the role of computer-aided Manufacturing (CAM) in product development. • Describe the concepts of geometric and solid modeling. • Visualize geometric models through animation and transform them into real world systems.
6	MEM 324	Simulation & Modeling Lab	After the completion of course students will have a clear understanding of the need for the development process to initiate the real problem. Students will have a clear understanding of principle and techniques of simulation methods. Students would be able to model from different fields –and implementation of numerical algorithm to meet simple requirements.

			On completion of this course, the students will be able to understand issues & challenges in implementing & developing lean manufacturing techniques and its contribution for improving organizational performance.
7	MEM 304	Lean Manufacturing	On completion of this course, the students will be able to understand issues & challenges in implementing & developing lean manufacturing techniques and its contribution for improving organizational performance.
8	MEM 305	Total Productive Maintenance	Upon completion of this course, students will be able to understand the principles of various maintenance techniques.
9	MEM 306	Supply Chain Management & Logistics	Upon completion of this course, students will have knowledgeof scientific theories and methods relevant to managing supply chains and operations within such chains.

FOURTH SEMESTER:

S. N o.	Course Code	Course Name	Course Outcome
1	MMP 460	DISSERTATION (20-22 WEEKS)	Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student

M.TECH. (STRUCTURAL ENGINEERING)
M Tech (Structural Engineering)

Graduates of the programme M Tech Structural Engineering will

PEO 1: Graduates of the program will have in-depth knowledge to identify and formulate challenging problems in Structural Engineering, apply appropriate research methodologies, use modern engineering tools and provide technically sound, economical and sustainable solutions.

PEO 2: Graduates will have ability for higher studies and undertake high value research on Structural Engineering and other related issues.

PEO 3: Graduate of program will actively engage in a professional career as a Structural Consultant and has sound analytical and lateral thinking ability to engage in lifelong learning for professional advancement to cope up with multidisciplinary and changing technologies in Structural Engineering.

PEO 4: Graduates of the program will have sense of social responsibility, will demonstrate ability to communicate and

PEO 5: Graduates of the programme will work effectively as a team member in an ethical way, and will play leadership roles in their profession, public services and community.

Programme Outcomes :

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineeringproblems.

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 theengineering 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 theengineering and management principles and apply these to one's own work, as a member andleader in a team, to manage projects and in multidisciplinary environments.

PO12.Life-long learning: Recognize the need for, and have the preparation and ability toengage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes:

PSO_01: Develop and apply innovative, state-of-the-art practices and technologies and Provide sustainable solutions to the Civil Engineering Problems

PSO_02: Plan, design, construct and operate society economic and social engine that built the environment and also protecting, restoring the natural environment

PSO_03: Apply modern techniques, advanced materials, equipment and management tools so as to complete the civil engineering project within specified time and funds

Course Outcomes:

FIRST SEMESTER:

S.No.	Course Code	Course Name	Course Outcome
1	CEM 101	Numerical Analysis and ComputerProgramming	On completion of this course, the students will be able to learn about fundamentals of numerical methods such as interpolation, differentiation, integration and differential equations. They will also learn the basics of programming.
2	CEM 102	Concrete Technology	On completion of this course, the students will be able to learn the manufacture, properties, types and effect of different agencies on properties of concrete.
3	CEM 103	Advanced Structural Analysis	On completion of this course, the students will be able to learn the advanced concepts of structural analysis such as Force methods, Displacement methods, solution of symmetrical and anti-symmetrical problems, stiffness of plane and space frames solution of problems.
4	CEM 105	Bridge Engineering	On completion of this course, the students will be able tolearn the concepts of bridge engineering piers, abutments, R.C. bridges, Prestressed bridges, their construction

			and design.
5	CEM 121	Numerical Analysis and ComputerProgramming Lab	On completion of this course, the students will be able to learn about fundamentals of numerical methods such as interpolation, differentiation, integration and differential equations. They will also learn the basics of programming.
6	CEM 122	Concrete Technology Lab	On completion of this course, the students will be able tolearn the manufacture, properties, types and effect of different agencies on properties of concrete.

S. No.	Course Code	Course Name	Course Outcome
7	CEM 123	Advanced Structural Analysis Lab	On completion of this course, the students will be able to learn the advanced concepts of structural analysis such as Force methods, Displacement methods, solution of symmetrical and anti-symmetrical problems, stiffness of plane and space frames solution of problems.
8	CEM 106	Advanced Elasticity And Plasticity	On completion of this course, the students will be able to learn the behavior of curved bars and thick walled cylinder on pure bending, general stress and strain equations, Saint Venant's theory, 2-D plastic flow etc.

SECOND SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	CEM 104	Structural Dynamics And EarthquakeResistant Building	On completion of this course, the students will be able to learn the concepts of engineering seismology, earthquake resistant design of buildings, seismic strengthening procedures etc.
2	CEM 203	Finite Element Method	On completion of this course, the students will be able to learn about fundamentals of finite element method, its procedures, static analysis and Gaussian elimination.
3	CEM 207	Experimental Stress Analysis	On completion of this course, the students will be able to learn about different methods of measurement of strains, stresses and vibrations. They will also learn photoelasticity and different measurement devices.
4	CEM 222	Advanced Foundation EngineeringLab	On completion of this course, the students will be able to learn about advanced concepts of foundation engineering including pile and shallow foundation, cofferdams and machine foundation and soil exploration
5	CEM 223	Finite Element Method Lab	On completion of this course, the students will be able tolearn about fundamentals of finite element method, its procedures, static analysis and Gaussian elimination.

THIRD SEMESTER:

S. No.	Course Code	Course Name	Course Outcome
1	CEM 301	Research Methodology	On completion of this course, the students will be able to learn about different research methodologies, research modeling and design. They will learn how to use computer in their research.
2	CEM 302	Advanced RCC Design	On completion of this course, the students will be able to learn about construction of flat slab, yield line theory, virtualwork method and deep beam construction.
3	CEM 303	High Rise Buildings Analysis	On completion of this course, the students will be able to learn about high rise building analysis, analysis of torsion in buildings, shear walls and beam-column joints for ductility

4	CEM 306	Analysis of Plate and Shells	On completion of this course, the students will be able to learn about bending of plates, uniformly loaded circular plates, Navier solution for simply supported rectangular plates and design of spherical domes with/without lanterns at top.
5	CEM 322	Advanced RCC Design Lab	On completion of this course, the students will be able tolearn about construction of flat slab, yield line theory, virtual

S.No.	Course Code	Course Name	Course Outcome
			work method and deep beam construction.
7	CEM 324	Building Design Project Lab UsingSoftware	On completion of this course, the students will be able to learn about high rise building analysis, analysis of torsion in buildings, shear walls and beam-column joints for ductility.

FOURTH SEMESTER:

S.N o.	Course Code	Course Name	Course Outcome
1	MMP 460	DISSERTATION (20-22 WEEKS)	Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student