DVR & Dr. HS
MIC College of Technology
AUTONOMOUS
(Approved by AICTE & Permanently Affiliated to JNTUK. Kakinada)
Kanchikacherla-521180. NTR Dist, A.P. India.
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DEPARTMENT OF CIVIL ENGINEERING	
COURSE OUTCOMES MIC18 REGULATION	
I SEMESTER (I BTECH -I SEM)	
18CE1T01	ENGLISH - I
CO 1	Use English language, both written and spoken, competently and correctly.
CO 2	Improve comprehension and fluency of speech
CO 3	Gain confidence in using English in verbal situations.
CO 4	Hone the communication skills to meet the challenges of their careers very successfully.
CO 5	Strengthen communication skills in different contexts like formal and informal.
18CE1T02	LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS
CO 1	Apply the knowledge to solve a system of homogeneous and non-homogeneous linear equations
CO 2	Optimize functions of several variables and able to find extreme values of constrained functions
CO 3	Able to analyze the real life situations, formulate the differential equations and then applying the methods
CO 4	Apply the knowledge to solve the linear differential equations
CO 5	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
18CE1T03	ENGINEERING CHEMISTRY
CO 1	study ofpolymers and composite materials enable us to use them in a goof number of engineering fields
CO 2	Electrochemical principles from the basis of batteries that are being developed. Destruction of metals and alloys can be prevented by undrstanding the sicence of corrosion
CO 3	meythods of purification of water can be known so that more of them can be developed
CO 4	industries are run by the quality of fules and energy crisis can be met by broad unsderstandngh of different fuels
CO 5	Study of the existing developed materials forms a basis for developing more number of advanced materials and the basics of analytical techniques helps in analyzing the material.
18CE1T04	PROBLEM SOLVING THROUGH C
CO 1	To formulate simple algorithms for arithmetic, logical problems and translate them to programs in c language
CO 2	To implement conditional branching, iteration and recursion.
CO 3	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
CO 4	o use arrays, pointers and structures to formulate algorithms and programs
CO 5	To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
CO 6	To use structures and files

18CE1T05	**ENGINEERING MECHANICS**
CO 1	Identify and classify different types of forces acting on static structural systems and Model the problem using free-body diagrams and equilibrium equations
CO 2	Identify and model various types of loading and support conditions that act on structural systems
CO 3	Determine the centroid and moment of inertia for various structural elements
CO 4	Analyze motions of rigid body with concepts of dynamics.
CO 5	Analyze static structural frames subjected to loading by method of joints and method of section
18CE1L06	**ENGLISH COMMUNICATION SKILLS LAB - I**
CO 1	Acquire basic proficiency in English by learning functional aspects of English language
CO 2	Learn the methods of enhancing vocabulary
CO 3	Acquaint himself/herself with nuances of phonetics
18CE1L07	**ENGINEERING CHEMISTRY LAB**
CO 1	student is exposed to different methods of chemical analysis abd use of some commonly employed instruments.they thus acquire some expermental skills
18CE1L08	**PROBLEM SOLVING THROUGH C LAB**
CO 1	Demonstrate Knowledge on various concepts of a C language.
CO 2	Able to draw flowcharts and write algorithms.
CO 3	Able design and development of C problem solving skills.
CO 4	Able to design and develop modular programming skills.
CO 5	Able to trace and debug a program
18CE1L09	**ENVIRONMENTAL STUDIES**
CO 1	The concepts of the ecosystem and its function in the environment The importance of environment current global environmental challenges for the sustenance of the life on planet earth.
CO 2	Natural resources clssification and their conservation
CO 3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO 4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO 5	The environmental legislations of India and Social issues and the possible means and EIA
	II SEMESTER(I BTECH -II SEM)
18CE2T01	**ENGLISH - II**
CO 1	Use English language in various contexts
CO 2	Improve comprehension and fluency of speech
CO 3	Appreciate a literary text
CO 4	Hone the communication skills to meet the challenges of their careers very successfully
CO 5	Understand the need for lifelong learning

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18CE2T02	VECTOR CALCULUS & FOURIER TRANSFORMS
CO 1	Determine the areas and volumes using multiple integration
CO 2	Interpret the divergence, gradient and curl physically
CO 3	Analyze the general periodic functions in the form of an infinite convergent sine and cosine series
CO 4	Explain the techniques of Fourier transforms
CO 5	Illustrate the methods to solve the boundary value problems
18CE2T03	ENGINEERING PHYSICS
CO 1	To identify different crystal structures and to study different point defects.
CO 2	To gain basic knowledge of Simple harmonic waves and study of free and forced vibrations.
CO 3	To Develop the knowledge of science of Acoustics and Ultrasonics and their applications in various fields.
CO 4	The Analytical study of response of materials to Electromagnetic fields.
CO 5	The Study of lasers and optical fibers with an emphasis of their Engineering applications.
18CE2T04	BIOLOGY FOR ENGINEERS
CO 1	Understand how biological observations lead to major discoveries and the morphological, Bio chemical and ecological classification of organisms
CO 2	Understand that all forms of life have the same building blocks and their involvement in the maintanence and metabolic processes of living organisms
CO 3	Classify enzymes and distinguish between different mechanisms of enzyme action and study the chemical reactions that are catalysed by enzymes. Apply thermodynamic principles to biological systems and able to understand major chemical process that occur with in a living organism in order to maintain life
CO 4	Identify DNA as genetic material in the molecular basis of information transfer
CO 5	Identify and classify micro organisms, Understand media compositions and growth of microorganisms
18CE2T05	BASIC ELECTRICAL & ELECTRONICS ENGINEERING
CO 1	Analyze various electrical networks.
CO 2	Understand operation of DC generators, single-phase transformer and acquire proper knowledge and working of 3-phase alternator and 3-phase induction motors
CO 3	Understand operation of Sources of Energy & power transmission and distribution using single line diagrams.
CO 4	Analyze operation of half wave, full wave bridge rectifiers and OP-AMPs.
CO 5	Understanding operations of CE amplifier and basic concept of feedback amplifier
18CE2L06	ENGINEERING GRAPHICS
CO 1	Understand the concepts of projections and draw projections for simple entities such as points and lines.

CO 2	To visualize projections of planes
CO 3	To visualize projections of solids
CO 4	To visualize interpenetrations of solids & Development of Surfaces
CO 5	Analyze the 2D drawings and convert to 3D isometric views & converting Isometric view to Orthographic views
18CE2L07	**ENGINEERING PHYSICS lab**
CO 1	Implement the basic principles of Optics through various phenomena of light.
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
18CE2L08	**BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB**
CO1	Identify, assemble the connections of MCB,switches
CO2	Implement the DC Motor and DC Generator
CO3	able to implement Soldering for different circuits
CO4	able to perform chaarecteristics for Moosfet,BJT,UJT
18CE2M09	**BASIC ENGINEERING & IT WORKSHOP**
CO1	Identify, assemble and update the components of a computer
CO2	Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems
CO3	Make use of tools for converting pdf to word and vice versa
CO4	Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex
	III SEMESTER(II BTECH -I SEM)
18CE3T01	**EFFECTIVE TECHNICAL COMMUNICATION**
CO 1	Apply the knowledge to solve a system of homogeneous and non-homogeneous linear equations
CO 2	Illustrate the methods of computing Eigen values and Eigen vectors
CO 3	Able to analyze the real life situations, formulate the differential equations and then applying the methods
CO 4	Determine the solutions of linear differential equations
CO 5	Optimize functions of several variables and able to find extreme values of constrained functions
18CE3T02	**NUMERICAL METHODS AND PROBABILITY STATISTICS**
CO 1	To understand the various numerical techniques.
CO 2	To know the importance of the correlation coefficient & lines of regression
CO 3	To introduce the concepts of probability and statistics.
CO 4	To know sampling theory and principles of hypothesis testing.
18CE3T03	**LIFE SCIENCE**
CO 1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information

CO 2	ask and answer general questions on familiar topics
CO 3	employ suitable strategies to master the art of letter writing and email writing
CO 4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
CO 5	form sentences using proper grammatical structures and correct word forms
18CE3T04	**BULDING MATERIALS & CONSTRUCTION**
CO 1	Identify different building materials and their importance in building construction.
CO 2	Differentiate brick masonry, stone masonry
CO 3	Construction and use of lime and cement in various constructions.
CO 4	Importance of building components and finishings.
CO 5	Know the classification of aggregates, sieve analysis and moisture content
18CE3T05	**STRENGTH OF MATERIALS- I**
CO 1	Implement the basic principles of simple stress and strains
CO 2	Implement the basic principles of shear force and bending moment
CO 3	Implement the basic principles of theory of simple bending and shear stress
CO 4	Implement the basic principles of deflection of beams
CO 5	Implement the basic principles of thin and thick cylinders
18CE3T06	**FLUID MECHANICS**
CO 1	To explain concepts of fluid mechanics used in Civil Engineering.
CO 2	To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
CO 3	To enable the students measure quantities of fluid flowing in pipes, tanks and channels
CO 4	To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.
18CE3T07	**SURVEYING**
CO 1	Highlight the purpose of surveying in civil engineering construction
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
CO 4	Apply the knowledge, techniques, skills, and applicable tools of the discipline to Engineering and surveying activities
CO 5	Explain different types of curves, their requirement and curve setting
18CE3L08	**STRENGTH OF MATERIALS LAB**
CO 1	To introduce various stress and strain measuring equipment.
CO 2	To familiarize with various physical, mechanical and strength properties of various engineering materials.
18CE3L09	**SURVEYING FIELD WORK -I**
CO 1	To familiarize with surveying equipment/ instruments like chain, compass, levelling instruments, theodolite and total station
CO 2	To impart the knowledge on linear, angular measurement

18CE3N10	**ORGANIZATIONAL BEHAVIOR**
CO 1	To understand the psychology of workers and other members in the organization.
CO 2	To be equipped with the right knowledge and skills regarding organizational processes, group behavior, organizational structure and culture.
CO 3	To build up strategies for development at their workplace.
CO 4	To motivate and control employees.
CO5	To resolve organizational conflict effectively.
	IV SEMESTER(II BTECH -II SEM)
18CE4T01	**PROFESSIONAL PRACTICE LAW & ETHICS**
CO 1	To familiarize the students to what constitutes professional practice, introduction of various stakeholders and their respective roles; understanding the fundamental ethics governing the profession
CO 2	To give a good insight into contracts and contracts management in civil engineering, dispute resolution mechanisms: laws governing engagement overlabor
CO 3	To give an understanding of Intellectual Property Rights, Patents.
CO 4	To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
CO 5	To develop good ideas of the legal and practical aspects of their profession
18CE4T02	**ENERGY SCIENCE & ENGINEERING**
CO 1	Have basic understanding of the energy sources and scientific concepts/principles behind them.
CO 2	Understand effect of using these sources on the environment and climate
CO 3	List and describe the primary renewable energy resources and technologies
CO 4	To quantify energy demands and make comparisons among energy uses, resources, and technologies.
CO 5	Understand the Engineering involved in projects utilizing these sources.
18CE4T03	**BUILDING PLANNING & DRAWING**
CO 1	Plan various buildings as per the building by-laws.
CO 2	Distinguish the relation between the plan, elevation and cross section
CO 3	Identify the form and functions among the buildings.
CO 4	Learn the skills of drawing building elements
CO 5	Plan the buildings as per requirements.
18CE4T04	**STRENGTH OF MATERIALS-II**
CO 1	To understand torsion of shafts and springs
CO 2	To understand columns and struts
CO 3	To understand direct and bending stress
CO 4	To understand unsymmetrical bending and shear center
CO 5	To understand analysis of detrminate of trusses

18CE4T05	**CONCRETE TECHNOLOGY**
CO 1	Explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy
CO 2	Develop fundamental knowledge in the fresh and hardened properties of concrete
CO 3	Produce the testing methodology to evaluate the properties of concrete during fresh and hardened stage
CO 4	Knowledge on the behaviour of concrete with response to stresses developed.
CO 5	Knowledge on the special concretes and design a concrete mix which fulfils the required properties for fresh and hardened concrete
18CE4T06	**HYDRAULIC ENGINEERING**
CO 1	Introduce concepts of laminar and turbulent flows
CO 2	To understand the concept of boundary layer flows
CO 3	To teach principles of uniform and non-uniform flows through open channel.
CO 4	To impart knowledge on design of turbines.
CO 5	To impart knowledge on design of pumps.
18CE4L07	**SURVEYING FIELD WORK -II**
CO 1	To familiarize with surveying equipment/ instruments like chain, compass, levelling instruments, theodolite and total station
CO 2	To impart the knowledge on linear, angular measurement
18CE4L08	**CONCRETE TECHNOLOGY LAB**
CO1	Demonstrate Knowledge on various concepts of a C language.
CO2	Able to draw flowcharts and write algorithms.
CO3	Able design and development of C problem solving skills.
CO4	Able to design and develop modular programming skills.
CO5	Able to trace and debug a program
18CE4L09	**FLUID MECHANICS & HYDRAULIC MACHINERY LAB**
CO 1	To impart the knowledge on flow measurement through closed conduit/tank/channel.
CO 2	To familiarize with various losses in closed conduits.
CO 3	To familiarize with performance curves for various hydraulic turbines and pumps.
	V SEMESTER(III BTECH -I SEM)
18CE5T01	**ENGINEERING GEOLOGY**
CO 1	Identify and classify the geological minerals
CO 2	Classify the earthquake prone areas to practice the hazard zonation
CO 3	Analyses and interpret the Engineering Geological maps
CO 4	Analyses the ground conditions from geophysical surveys.
CO 5	Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc....
18CE5T02	**TRANSPORTATION ENGINEERING**
CO 1	Plan highway network for a given area.

CO 2	Determine Highway alignment and design highway geometrics
CO 3	Design Intersections and prepare traffic management plans
CO 4	Judge suitability of pavement materials and design flexible and rigid pavements
CO 5	Construct and maintain highways
18CE5T03	STRUCTURAL ANALYSIS
CO 1	Identify and classify different types of forces acting on static structural systems and Model the problem using free-body diagrams and equilibrium equations
CO 2	Identify and model various types of loading and support conditions that act on structural systems
CO 3	Determine the centroid and moment of inertia for various structural elements
CO 4	Analyze motions of rigid body with concepts of dynamics.
CO 5	Analyze static structural frames subjected to loading by method of joints and method of section
18CE5T04	GEOTECHNICAL ENGINEERING
CO 1	The student must know the definition of the various parameters related to soil mechanics and establish their inter-relationships.
CO 2	The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
CO 3	The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
CO 4	The student should be able to apply the above concepts in day-to-day civil engineering practice.
CO 5	To enable the students to differentiate between compaction and consolidation of soils and to determine the magnitude and the rate of consolidation settlement.
18CE5T05	HYDROLOGY & WATER RESOURCES ENGINEERING
CO 1	Be able to quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology
CO 2	Develop Unit hydrograph, Intensity-Duration-Frequency to design hydraulic structures
CO 3	Be able to develop design storms and carry out frequency analysis
CO 4	Be able to estimate flood magnitude and carry out flood routing.
CO 5	Be able to determine aquifer parameters and yield of wells
18CE5T06	STRUCTURAL ENGINEERING-I(RCC)
CO 1	Identify the basic components of any structural system and the standard loading for the RC structure
CO 2	Identify and tell the various codal provisions given in IS.456
CO 3	Describe the salient feature of limit state method, compare with other methods and the concepts of limit state of collapse and limit state of serviceability
CO 4	Evaluate the behavior of RC member under flexure, shear and compression, torsion and bond.
18CE5L07	ENGINEERING GEOLOGY LAB

CO 1	To provide practical knowledge about physical properties of minerals, rocks, drawing of geological maps, showing faults, uniformities etc.
18CE5L08	GETECHNICAL ENGINEERING LAB
CO1	To obtain index and engineering properties of locally available soils, and to understand the behavior of these soil under various loads.
18CE5N09	CONSTITUTION OF INDIA
CO 1	The concepts of the ecosystem and its function in the environment The importance of environment current global environmental challenges for the sustenance of the life on planet earth.
CO 2	Natural resources
CO 3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO 4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO 5	The environmental legislations of India and Social issues and the possible means and EIA
	VI SEMESTER(III BTECH -II SEM)
18CE6T01	STRUCTURAL ENGINEERING – II (STEEL)
CO 1	Explain the mechanical properties of structural steel, plasticity, yield.
CO 2	Analyze the Behaviour of steel structures under tension, compression and flexure.
CO 3	Design the tension, Compression, flexural members and plate girder
CO 4	Design the connection in steel structure, 'build -up member and (bolted and welded).
CO 5	Identify and Design the various components of welded plate girder including stiffeners
18CE6T02	ENVIRONMENTAL ENGINEERING-I
CO 1	Plan and design the water and distribution networks and sewerage systems
CO 2	Identify the water source and select proper intake structure
CO 3	Characterization of water
CO 4	Select the appropriate appurtenances in the water supply
CO 5	Selection of suitable treatment flow for raw water treatments
18CE6T03	STRUCTURAL ANALYSIS-II
CO 1	Identify and classify different types of forces acting on static structural systems and Model the problem using free-body diagrams and equilibrium equations
CO 2	Identify and model various types of loading and support conditions that act on structural systems
CO 3	Determine the centroid and moment of inertia for various structural elements
CO 4	Analyze motions of rigid body with concepts of dynamics.
CO 5	Analyze static structural frames subjected to loading by method of joints and method of section
18CE6T04	TRANSPORTATION ENGINEERING-II
CO 1	To know various components and their functions in a railway track
CO 2	To acquire design principles of geometrics in a railway track.

CO 3	To acquire design principles of airport geometrics and pavements.
CO 4	Design geometrics in a railway track.
CO 5	Design airport geometrics and airfield pavements.
18CE6T05	QUANTATIVE APTITUDE & REASONING
CO 1	Understand the basics concepts of Numerical Ability and Reasoning Skills
CO 2	Use the logical thinking and analytical abilities to solve Quantitative Aptitude questions from Companies specific and other competitive tests.
CO 3	Solve questions related to Time and Distance, Time and Work , Percentages, Simple interest , Compound interest. Etc.
CO 4	Solve questions related to Coding and Decoding, Number series, Directions, Puzzles etc.
CO 5	Understand and solve Puzzle related questions for Competitive and Campus Placement exams.
18CE6T06	LOW COST HOUSING
CO 1	To learn about Urban housing and Rural housing scenarios in India
CO 2	To learn about Living conditions and planning for housing in urban Land
CO 3	To learn about prefabrication technologies and its adaptation in India
CO 4	To know about Low infrastructure services and Rural Housing.
CO 5	To look over the housing techniques in disaster prone areas
18CE6L07	ARCHITECTURAL PLANNING AND CAD LAB
CO 1	Master the usage of Auto cad commands for drawing 2D & 3D building drawings required for different civil engineering applications
18CE6L08	TRANSPORTATION ENGINEERING LAB
CO1	To test crushing value, impact resistance, specific gravity and water absorption, percentage attrition, percentage abrasion, flakiness index and elongation index for the given road aggregates.
CO2	To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
CO3	To test the stability for the given bitumen mix
CO4	To carry out surveys for traffic volume, speed and parking
	VII SEMESTER(IV BTECH -I SEM)
18CE7T01	ESTIMATION, COSTING AND VALUATION
CO 1	Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
CO 2	Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
CO 3	Understand how competitive bidding works and how to submit a competitive bid proposal.
18CE7T02	WATER RESOURCES ENGINEERING-II
CO 1	Estimate irrigation water requirements
CO 2	Design irrigation canals and canal network and can plan an canal irrigation system

CO 3	Find the capacity of a reservoir
CO 4	Analyze stability of gravity dams
CO 5	Apply suitable spillways and energy dissipation works
18CE7T03	ENVIRONMENTAL ENGINEERING-II
CO 1	Plan and design the sewerage systems
CO 2	Select the appropriate appurtenances in the sewerage systems
CO 3	Analyze sewage and suggest and design suitable treatment system for sewage treatment
CO 4	Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river
CO 5	Suggest a suitable disposal method with respect to effluent standards.
18CE7T04	GEOTECHNICAL ENGINEERING-II
CO 1	The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
CO 2	The student must be able to design Piles based on the principles of bearing capacity.
CO 3	The student must be able to identify different components of well foundation and soil sampling methods
CO 4	student must be able to analyse slope stability
CO 5	To be able to estimate earth pressure using various theories
18CE7T05	REMOTE SENSING AND GIS
CO 1	Be familiar with ground, air and satellite based sensor platforms
CO 2	Interpret the aerial photographs and satellite imageries
CO 3	To be familiar with GIS components
CO 4	Create and input spatial data for GIS application
CO 5	Apply RS and GIS concepts in water resources engineering
18CE7L06	STAAD PRO LAB
CO 1	Work comfortably on GIS software
CO 2	Digitize and create thematic map and extract important features
CO 3	Use structural analysis software to analyze and design 2D and 3D frames
CO 4	Design and analyze retaining wall and simple towers using CADD software.
18CE7L07	ENVIRONMENTAL ENGINEERING LAB
CO 1	Perform the experiments to determine water and waste water quality
CO 2	Understand the water & waste water sampling, their quality standards
CO 3	Estimate quality of water, waste water, Industrial water
	VIII SEMESTER(IV BTECH -II SEM)
18CE8T01	PRESTRESSED CONCRETE
CO 1	Familiarize Students with concepts of prestressing
CO 2	Equip student with different systems and devices used in prestressing
CO 3	Understand the different losses of prestress including short- and long-term losses

CO 4	Familiarize students with the analysis and design of prestressed concrete members under flexure
CO5	Familiarize students with the analysis and design of prestressed concrete members under shear and torsion
18CE8T02	CONSTRUCTION TECHNOLOGY AND MANAGEMENT
CO 1	Able to perform construction operation planning & management
CO 2	Able to perform classification of construction projects
CO 3	Able to perform resource planning
CO 4	Able to perform contracts
CO5	Able to perform management information system
18CE8T03	ADVANCED CIVIL ENGINEERING TECHNOLOGIES
CO 1	Apply the principles and uses of Electronic Surveying instruments
CO 2	Understand the Pre stressed concrete
CO 3	Advanced methods in Earth retaining structures
CO 4	Application Pre - fabricated building technology
18CE8L05	PROJECT
CO 1	Identify different works to be carried out in the Project.
CO 2	Select the most efficient method from the available choices based on preliminary investigation
CO 3	Design the required elements of the project as per standard Practice.
CO 4	Prepare working drawings for the project
CO 5	Prepare project report.

PROGRAMME OUTCOMES (POs)

PO1- Engineering knowledge: An ability to apply knowledge of mathematics, science and engineering.

PO2- Problem analysis: An ability to design and conduct experiments, as well as to analyze and interpret data.

PO3- Design/development of solutions: An ability to design a system, component, or process To meet desired needs within realistic constraints such as economic, environmental, social, political

PO4- Investigations of complex problems: An ability to function on multidisciplinary teams.

PO5- Modern tool usage An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

PO6- The engineer and society: An ability to understand the impact of engineering solutions in a global, economic, environmental and societal context.

PO7- Environment and sustainability: An ability to communicate effectively.

PO8- Ethics: An understanding of professional and ethical responsibility.

PO9- Individual and team work: An understanding of critical issues for professional practice such as the procurement of work and the interaction with contractors during the construction

PO10- Communication: A knowledge of contemporary issues.

PO11- Project management and finance: An ability to identify, formulate and solve engineering problems.

PO12- Life-long learning: A recognition of the need for and an ability to engage in life-long learning.

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CO 4	Apply the knowledge to solve the linear differential equations
CO 5	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
18EE1T03	APLIED CHEMISTRY
CO 1	study ofpolymers and composite materials enable us to use them in a goof number of engineering fields
CO 2	Electrochemical principles from the basis of batteries that are being developed. Destruction of metals and alloys can be prevented by undrstanding the sicence of corrosion
CO 3	meythods of purification of water can be known so that more of them can be developed
CO 4	industries are run by the quality of fules and energy crisis can be met by broad unsderstandngh of different fuels
CO 5	Study of the existing developed materials forms a basis for developing more number of advanced materials and the basics of analytical techniques helps in analyzing the material.
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CO 4	o use arrays, pointers and structures to formulate algorithms and programs

CO 5	To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
CO 6	To use structures and files
18EE1T05	**ENGINEERING GRAPHICS**
CO 1	Draw the polygons, ellipse, parabola, hyperbola, cycloids and involutes for various types of profiles
CO 2	Construction of various scales like plain, diagonal and venier scales .Draw the orthographic projections of the points, lines.
CO 3	Draw the projections of planes.
CO 4	Draw the projections of solids
CO 5	Convert Orthographic projections to isometric projection and vice versa.
18EE1L06	**ENGLISH COMMUNICATION SKILLS LAB - I**
CO 1	Acquire basic proficiency in English by learning functional aspects of English language
CO 2	Learn the methods of enhancing vocabulary
CO 3	Acquaint himself/herself with nuances of phonetics
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CO 1	student is exposed to different methods of chemical analysis and use of some commonly employed instruments.they thus acquire some expermental skills
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CO 1	Demonstrate Knowledge on various concepts of a C language.
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CO 3	Able design and development of C problem solving skills.
CO 4	Able to design and develop modular programming skills.
CO 5	Able to trace and debug a program
18EE1L09	**FIELD PRACTICE LAB**
CO 1	To select suitable tools and equipment to prepare joints using bench-work tools.
CO 2	To produce joints using materials of specific shape and size by a suitable set of operations and check the accuracy of shape and dimensions using.
	II SEMESTER(I BTECH -II SEM)
18EE2T01	**ENGLISH - II**
CO 1	Use English language in various contexts
CO 2	Improve comprehension and fluency of speech
CO 3	Appreciate a literary text

CO 4	Hone the communication skills to meet the challenges of their careers very successfully
CO 5	Understand the need for lifelong learning
18EE2T02	**VECTOR CALCULUS & FOURIER TRANSFORMS**
CO 1	Determine the areas and volumes using multiple integration
CO 2	Interpret the divergence, gradient and curl physically
CO 3	Analyze the general periodic functions in the form of an infinite convergent sine and cosine series
CO 4	Explain the techniques of Fourier transforms
CO 5	Illustrate the methods to solve the boundary value problems
18EE2T03	**APLIED PHYSICS**
CO 1	To identify different crystal structures and to study different point defects.
CO 2	To gain basic knowledge of Simple harmonic waves and study of free and forced vibrations.
CO 3	To Develop the knowledge of science of Acoustics and Ultrasonics and their applications in various fields.
CO 4	The Analytical study of response of materials to Electromagnetic fields.
CO 5	The Study of lasers and optical fibers with an emphasis of their Engineering applications.
18EE2T04	**BIOLOGY FOR ENGINEERS**
CO 1	Understand how biological observations lead to major discoveries and the morphological, Bio chemical and ecological classification of organisms
CO 2	Understand that all forms of life have the same building blocks and their involvement in the maintanence and metabolic processes of living organisms
CO 3	Classify enzymes and distinguish between different mechanisms of enzyme action and study the chemical reactions that are catalysed by enzymes. Apply thermodynamic principles to biological systems and able to understand major chemical process that occur with in a living organism in order to maintain life
CO 4	Identify DNA as genetic material in the molecular basis of information transfer
CO 5	Identify and classify micro organisms, Understand media compositions and growth of microorganisms
18EE2T05	**POWER SYSTEMS-1**
CO 1	Determine the significance of various components of the Thermal Power Stations
CO 2	Determine the significance of various components of the power generation plants
CO 3	Describe the use of solar energy and the various components used in the energy production
CO 4	Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.
CO 5	Appreciate the Economic Aspects different types of tariff.

18EE2L06	**ELECTRICAL CIRCUIT ANALYSIS-1**
CO 1	Various electrical networks in presence of active and passive elements
CO 2	R, L, C network with sinusoidal excitation & R, L, network with variation of any one of the parameters i.e R, L, C and f.
CO 3	Electrical networks with network topology concepts.
CO 4	Any magnetic circuit with various dot conventions.
CO 5	Electrical networks by using principles of network theorems.
18EE2L07	**APPLIED PHYSICS lab**
CO 1	Implement the basic principles of Optics through various phenomena of light.
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
18EE2L08	**BASIC ENGINEERING & IT WORKSHOP**
CO1	Identify, assemble and update the components of a computer
CO2	Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems
CO3	Make use of tools for converting pdf to word and vice versa
CO4	Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex
18EE2M09	**ENVIRONMENTAL SCIENCE**
CO1	The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.
CO2	The concepts of the ecosystem and its function in the environment.
CO3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
CO5	The environmental legislations of India and Social issues and the possible means.
CO6	Environmental assessment and the stages involved in EIA.
III SEMESTER(II BTECH -I SEM)	
18EE3T01	**Complex Variables and Numerical Methods**

CO 1	Apply complex functions in the study of fluid mechanics, thermodynamics and electric fields
CO 2	Analyze the analytic function into a power series which is useful in the study of communication systems
CO 3	Illustrate the techniques of the contour integration to determine the real integrals
CO 4	Determine the solution of transcendental equations by different numerical methods
CO 5	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries
18EE3T02	**Electrical Circuit Analysis – II**
CO 1	able to solve three- phase circuits under balanced condition
CO 2	able to solve three- phase circuits under unbalanced condition
CO 3	able find the transient response of electrical networks for different types of excitations
CO 4	able to find parameters for different types of network.
CO 5	able to realize electrical equivalent network for a given network transfer function
18EE3T03	**Analog Electronics-I**
CO 1	Able to assimilate the concepts of semiconductor devices
CO 2	Able to understand the the concepts of diode circuits
CO 3	Able to understand the the concepts of BJT & Configurations
CO 4	Able to analyze the performance of Field Effect Transistors
CO 5	Able to understand the the concepts of Feedback Amplifiers & Oscillators
18EE3T04	**Electrical Machines – I**
CO 1	Able to assimilate the concepts of electromechanical energy conversion
CO 2	Able to mitigate the ill-effects of armature reaction and improve commutation in dc machines

CO 3	Able to understand the torque production mechanism and control the speed of dc motors
CO 4	Able to analyze the performance of single phase transformers.
CO 5	Able to predetermine regulation, losses and efficiency of single phase transformers
18EE3T05	**Electromagnetic Fields**
CO 1	Understand the production of electric field and potentials due to different configurations of static charges
CO 2	Understand the concepts of conduction and convection current densities
CO 3	Understand the concept of magnetic field and Maxwell equations
CO 4	Calculate the magnetic force
CO 5	Understand the time varying fields
18EE3T06	**Basics of Mechanical Engineering**
CO 1	Understand the concepts of Heat and Work
CO 2	Understand the concept of Power Cycles and Refrigeration Cycle
CO 3	Understand the concepts of Hydro Prime Movers & Hydro Power
CO 4	Understand the concepts of Engineering Mechnics
18EE3L07	**Electrical Circuits Lab**
CO 1	Able to Perform circuit Teorems
CO 2	Able to Perform Series and Parallel Resonance
CO 3	Able to Calculate Z and Y parameters
CO 4	Able to Perform parameters of a Choke coil
CO 5	Able to measure3 phase power by two watt meter method unbalanced loads
18EE3L08	**Analog Electronics Lab**
CO 1	Able to Perform PN Junction diode Characteristics

CO 2	Able to Perform Zenor Diode Characteristics
CO 3	Able to understand the concepts of Rectifiers
CO 4	Able to Perform BJT and FET Characteristics
CO 5	Able to perform Clippers,clampers and RC phase shift Oscillator
18EE3T09	**Education Technology and Society**
CO 1	Will be able to understand the need of education to human life
CO 2	Able to understand the Nature of scope of education
CO 3	able to understand role of technology in education
CO 4	able to understand the technology & society
CO 5	able to understand Ethical Values and Implications
	IV SEMESTER (II BTECH -II SEM)
18EE4T01	**Analog Electronics-II**
CO 1	Analyse and Design of Multivibrators using transistors
CO 2	Able to explain the operation and performance of Op-amp
CO 3	Able to analyze the Applications of Op-Amp
CO 4	Able to understand the operation of filters and timers
CO 5	Use various DAC techniques
18EE4T02	**Electrical Machines – II**
CO 1	Able to explain the operation and performance of three phase induction motor.
CO 2	Able to analyze the torque-speed relation, performance of induction motor and induction generator
CO 3	Able to explain design procedure for transformers and three phase induction motors.
CO 4	Implement the starting of single phase induction motors.

CO 5	To perform winding design and predetermine the regulation of synchronous generators
18EE4T03	**Control Systems**
CO 1	Understand the different Classification of control systems and modelling
CO 2	Understand the functioning of Signals & time response analys
CO 3	Understand the concept of Root Locus & Construction of Root Loci
CO 4	Understand the concept of Bode plot & Nyquist Plot
CO 5	Understand the concept of States Space Analysis of LTI System
18EE4T04	**Power Systems –II**
CO 1	Able to understand parameters of various types of transmission lines during different operating conditions
CO 2	Able to understand the performance of short and medium transmission lines
CO 3	Student will be able to understand travelling waves on transmission lines.
CO 4	Will be able to understand various factors related to charged transmission lines.
CO 5	Will be able to understand sag/tension of transmission lines and performance of line insulators
18EE4T05	**Digital Electronics**
CO 1	Learn the advantages of discrete time control systems and the "know how" of various associated accessories
CO 2	Understand z–transformations and their role in the mathematical analysis of different Systems
CO 3	The stability criterion for digital systems and methods adopted for testing the same are Explained
CO 4	Understand, the conventional and state space methods of design are also introduced

CO 5	Understand, the State Feedback Controllers
18EE4T06	**Data Structures Through C**
CO 1	Use various searching and sorting algorithms.
CO 2	Use basic data structures such as arrays and linked list.
CO 3	Implementation of stacks.
CO 4	Implementation of queues.
18EE4L07	**Control Systems & Simulation Lab**
CO 1	Analyze and design of various power system and power electronics
CO 2	Examine the transient response of RLC circuits for different inputs
CO 3	Analyze the voltage and current waveforms of power system components
CO 4	Simulation performance of RLC parameters
18EE4L08	**Electrical Machines – I Lab**
CO 1	Determine and predetermine the performance of DC machines and Transformers
CO 2	Control the speed of DC motor
CO 3	Achieve three phase to two phase transformation
18EE4L09	**Data Structures Through C Lab**
CO1	Use basic data structures such as arrays and linked list
CO2	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
CO3	Use various searching and sorting algorithms
CO4	Understand and use Trees for complex operations
V SEMESTER(III BTECH -I SEM)	
18EE5T01	**POWER ELECTRONICS**

CO1	Explain the characteristics of various power semiconductor devices and analyze the static and dynamic characteristics of SCR's
CO2	Explain the operation of single phase & three Phase full–wave converters and analyze harmonics in the input current.
CO3	Analyze the operation of different types of DC-DC converters.
CO4	Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation
CO5	Analyze the operation of AC-AC regulators
18EE5T02	**ELECTRICAL MEASUREMENTS**
CO1	Choose right type of instrument for measurement of voltage and current current for ac and dc
CO2	Choose right type of instrument for measurement of power and energy
CO3	Use potentiometer and instrumentation transformer
CO4	Select suitable bridge for measurement of electrical parameters
CO5	Measure frequency and phase difference between signals using CRO
18EE5T03	**PYTHON PROGRAMMING**
CO1	Identify the type of NoSQL database to implement based on business requirements
CO2	Apply NoSQL data modeling from application specific queries
CO3	Understand NoSQL Storage Architecture
CO4	Use Atomic Aggregates and denormalization as data modeling techniques to optimize query processing
CO5	Apply indexing and ordering of data sets
18EE5T04	**EFFECTIVE TECHNICAL COMMUNICATION**
CO1	Able to speak with fluent vocabulary
CO2	Able to write with proper sentence formation

CO3	Able to identify errors in writing.
CO4	Able to communicate orally
CO5	Able to analyze different life skills
18EE5T07	**QUANTATIVE APTITUDE AND REASONING**
CO1	Understand the basics concepts of Numerical Ability & Reasoning Skills
CO2	Use the logical thinking and analytical abilities to solve Quantitative aptitude questions from companies specific and other competitive tests
CO3	Solve questions related to time and distance, time and work ,percentages, simple interest and compound interest etc.
CO4	Solve questions related to coding and decoding, number series, directions, puzzles ,etc.
CO5	Understand and solve puzzle related questions for competitive and campus placements exams.
18EE5L08	**ELECTRICAL MACHINES -II LAB**
CO1	Able to assess the performance of single phase and three phase induction motors
CO2	Able to control the speed of three phase induction motor
CO3	Able to predetermine the regulation of three–phase alternator by various methods.
CO4	Able to find the Xd/ Xqratio of alternator and asses the performance of three–phase synchronous motor
18EE5L09	**ELECTRICAL MEASUREMENTS LAB**
CO1	Able to measure the electrical parameters voltage & current
CO2	Able to find electrical characteristics of resistance, inductance and capacitance
CO3	Able to calibrate different measuring instruments
CO4	Able to measure the electrical parameters power and energy.
CO5	Able to test transformer oil for its effectiveness

18EE5L10	**PYTHON PROGRAMMING LAB**
CO1	Identify the type of NoSQL database to implement based on business requirements
CO2	Apply NoSQL data modeling from application specific queries
CO3	Understand NoSQL Storage Architecture
CO4	Use Atomic Aggregates and denormalization as data modeling techniques to optimize query processing
CO5	Apply indexing and ordering of data sets
18EE5T11	**CONSTITUTION OF INDIA**
CO1	Importance for building a democratic India, features and principles of Indian Constitution.
CO2	The functioning of three wings of the government ie., executive, legislative and judiciary.
CO3	The roles and powers of State Government
CO4	The decentralization of power between Union, State and Local self-Government and local administration
CO5	Election Commission, UPSC, Welfare commissions for sustaining democracy
	VI SEMESTER(III BTECH -II SEM)
18EE6T01	**MICROPROCESSORS AND MICROCONTROLLERS**
CO1	To be able to understand the microprocessor capability in general and explore the evaluation of microprocessors.
CO2	To be able to understand the addressing modes of microprocessors
CO3	To be able to understand the micro controller capability
CO4	To be able to program microprocessor and microcontroller
CO5	To be able to interface microprocessor and microcontroller with other electronic devices
18EE6T02	**SWITCHGEAR AND PROTECTION**
CO1	Able to understand the principles of arc interruption for application to High voltage circuit breakers of air, oil, vacuum, SF6 gas type

CO2	Ability to understand the working principle and operation of different Types of electromagnetic protective relays.
CO3	Students acquire knowledge of faults and protective schemes for high power generator and transformers and understand various types of protective schemes
CO4	Able to understand different types of static relays and their applications
CO5	Able to understand different types of over voltages and protective schemes required for insulation co–ordination
18EE6T03	**OOPS THROUGH JAVA**
CO1	Implement java applications using OOP principles and proper program structuring.
CO2	Develop java programs using packages, inheritance and interfaces
CO3	Implement error and exception handling techniques.
CO4	Design event driven GUI and real-time web related applications
18EE6T04	**MANAGEMENT SCIENCE**
CO1	Understand the concepts related to Business
CO2	Demonstrate the roles, skills and functions of management
CO3	Analyze effective application of PPM knowledge to diagnose
CO4	solve organizational problems and develop optimal managerial decisions.
CO5	Understand the complexities associated with management of human resources in the organizations
18EE6T08	**ENERGY AUDIT CONSERVATION AND MANAGEMENT**
CO1	Explain energy efficiency, conservation and various technologies. Design energy efficient lighting systems.
CO2	Calculate power factor of systems and propose suitable compensation techniques.
CO3	Explain energy conservation in HVAC systems

CO4	Calculate life cycle costing analysis and return on investment on energy efficient technologies.
CO5	Design energy efficient lighting systems
18EE6L07	**MICROPROCESSORS AND MICROCONTROLLERS LAB**
CO1	To write assembly language program using 8086 microprocessor based on arithmetic, logical, and shift operations
CO2	To do modular programming using 8086 micro processor
CO3	To interface 8086 with I/O and other devices
CO4	To do serial communication using 8051 micro controllers
CO5	To interface 8051 with I/O and other devices.
18EE6L08	**POWER ELECTRONICS & SIMULATION LAB**
CO1	Obtain static characteristics of semiconductor devices to discuss their Performance
CO2	Trigger the SCR by different methods
CO3	Verify the performance of single phase controlled full wave rectifier and AC voltage controller with R and RL loads
CO4	Verify the performance of single phase full bridge inverter connected to resistive load
CO5	Ability to experiment about switching characteristics various switches
18EE6L09	**OOPS THROUGH JAVA LAB**
CO1	Understand the behavior of primitive data types, object references, and arrays.
CO2	Implement Java classes from specifications
CO3	Implement interfaces, inheritance, and polymorphism as programming techniques
CO4	Apply exceptions handling.
VII SEMESTER (IV BTECH -I SEM)	
18EE7T01	**DIGITAL SIGNAL PROCESSING**

CO1	Perform time, frequency, and Z -transform analysis on signals and systems
CO2	Understand the inter-relationship between DFT and various transforms.
CO3	Understand the significance of various filter structures and effects of round off errors
CO4	Design a digital filter for a given specification.
CO5	Understand the fast computation of DFT and appreciate the FFT processing.
18EE7T02	**POWER SYSTEM OPEARTION AND CONTROL**
CO1	Develop Power flow solutions using iterative techniques
CO2	Compute symmetrical and unsymmetrical fault analysis of given power system.
CO3	Perform stability analysis of a power system.
CO4	Analyse the performance of generators in thermal power station for economical operation
CO5	Analyse Load frequency control of power system.
18EE7T04	**RENEWABLE ENERGY SOURCES**
CO1	Know the need of various renewable energy systems
CO2	understand the concepts of bio-energy
CO3	Acquire the knowledge of OTEC, tidal
CO4	Acquire the knowledge of geothermal and Alternative energy sources
18EE7T08	**SPECIAL ELECTRICAL MACHINES**
CO1	Distinguish between brush dc motor and brush less dc motor
CO2	Explain the performance and control of stepper motors, and their applications
CO3	Explain theory of operation and control of switched reluctance motor.
CO4	Explain the theory of travelling magnetic field and applications of linear motors.
CO5	Understand the significance of electrical motors for traction drives.

18EE7T03	**ELECTRIC VEHICLES**
CO1	Assess the performance, societal and environmental impact of EHVs having known their past history
CO2	Implement various drive train topologies and control strategies in Electric and Hybrid vehicles
CO3	Recommend, Design/Size and Control different electric propulsion units and other components of EHVs and BEVs
CO4	Appropriately select the energy storage system and strategize its management in EHVs
18EE7L09	**DIGITAL SIGNAL PROCESSING LAB**
CO1	Apply the difference equations concept in the analyzation of Discrete time systems
CO2	Use the FFT algorithm for solving the DFT of a given signal
CO3	Design a Digital filter (FIR&IIR) from the given specifications
CO4	Realize the FIR and IIR structures from the designed digital filter.
18EE7L10	**POWER SYSTEMS & SIMULATION LAB**
CO1	Students are able to determine parameters of transmission line.
CO2	Students are able to understand the concept of fault analysis of alternator.
CO3	Students are able to check the dielectric strength of transformer oil.
CO4	Students are able to write the program for analysing energy management systems functions at load dispatch centre.
	VIII SEMESTER(IV BTECH -II SEM)
18EE8T01	**UTILIZATION OF ELECTRICAL ENERGY**
CO1	Student should be able to identify a suitable motor for electric drives and industrial applications
CO2	Student should able to identify most appropriate heating or welding techniques for suitable applications

CO3	Student should able to understand various level of illuminosity produced by different illuminating sources.
CO4	Student shold able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.
CO5	Student should able to determine the speed/time characteristics of different types of traction motors and estimate energy consumption levels
18EE8T02	**POWER ELECTRONIC CONTROL OF ELECTRIC DRIVES**
CO1	Identify different electric drive system
CO2	Understand the operation of rectifier fed DC drives, chopper fed DC drives and closed loop control of DC motor
CO3	Analyse the slip power recovery schemes of Induction motor and speed control of converter fed induction motor & synchronous motor.
CO4	Evalute the performance of speed control of synchronuous motor by CSI and VSI
18EE8T05	**HVDC & FACTS**
CO1	To Understand basic concepts of HVDC Transmission
CO2	Analyze the converter configuration and the operation of converters.
CO3	The control of converter and HVDC Transmission.
CO4	Analyze the basic concepts of FACTS.
CO5	To learn the operation of different FACTS devices
18EE8T10	**POWER QUALITY**
CO1	Differentiate between different types of power quality problems.
CO2	Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power System.
CO3	Analyze power quality terms and power quality standards

CO4	Explain the principle of voltage regulation and power factor improvement methods
CO5	Explain the power quality monitoring concepts and the usage of measuring Instruments

PROGRAMME OUTCOMES (POs)

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: 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 practice.

PO 9: Individual and team work: 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 presentation, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team. To manage projects and in multidisciplinary environments.

Po 12: Life-long learning: recognize the need for, and have the preparation and ability to engage in independent and life – long learning in the broadest context of technological change.

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DEPARTMENT OF MECHANICAL ENGINEERING	
COURSE OUTCOMES (MIC18)	
I SEMESTER (I BTMEH-I SEM)	
18ME1T01	**English-1**
CO 1	Use English language, both written and spoken, competently and correctly
CO 2	Improve comprehension and fluency of speech
CO 3	Gain confidence in using English in verbal situations.
CO 4	Hone the communication skills to meet the challenges of their careers very successfully.
CO 5	Strengthen communication skills in different contexts like formal and informal.
18ME1T02	**Linear Algebra & Differential Equations**
CO 1	Apply the knowledge to solve a system of homogeneous and non-homogeneous linear equations
CO 2	Optimize functions of several variables and able to find extreme values of constrained functions
CO 3	Able to analyze the real-life situations, formulate the differential equations and then applying the methods
CO 4	Apply the knowledge to solve the linear differential equations
CO 5	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
18ME1T03	**Engineering Chemistry**
CO 1	study of polymers and composite materials enable us to use them in a goof number of engineering fields
CO 2	Electrochemical principles from the basis of batteries that are being developed. Destruction of metals and alloys can be prevented by undrstanding the sicence of corrosion
CO 3	meythods of purification of water can be known so that more of them can be developed
CO 4	industries are run by the quality of fules and energy crisis can be met by broad unsderstandngh of different fuels
CO 5	importance of engineering materials in the engineering fields can be undertood
18ME1T04	**Problem Solving through C and Python**
CO 1	Understand the basic concepts of programming
CO 2	Understand and Apply loop construct for a given problem
CO 3	Demonstrate the use pointers
CO 4	Understand the use of functions and develop modular reusable code
CO 5	Understand File I/O operations
18ME1T05	**Engineering Mechanics**

CO 1	Identify and classify different types of forces acting on static structural systems and Model the problem using free-body diagrams and equilibrium equations
CO 2	Identify and model various types of loading and support conditions that act on structural systems
CO 3	Determine the centroid and moment of inertia for various structural elements
CO 4	Analyze motions of rigid body with concepts of dynamics.
CO 5	Analyze static structural frames subjected to loading by method of joints and method of section
18ME1L06	**English Communication Skills Lab-1**
CO 1	Acquire basic proficiency in English by learning functional aspects of English language
CO 2	Learn the methods of enhancing vocabulary
CO 3	Acquaint himself/herself with nuances of phonetics
18ME1T07	**Engineering Chemistry Lab**
CO 1	student is exposed to different methods of chemical analysis abd use of some commonly employed instruments.they thus acquire some expermental skills
18ME1L08	**Problem Solving Lab using C and Python**
CO 1	Demonstrate Knowledge on various concepts of a C language.
CO 2	Able to draw flowcharts and write algorithms.
CO 3	Able design and development of C problem solving skills.
CO 4	Able to design and develop modular programming skills.
CO 5	Able to trace and debug a program
18ME1T09	**Environmental Studies**
CO 1	The concepts of the ecosystem and its function in the environment the importance of environment current global environmental challenges for the sustenance of the life on planet earth.
CO 2	Natural resources classification and their conservation
CO 3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO 4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO 5	The environmental legislations of India and Social issues and the possible means and EIA
II SEMESTER (I BTECH-II SEM)	
18ME2T01	**English-II**
CO 1	Use English language in various contexts
CO 2	Improve comprehension and fluency of speech
CO 3	Appreciate a literary text
CO 4	Hone the communication skills to meet the challenges of their careers very successfully
CO 5	Understand the need for lifelong learning
18ME2T02	**Vector Calculus and Fourier Transforms**

CO 1	Determine the areas and volumes using multiple integration
CO 2	Interpret the divergence, gradient and curl physically
CO 3	Analyze the general periodic functions in the form of an infinite convergent sine and cosine series
CO 4	Explain the techniques of Fourier transforms
CO 5	Illustrate the methods to solve the boundary value problems
18ME2L03	**Engineering Physics**
CO 1	To identify different crystal structures and to study different point defects.
CO 2	To gain basic knowledge of Simple harmonic waves and study of free and forced vibrations.
CO 3	To Develop the knowledge of science of Acoustics and Ultrasonics and their applications in various fields.
CO 4	The Analytical study of response of materials to Electromagnetic fields.
CO 5	The Study of lasers and optical fibers with an emphasis of their Engineering applications.
18ME2T04	**Biology for Engineers**
CO 1	Understand how biological observations lead to major discoveries and the morphological, Biochemical and ecological classification of organisms
CO 2	Understand that all forms of life have the same building blocks and their involvement in the maintenance and metabolic processes of living organisms
CO 3	Classify enzymes and distinguish between different mechanisms of enzyme action and study the chemical reactions that are catalysed by enzymes. Apply thermodynamic principles to biological systems and able to understand major chemical process that occur within a living organism in order to maintain life
CO 4	Identify DNA as genetic material in the molecular basis of information transfer
CO 5	Identify and classify micro-organisms, Understand media compositions and growth of microorganisms
18ME2T05	**Basic Electronics & Electrical Engineering**
CO 1	Understand basic semiconductor devices
CO 2	Observe characteristics diodes
CO 3	Analyze applications of Semiconductor diodes
CO 4	Characterize the Bipolar Junction Transistor in different modes
CO 5	Understand the construction and working of Field Effect Transistor
CO 6	To understand the concepts and applications of electronic devices
18ME2T06	**Engineering Graphics**
CO 1	Introduce the students, the techniques of constructing the various types of polygons
CO 2	Understand the concepts of projections and draw projections for simple entities such as points and lines.
CO 3	To visualize projections of planes
CO 4	To visualize projections of solids

CO 5	Analyze the 2D drawings and convert to 3D isometric views & converting Isometric view to Orthographic views
18ME2L07	**Engineering Physics Lab**
CO 1	Implement the basic principles of Optics through various phenomena of light.
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
18ME2L08	**Basic Electronics & Electrical Engineering Lab**
CO 1	Identify, assemble the connections of MCB,switches
CO 2	Implement the DC Motor and DC Generator
CO 3	able to implement Soldering for different circuits
CO 4	able to perform chaarecteristics for Moosfet,BJT,UJT
18ME2L09	**Basic Engineering & IT Workshop**
CO1	Identify, assemble and update the components of a computer
CO2	Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems
CO3	Make use of tools for converting pdf to word and vice versa
CO4	Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex
III SEMESTER (II BTECH-I SEM)	
18ME3T01	**Complex variables & Numerical methods**
CO 1	Apply complex functions in the study of fluid mechanics, thermodynamics and electric fields
CO 2	Analyze the analytic function into a power series which is useful in the study of communication systems
CO 3	Illustrate the techniques of the contour integration to determine the real integrals
CO 4	Determine the solution of transcendental equations by different numerical methods
CO 5	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries
18ME3T03	**Kinematics of Machines**
CO 1	Classify, understand and analyze different types of links and mechanisms
CO 2	Acquire knowledge on straight-line motion mechanisms and on hooks joint.
CO 3	Solve the forces, velocities and accelerations in different mechanisms
CO 4	Construct cam profile for different follower motion
CO 5	Describes the power transmission through gears, belts, ropes, and chain drives
18ME3T04	**Thermodynamics**
CO 1	understand the basic laws of thermodynamics
CO 2	apply the laws of thermodynamics
CO 3	understand the concept of entropy, Availability and Irreversibility
CO 4	understand the properties of Steam and use of Steam Tables

CO 5	understand the use of standard cycles and their applications.
18ME3T05	**Materials science and Engineering**
CO 1	Analyze the basic fundamentals of metals, alloys.
CO 2	Understand the properties and classification of cast irons and steels.
CO 3	Analyze properties and applications of non ferrous metals and understand the stabilityof phases, various heat treatment and strengthening processes.
CO 4	Understand the concepts of powder metallurgy.
CO 5	Understand the concepts of ceramics, composite materials and nano materials.
18ME3T06	**Fluid mechanics & hydraulic machines**
CO 1	Recite fluid properties and fluid statics
CO 2	Understand and analyze fluid kinematics and fluid dynamics
CO 3	Analyze the flow of fluid through pipes and its measurement
CO 4	Acquire the knowledge on fundamentals of turbo machinery
CO 5	Analyze the performance of various types of hydraulic turbines and Pumps
18ME3L07	**Fluid mechanics & Hydraulic machines lab**
CO 1	Determine the efficiency of the jet
CO 2	Determine the efficiencies of pelton wheel, Francis and Kaplan turbines.
CO 3	Determine the efficiencies of pumps.
CO 4	Determine the Coefficient of discharge of flow measuring devices
CO 5	Determine the friction factor of a given pipeline & Determine the coefficient of contraction of a given pipe line
18ME3L08	**Mechanics of Solids & Metallurgy LAB**
CO 1	Predict the behavior of ferrous and non-ferrous metals and alloys by studying the microstructure
CO 2	Conduct experiment to find out the hardness of various treated and untreated steels.
CO 3	Conduct tensile, compression, impact and hardness tests to determine the mechanical properties of engineering materials
CO 4	Develop communication and self-learning skills through viva-voce and experiments
18ME3L09	**Proficiency through Reading and Writing**
CO 1	build their vocabulary by following various strategies and use the vocabulary to write meaningful and effective paragraphs
CO 2	learn to identify and avoid the common errors in writing
CO 3	read and review various kinds of books
CO 4	The decentralization of power between Union, State and Local self-government and local administration
CO 5	Election Commission, UPSC, Welfare commissions for sustaining democracy
	IV SEMESTER (II BTECH-II SEM)
18ME4T01	**Probability & Statistics**
CO 1	Understand random variables and discrete probability distributions

CO 2	Determine probabilities based on practical situations using the normal distributions
CO 3	Apply different distributions to compute confidence intervals
CO 4	Test the hypothesis concerning means and proportions
CO 5	Understand the concept of least square estimation linear regression
18ME4T02	**Production Technology**
CO 1	Identify the steps involved in casting, requirements and applications of casting
CO 2	Illustrate the insight into sand casting, types of furnaces, melting and solidification of casting and application of other casting processes
CO 3	Demonstrate the basic knowledge on gas welding and arc welding processes and their applications
CO 4	Identify appropriate bulk forming processes on materials for suitable applications
CO 5	Identify various sheet metal forming operations and their principles
18ME4T03	**Design of Machine Elements**
CO 1	Apply general and manufacturing considerations in the design of various machine components.
CO 2	Design the machine components using various theories of failures and predict the stress concentration and fatigue in parts subjected to cyclic loads
CO 3	Design riveted, welded and bolted joints.
CO 4	Design the keys, cotters and knuckle joints.
CO 5	Design the shafts, shaft couplings and springs.
18ME4T04	**IC Engines & Air Compressors**
CO 1	Discuss various losses occur in actual fuel air cycles. & Classify various types of IC Engines and Discuss its lubrication, ignition, fuel meteringand fuel supply systems
CO 2	Distinguish normal and abnormal combustion phenomena in SI and CI engines
CO 3	Perform testing on engines to evaluate engine performance parameters
CO 4	Expalin working of reciprocating and predicts its performance
CO 5	Explain working of rotary compressors and predicts its performance
18ME4T05	**Computer Aided Machine Drawing**
CO 1	Demonstrate the conventional representations of materials and machine components.
CO 2	Model riveted, welded and key joints using CAD system.
CO 3	Create solid models and sectional views of machine components.
CO 4	Generate solid models of machine parts and assemble them.
CO 5	Create manufacturing drawing with dimensional and geometric tolerances.
18ME4T08	**Entrepreneurship & Project Management**
CO 1	Role of entrepreneurship in economic development, Opportunities and Challenges
CO 2	Role & Importance, Problems of Women Entrepreneurs
CO 3	Phases,Characteristics of a project, role and responsibilities of project manager.

CO 4	Selection, Project formulation, contents of a project report
CO 5	Institutional finance supporting projects project evaluation
18ME4L09	**Production Technology Lab**
CO 1	Make single piece and split piece pattern making and prepare components using sand casting
CO 2	Find sand properties and able to apply metal forming operations
CO 3	Make single piece and split piece patterns using wood turning lathe machine
CO 4	Make use of plastics materials with injection moulding technique and blow moulding technique
CO 5	Make use of resistance spot welding, manual metal arc welding operations and soldering
18ME4L10	**Thermal engineering Lab**
CO 1	Conduct experiments to evaluate friction power on IC Engines
CO 2	Prepare heat balance sheet on CI/SI engine.
18ME4T11	**Indian constitution**
CO1	Importance for building a democratic India, features and principles of Indian Constitution.
CO2	The functioning of three wings of the government ie., executive, legislative and judiciary.
CO3	The roles and powers of State Government
CO4	The decentralization of power between Union, State and Local self-Government and local administration
CO5	Election Commission, UPSC, Welfare commissions for sustaining democracy
	V SEMESTER (III BTECH-I SEM)
18ME5T01	**Dynamics of Machines**
CO 1	Analyze stabilization of sea vehicles, aircrafts and automobile vehicles
CO 2	Compute frictional losses, torque transmission of mechanical systems
CO 3	Analyze dynamic force analysis of slider crank mechanism and design of flywheel.
CO 4	Understand balancing of reciprocating and rotary masses.
CO 5	Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.
18ME5T02	**Management Science & Productivity**
CO 1	Understand the concepts related to Business
CO 2	Demonstrate the roles, skills and functions of management
CO 3	Analyze effective application of PPM knowledge to diagnose
CO 4	solve organizational problems and develop optimal managerial decisions.
CO 5	Understand the complexities associated with management of human resources in the organizations
18ME5T03	**Turbo machines**
CO 1	Evaluate performance of thermal power plant with Rankine cycle and analyze flue gas composition.

CO 2	Describes the working and analyze the performance of boilers.
CO 3	analyze and evaluate the performance of steam nozzles and steam turbines
CO 4	analyze and evaluate the performance of steam turbines and steam condensers
CO 5	Aanalyze and evaluate the performance of Gas turbine and jet engines.
18ME5T04	**MC&MT**
CO 1	Apply the elementary theory of metal cutting and principles in material removal processes
CO 2	Understand the working principles and operations that can be performed on different lathe machines
CO 3	Identify the working principles and operations that can be performed on shaper, slotter, planner machines and drilling machines calculate the material removal rates
CO 4	Understand the working principles and operations that can be performed for producing various features using milling machine tool and select appropriate machining processes for finishing operation with the desired quality
CO 5	Apply appropriate jigs and fixtures on machine tools and write simple CNC programs and conduct CNC machining
18ME5T06	**QUANTATIVE APTITUDE AND REASONING**
CO 1	Understand the basics concepts of Numerical Ability & Reasoning Skills
CO 2	Use the logical thinking and analytical abilities to solve Quantitative aptitude questions from companies specific and other competitive tests
CO 3	Solve questions related to time and distance, time and work ,percentages, simple interest and compound interest etc.
CO 4	Solve questions related to coding and decoding, number series, directions, puzzles ,etc.
CO 5	Understand and solve puzzle related questions for competitive and campus placements exams.
18ME5L13	**Theory of machines Lab**
CO 1	Examine the motion of a motorized gyroscope when the couple is applied along its spin axis.
CO 2	Find the frequency of undamped and damped free vibration of an equivalent spring mass system.
CO 3	Find the position of sleeve against controlling force and speed of a Hartnell governor and to plot the characteristic curve of radius of rotation
CO 4	Interpret the static and dynamic balancing using rigid blocks
CO 5	Interpret the moment of inertia of a flywheel and Determine whirling speed of shaft theoretically and experimentally
18ME5L14	**MT Lab**
CO 1	Make use of Lathe machine tool to produce step turning, taper turning, knurling and threading features on the given workpiece.
CO 2	Understand the working of Milling machine tool to produce grooves.
CO 3	Utilize Drilling machine tool to produce features of cylindrical holes on flat and round surfaces and perform tapping operation
CO 4	Make use of Shaper and Planer machine tools to produce features of slots and pockets on flat surfaces to the desired quality.

CO 5	Utilize Grinding machine tool to produce finished surfaces and grind cutting tools
18ME5L15	**Communication Skills Lab**
CO 1	build their resume effectively
CO 2	learn various nuances of the interview process like JAM/GD/HR interviews
CO 3	enhance their debating and argumentative skills
18ME5T16	**Essence of Indian Traditional Culture**
CO 1	Understand the significance of Indian Traditional Knowledge
CO 2	Classify the Indian Traditional Knowledge
CO 3	Compare Modern Science with Indian Traditional Knowledge system.
CO 4	Analyze the role of Government in protecting the Traditional Knowledge
CO 5	Understand the impact of Philosophical tradition on Indian Knowledge System.
VI SEMESTER (III BTECH-II SEM)	
18ME6T01	**Design of Transmission Elements**
CO 1	The student will able to select the suitable bearing based on the application of the loads and predict the life of the bearing
CO 2	Design of IC Engines parts
CO 3	Design power transmission elements such as gears, belts, chains, pulleys, ropes, levers and power screws.
CO 4	Design power transmission elements such as gears, belts, chains, pulleys, ropes, levers and power screws.
CO 5	Design and analyze of machine tool elements
18ME6T02	**Heat Transfer**
CO 1	Find heat transfer rate for 1D, steady state composite systems with heat generation and performance of pins.
CO 2	Understand the concepts transient heat conduction and basic laws involved in the convection heat transfer
CO 3	Illustrate the concepts of radiation heat transfer
CO 4	Examine the rate of heat transfer in the heat exchangers
CO 5	Examine the rate of heat transfer with phase change
18ME6T03	**Metrology and measurements**
CO 1	Interpret the principles of different types of limits and fits and explain the operating principles of linear and angular measurements.
CO 2	Understanding the principles of surface roughness measurement and apply the knowledge of flatness measurement
CO 3	Illustrate the concepts of gear and screw thread measurements.
CO 4	Construction of various transducers for displacement measurement and to Understand the working principles of speed measuring instruments
CO 5	Illustrate the operating principles of force and torquemeasurements and to Classify and study the different types of temperature, pressure and sound measuring devices.
18ME6T06	**R & AC**

CO 1	Illustrate the fundamental principles and applications of refrigeration and air conditioning system
CO 2	Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems
CO 3	Present the properties, applications and environmental issues of different refrigerants
CO 4	Calculate cooling load for air conditioning systems used for various
CO 5	Operate and analyze the refrigeration and air conditioning systems.
18ME6T14	**Nanotechnology**
CO 1	Analyze the concepts and preparation methods of Nano materials
CO 2	Understand the nano material properties and their behavior
CO 3	Use various techniques for investigating nano material
CO 4	Know the importance of Nano Technology for advanced materials processing
CO 5	Know the importance of Nano structured Materials for Various Energies.
18ME6L21	**Metrology & Instrumentation Lab**
CO 1	Measure length, height, diameter and angles using various instruments
CO 2	Measure surface roughness with roughness measurement instrument and alignment tests on Lathe Machine tool
CO 3	Apply resistant temperature detector for temperature measurement
CO 4	Utilize LVDT transducer and of rotameter
CO 5	Utilize displacement strain measurement trainer and capacitance measurement trainer
18ME6L22	**Heat Transfer Lab**
CO 1	Find the thermal conductivity of different materials, composite slabs and powders.
CO 2	Solve heat transfer coefficient for free and forced convection and pin fin efficiency for forced and free convection
CO 3	Examine the Stefan Boltzmann Constant and emissivity of grey body.
CO 4	Compare parallel and counter flow heat exchanger performance characteristics and investigation of Lambert's cosine law
CO 5	Solve the heat transfer rate through lagged pipes and heat transfer rate in film and drop wise condensation
18ME6T23	**Disaster Management**
CO 1	Differentiate the types of disasters, causes and their impact on environment and society
CO 2	Assess vulnerability and various methods of risk reduction measures as well as mitigation.
CO 3	Draw the hazard and vulnerability profile of India
CO 4	Analyze the Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster
CO 5	Understand about Risk Assessment, Response and Recovery Phases of Disaster
VII SEMESTER (IV BTECH-I SEM)	
18ME7T01	**CAD CAM**

CO 1	Describe basic structure of CAD workstation, Memory types, input/output devices and display devices and computer graphics
CO 2	Acquire the knowledge of geometric modeling, parametric representation of curves, surfaces and Execute the steps required in CAD software for developing 2D and 3D models and perform transformations
CO 3	Explain fundamental of NC and advanced features of CNC machines
CO 4	Explain fundamentals of part programming
CO 5	Illustrate Automation, CAQC, CIM, VR, AR, AI concepts & applications of robots in manufacturing
18ME7T02	**Operational Research**
CO 1	Understand the methodology of Operations Research& concepts of linear programming
CO 2	Formulate the solutions to transportation problems
CO 3	Explain the solutions for various sequencing problems
CO 4	Illustrate the solutions to different replacement policies
CO 5	Apply game theory to solve real world problems
18ME7T03	**Finite Element Methods**
CO 1	Understand the basic concepts of finite element Method
CO 2	Formulate simple problems into finite elements
CO 3	Solve structural and thermal problems.
CO 4	Solve complicated 2D structural problems for stress analysis under various loads
CO 5	Analyze and formulate 1D and 2D problems under steady load conditions. Formulate finite element model under dynamic load conditions.
18ME7T07	**Power plant Engineering**
CO 1	Select the suitable site for a power plant and propose ash handling,coal handling methods for power plants
CO 2	Explain the layout with auxiliaries, construction and working of IC and Gas turbine power plants
CO 3	Explain the basic concepts of hydro electric power plant AND Explain working principle of different types of nuclear power plant
CO 4	Explain working principle of different types of NON-CONVENTIONAL SOURCES
CO 5	Understand Environmental consideration of power plant and Calculate load factor,
18ME7T11	**Advanced Machining Processes**
CO 1	Explain need for Nontraditional processes
CO 2	Explain working principles and applications of various machining processes in advanced machining processes.
CO 3	Understand the working principles and application of EDM, WEDM, ECM
CO 4	Understand the working principles and application of LBM, PAM, EBM
CO 5	Understand the applications of CNC Part Programming, Indexing and CNC applications.

18ME7L12	**CAD CAM Lab**
CO 1	Solve displacements, stress and reactions in a the 2D bar, beam and truss elements
CO 2	Solve displacements, stress and reactions in a the 3D bar, beam and truss elements
CO 3	Understand the steady state heat transfer analysis of plane and Axisymmetric Components.
CO 4	Understand CNC part programming
CO 5	Understand APT part programming
CO 5	Technical report writing.
VIII SEMESTER (IV BTECH-II SEM)	
18ME8T02	**Automobile Engineering**
CO 1	Describe the basic lay-out of an automobile and its components and classify various lubricating and cooling systems of an automobile.
CO 2	Describe various fuel supply and electrical systems and ignition systems in SI and CI engines
CO 3	Understand the concept of power transmission system and vehicle controlling.
CO 4	Explain the principles of suspension and braking System
CO 5	Explain the principles of safety systems and emission standards.
18ME8T04	**Robotics**
CO 1	Understand various applications of robotics and classification of coordinate system and control systems
CO 2	Build the concepts of components of industrial robotics.
CO 3	Apply kinematic analysis with D-H notation, forward and inverse kinematics and Solve dynamic analysis with Lagrange – Euler and Newton – Euler formulations.
CO 4	Model trajectory planning for a manipulator by avoiding obstacles.
CO 5	Understand different types of actuators and applications of robots in manufacturing.
18ME8T14	**Solar Energy Systems**
CO 1	Significance of renewable energy and describe the principles of solar radiation. Analyze various solar collectors.
CO 2	Know the various storage methods and application of solar energy.
CO 3	Understand the concept of converting wind energy into electrical energy using both horizontal and vertical axis wind machines.
CO 4	Know biomass disasters, functional operation of geothermal systems. Generalize the operation of ocean, tidal and wave energy systems.
CO 5	understand the operating principle of direct energy conversion systems .and to recognize the need and ability to engage in lifelong learning for further developments in this field.

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PROGRAMME OUTCOMES (POs)

PO1: Able to apply the basic knowledge of mathematics, science, engineering fundamentals and comprehensive knowledge of thermal, design and manufacturing engineering to solve complex engineering problems. [Engineering Knowledge].

PO2: Able to identify, formulate and solve mechanical engineering problems using principles of engineering sciences, mathematics and appropriate engineering standards. [Problem Analysis].

PO3: Able to design mechanical systems/components as per engineering standards to meet desired specifications and requirements with suitable consideration for economy, environment and safety norms. [Design and development of Solutions].

PO4: Able to conduct investigations by analyzing and interpreting data using tools, techniques and research to find solutions for complex engineering problems. [Investigation].

PO5: Able to model, simulate and analyze engineering problems using modern tools. [Modern Tool].

PO6: Able to understand responsibilities associated with the use of technology and processes on societal & legal issues of concern in respect of health, safety and culture. [Engineer and Society].

PO7: Able to understand contemporary issues in sustainable development and in providing technological solutions considering impact of socio-economic and environmental aspects. [Environment and Sustainability].

PO8: Able to understand and implement ethical and professional responsibilities in engineering practice. [Ethics].

PO9: Able to function effectively, as a member or team leader, in executing projects under multidisciplinary environments. [Team Work].

PO10: Able to communicate effectively in written, oral and graphical forms and present the results in a professional manner. [Communication].

PO11: Able to apply knowledge of engineering and management principles for effective project and finance management. [Project Management].

PO12: Able to recognize the need for lifelong learning and adapt to latest technological developments. [Life Long Learning].

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING	
COURSE OUTCOMES (MIC18)	
I SEMESTER(I BTECH -I SEM)	
18EC1T01	**English-1**
CO 1	Use English language, both written and spoken, competently and correctly.
CO 2	Improve comprehension and fluency of speech
CO 3	Gain confidence in using English in verbal situations.
CO 4	Hone the communication skills to meet the challenges of their careers very successfully.
CO 5	Strengthen communication skills in different contexts like formal and informal.
18EC1T02	**Linear Algebra & Differential Equations**
CO 1	Apply the knowledge to solve a system of homogeneous and non-homogeneous linear equations
CO 2	Optimize functions of several variables and able to find extreme values of constrained functions
CO 3	Able to analyze the real life situations, formulate the differential equations and then applying the methods
CO 4	Apply the knowledge to solve the linear differential equations
CO 5	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
18EC1T03	**Applied Physics**
CO 1	Study of lasers and optical fibers with an emphasis of their application in communication in particular.
CO 2	Outline the principles of Quantum mechanics to understand the principles of solid state materials for use in engineering applications.
CO 3	The Analytical study of response of materials to Electromagnetic fields.
CO 4	To study various magnetic and dielectric materials and their Engineering applications
CO 5	To Gain knowledge on the physics of semiconductors for their engineering applications
18EC1T04	**Problem Solving through C and Python**
CO 1	Understand the basic concepts of programming
CO 2	Understand and Apply loop construct for a given problem
CO 3	Demonstrate the use pointers
CO 4	Understand the use of functions and develop modular reusable code
CO 5	Understand File I/O operations
18EC1T05	**Engineering Graphics**
CO 1	Introduce the students, the techniques of constructing the various types of polygons
CO 2	Understand the concepts of projections and draw projections for simple entities such as points and lines.
CO 3	To visualize projections of planes
CO 4	To visualize projections of solids

CO 5	Analyze the 2D drawings and convert to 3D isometric views & converting Isometric view to Orthographic views
18EC1L06	**English Communication Skills Lab-1**
CO 1	Acquire basic proficiency in English by learning functional aspects of English language
CO 2	Learn the methods of enhancing vocabulary
CO 3	Acquaint himself/herself with nuances of phonetics
18EC1T07	**Applied Physics Lab**
CO 1	Implement the basic principles of Optics through various phenomena of light.
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
18EC1L08	**Problem Solving Lab using C and Python**
CO 1	Demonstrate Knowledge on various concepts of a C language.
CO 2	Able to draw flowcharts and write algorithms.
CO 3	Able design and development of C problem solving skills.
CO 4	Able to design and develop modular programming skills.
CO 5	Able to trace and debug a program
18EC1T09	**Environmental Studies**
CO 1	The concepts of the ecosystem and its function in the environment The importance of environment current global environmental challenges for the sustenance of the life on planet earth.
CO 2	Natural resources clssification and their conservation
CO 3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO 4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO 5	The environmental legislations of India and Social issues and the possible means and EIA
	II SEMESTER(I BTECH -II SEM)
18EC2T01	**English-II**
CO 1	Use English language in various contexts
CO 2	Improve comprehension and fluency of speech
CO 3	Appreciate a literary text
CO 4	Hone the communication skills to meet the challenges of their careers very successfully
CO 5	Understand the need for lifelong learning
18EC2T02	**Numerical Methods &Vector Calculus**
CO 1	Determine the solution of transcendental & linear equations by different numerical methods
CO 2	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries
CO 3	Determine the areas and volumes using multiple integration

CO 4	Interpret the divergence, gradient and curl physically
CO 5	Apply complex functions in the study of thermodynamics and electric fields
18EC2L03	**Applied Chemistry**
CO 1	study of polymers and composite materials enable us to use them in a goof number of engineering fields
CO 2	Electrochemical principles from the basis of batteries that are being developed. Destruction of metals and alloys can be prevented by understanding the science of corrosion
CO 3	industries are run by the quality of fuels and energy crisis can be met by broad understanding of different fuels
CO 4	study of existing developed materials forms a basis for developing more number of advanced materials
CO 5	importance of engineering materials in the engineering fields can be understood
18EC2T04	**Biology for Engineers**
CO 1	Understand how biological observations lead to major discoveries and the morphological, Bio chemical and ecological classification of organisms
CO 2	Understand that all forms of life have the same building blocks and their involvement in the maintenance and metabolic processes of living organisms
CO 3	Classify enzymes and distinguish between different mechanisms of enzyme action and study the chemical reactions that are catalysed by enzymes. Apply thermodynamic principles to biological systems and able to understand major chemical process that occur within a living organism in order to maintain life
CO 4	Identify DNA as genetic material in the molecular basis of information transfer
CO 5	Identify and classify micro-organisms, Understand media compositions and growth of microorganisms
18EC2T05	**Basic Electronics & Electrical Engineering**
CO 1	Understand basic semiconductor devices
CO 2	Observe characteristics diodes
CO 3	Analyze applications of Semiconductor diodes
CO 4	Characterize the Bipolar Junction Transistor in different modes
CO 5	Understand the construction and working of Field Effect Transistor
CO 6	To understand the concepts and applications of electronic devices
18EC2T06	**Data Structures using C**
CO 1	Understand the properties, interfaces, and behaviors of basic abstract data types.
CO 2	Understand and apply linked lists
CO 3	Apply Stacks and Queue data structures.
CO 4	Demonstrate different methods for traversing trees.
CO 5	Demonstrate the application of Graphs
18EC2L07	**Applied Chemistry Lab**

CO 1	Student is exposed to different methods of chemical analysis and use of some commonly employed instruments, they thus acquire some experimental skills
18EC2L08	**Basic Electronics & Electrical Engineering Lab**
CO 1	Measure voltage, frequency and phase of any waveform using CRO
CO 2	Generate sine, square and triangular waveforms with required frequency and amplitude using function generator
CO 3	Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers, amplifiers etc.
18EC2L09	**Data Structures using C Lab**
CO1	Understand the properties, interfaces, and behaviors of basic abstract data types.
CO2	Understand and apply linked lists
CO3	Apply Stacks and Queue data structures.
CO4	Demonstrate different methods for traversing trees.
CO5	Demonstrate the application of Graphs
	III SEMESTER(II BTECH -I SEM)
18EC3T01	**Probability Theory & Stochastic Processes**
CO 1	Define sample space and probability
CO 2	Understand the concept of random variable ,distribution and density functions
CO 3	Operations on Single and Multiple Random Variables
CO 4	Evaluate the temporal characteristics of random process
CO 5	Analyze the spectral characteristics and response of linear system for random input
18EC3T02	**Electronic Circuit Analysis**
CO 1	Design and analyze the small signal low and high frequency transistor amplifier using BJT
CO 2	Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT
CO 3	Identify and analyze the different feedback topologies
CO 4	Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept
CO 5	Know the classification of the power amplifiers and their analysis with performance comparison
18EC3T03	**Digital Electronics**
CO 1	Understand different number systems and their conversions
CO 2	Analyze the logical operations and Boolean algebra
CO 3	Develop combinational circuits and perform logical operations
CO 4	Design the sequential logic functions
CO 5	Know finite state machines and different programmable logic devices
18EC3T04	**Network Theory**
CO 1	Gain the knowledge on basic network elements and graph theory

CO 2	Understand Network Theorems and applications
CO 3	Analyze Coupled circuits and Resonance
CO 4	Will analyze the RLC circuit's behavior in detailed
CO 5	Gain the knowledge in characteristics of two port network parameters
18EC3T05	**Signals & Systems**
CO 1	Characterize the signals and systems and principles of vector spaces, Concept of Orthogonality
CO 2	Analyze the Fourier series, Fourier transform and Laplace transform
CO 3	Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back
CO 4	Understand the relationships among the various representations of LTI systems
CO 5	Apply z-transform to analyze discrete-time signals and systems
18EC3T06	**Managerial Economics & Finance Analysis**
CO 1	The knowledge of estimating the Demand and demand elasticity's for a product
CO 2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
CO 3	to understand the nature of different markets and Price Output determination under various market conditions
CO 4	he Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
CO 5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques
18EC3L07	**Electronic Circuit Analysis Lab**
CO 1	Understand how the amplification under small signal models
CO 2	Analyzing frequency response of amplifiers
CO 3	Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications
CO 4	Utilize the Concepts of negative feedback to improve and importance of multivibrators
CO 5	Understand the concepts of sampling gates
18EC3L08	**Signals & Systems Lab**
CO 1	Have a thorough understanding of the fundamental concepts and techniques used
CO 2	To understand and examine the signals and its operations
CO 3	The ability to understand and analyze sampling process
CO 4	Ability to identify basic requirements for a transformation techniques in continuous and discrete time
18EC3N09	**Constitution of India**
CO 1	Importance for building a democratic India, features and principles of Indian Constitution.
CO 2	The functioning of three wings of the government ie., executive, legislative and judiciary.
CO 3	The roles and powers of State Government

CO 4	The decentralization of power between Union, State and Local self-Government and local administration
CO 5	Election Commission, UPSC, Welfare commissions for sustaining democracy
IV SEMESTER(II BTECH -II SEM)	
18EC4T01	**Humanities (Effective Technical Communication)**
CO 1	learn different ways of enhancing their range of vocabulary
CO 2	Improve their writing skills
CO 3	identify common errors in writing
CO 4	Hone their skills needed for making presentations and succeed at interviews
CO 5	gain practical knowledge about the soft skills required
18EC4T02	**Physics of Materials**
CO 1	To identify different crystal structures
CO 2	To study about different defects in crystals
CO 3	To acquire knowledge on physical properties of metals
CO 4	To develop the knowledge of Ultrasonics and their applications in various fields
CO 5	Impart knowledge of Physical Optics phenomenon and identify these phenomenon in natural processes
18EC4T03	**Analog IC Applications**
CO 1	Understand about Logic Families with Diode-Transistor
CO 2	Design different Time base generators
CO 3	Design circuits using operational Amplifier for various applications
CO 4	Understand the concept of A/D & D/A Converters
CO 5	Analyze and design amplifiers and active filters using Op-amp
18EC4T04	**Digital System Design Using HDL**
CO 1	Understand the concepts of Design Flow and Programming Statements
CO 2	Understand the concepts of Combinational logic circuits in digital system
CO 3	Understand the concepts of sequential logic circuits in digital system
CO 4	Understand the concepts of Programmable logic devices & memories
CO 5	Understand the concepts of HDL modeling and logic families
18EC4T05	**Electromagnetic Waves & Transmission lines**
CO 1	Know the basic principles of electrostatics
CO 2	Understand the primary laws in magneto statics and its importance
CO 3	Gain knowledge on functionalities of time varying fields
CO 4	Determine the parameters in EM Wave propagating conditions
CO 5	Derive and determine the conditions and constants in transmission lines
18EC4T06	**Control Systems**
CO 1	Represent the mathematical model of a system
CO 2	Determine the response of different order systems for various inputs in time domains

CO 3	Analyze the stability of the system using RH and RL
CO 4	Know the Frequency Response Using Different Graphical Networks
CO 5	Design Controllers for Different Applications
18EC4L07	**Analog IC Applications Lab**
CO 1	Understand about Logic Families with Diode-Transistor
CO 2	Design different Time base generators
CO 3	Design circuits using operational Amplifier for various applications
CO 4	Analyze and design amplifiers and active filters using Op-amp
CO 5	Understand the concept of A/D & D/A Converters
18EC4L08	**Digital System Design Using HDL Lab**
CO 1	Understand the concepts of Design Flow and Programming Statements
CO 2	Understand the concepts of Combinational logic circuits in digital system
CO 3	Understand the concepts of sequential logic circuits in digital system
CO 4	Understand the concepts of Programmable logic devices & memories
CO 5	Understand the concepts of HDL modeling and logic families
18EC4L09	**Mini Project**
CO 1	Understand the real world problems
CO 2	Gain knowledge to solve and address the problem
CO 3	Improve presentation skills and writing skills
CO 4	Involve in both theoretical and practical work
	V SEMESTER(III BTECH -I SEM)
18EC5T01	**Analog and Digital Communications**
CO 1	Differentiate various Analog modulation schemes
CO 2	Analyze demodulation schemes and their spectral characteristics
CO 3	Analyze noise characteristics of various analog modulation methods
CO 4	Differentiate various Digital modulation schemes
CO 5	Analyze demodulation schemes and their spectral characteristics
18EC5T02	**Microcontroller and Microprocessors**
CO 1	To be able to understand the overview of 8085 & 8086 microprocessor in general
CO 2	To be able to understand the Assembly Language Programming in microprocessors
CO 3	To be able to understand Interfacing I/O devices through PPI with microprocessor
CO 4	To be able to understand the overview of microcontroller in general & ALP in microcontrollers
CO 5	To be able to understand the microcontroller interfacing with I/O devices using ALP
18EC5T03	**Digital Signal Processing**
CO 1	Apply the difference equations concept in the analyzation of Discrete time systems
CO 2	Use the FFT algorithm for solving the DFT of a given signal

CO 3	Design a Digital filter (FIR&IIR) from the given specifications
CO 4	Realize the FIR and IIR structures from the designed digital filter
CO 5	Use the Multirate processing concepts in various applications
18EC5T04	**IPR & Patents**
CO 1	To introduce the various concepts relating to Intellectual Property Rights andPatents.
CO 2	To impart knowledge on various aspects relating to laws relating to patents in India.
CO 3	To indulge the process of registering for copyrights and trademarks.
18EC5T05	**Quantitative Aptitude & Reasoning**
CO 1	Understand the basics concepts of Numerical Ability & Reasoning Skills
CO 2	Use the logical thinking and analytical abilities to solve Quantitative aptitude questions from companies specific and other competitive tests
CO 3	Solve questions related to time and distance, time and work ,percentages, simple interest and compound interest etc.
CO 4	Solve questions related to coding and decoding, number series, directions, puzzles ,etc.
CO 5	Understand and solve puzzle related questions for competitive and campus placements exams.
18EC5L08	**Microcontroller and Microprocessors Lab**
CO 1	Apply assembly language programming skills for simple and complex calculations.
CO 2	Interface peripherals with microprocessor
CO 3	Understand the concepts on hardware and software/programming of a microcontroller.
CO 4	Interface peripherals with microcontroller.
CO 5	ADC & DAC interfacing with microcontrollers.
18EC5L09	**DSP Lab**
CO 1	Use MATLAB software to process different signals.
CO 2	Design the digital filters for generating desired signals.
CO 3	Simulation of system in Time and Frequency domain.
CO 4	Use Digital signal processing algorithms for implementation of DFT.
CO 5	understand the concept of interpolation and decimation
18EC5L10	**Communication Systems Lab**
CO 1	Simulate modulation and demodulation circuits such as AM, DSB-SC in hardware and MATLAB simulation
CO 2	Understand of Sampling Process.
CO 3	Orientation to time-division multiplexing (TDM) systems
CO 4	Verification of ASK, FSK and PSK
CO 5	Understand of pulse code modulation technique
18EC5N11	**Essence of Indian Traditional Knowledge**
CO 1	Understand the significance of Indian Traditional Knowledge
CO 2	Classify the Indian Traditional Knowledge

CO 3	Compare Modern Science with Indian Traditional Knowledge system.
CO 4	Analyze the role of Government in protecting the Traditional Knowledge
CO 5	Understand the impact of Philosophical tradition on Indian Knowledge System.
VI SEMESTER(III BTECH -II SEM)	
18EC6T01	**VLSI Design**
CO 1	Model the behavior of a MOS Transistor
CO 2	Design combinational and sequential circuits using CMOS gates
CO 3	Design the low power circuits
CO 4	Implement design on FPGA
CO 5	Perform Testing and implementation techniques
18EC6T02	**Antenna and wave propagation**
CO 1	Define various antenna parameters
CO 2	Analyze radiation patterns of antennas
CO 3	Evaluate antennas for given specifications
CO 4	Illustrate techniques for antenna parameter measurements
CO 5	Design antennas for specific applications
18EC6T03	**Cellular Mobile Communication**
CO 1	Understand the basic cellular concepts like frequency reuse, cell splitting, cell sectoring etc., and various cellular systems
CO 2	Understand the different types of interference s influencing cellular and mobile communications
CO 3	Understand the frequency management, channel assignment and various propagation effects in cellular environment
CO 4	Understand the different types antennas used at cell site and mobile
CO 5	Understand the concepts of handoff and types of handoffs
18EC6T06	**OOPS Through JAVA**
CO 1	Understand the principles of object oriented concepts. Define classes and objects by identifying real world entities, their properties and functionalities.
CO 2	Reuse the existing classes by using inheritance and understand the concepts of packages and exception handling.
CO 3	Make use of built-in classes in Java and understand the concept of thread.
CO 4	Develop user interfaces using applets, AWT and Event handling in java.
CO 5	Create portable GUI applications using Swing components.
18EC6T09	**Embedded Systems**
CO 1	Program an embedded system
CO 2	Design, implement and test an embedded system
CO 3	Identify the unique characteristics of real-time systems
CO 4	Explain the general structure of a real-time system

CO 5	Define the unique design problems and challenges of real-time systems
18EC6L10	**VLSI Lab**
CO 1	Design and analyse the MOS at device, circuit and layout level using back end CAD tool
CO 2	Design of combinational and sequential circuit using CAD tool
CO 3	Design of Combinational and sequential circuit at gate level using Front end tool
18EC6L11	**OOPS Through JAVA Lab**
CO 1	Understand the behavior of primitive data types, object references, and arrays.
CO 2	Implement Java classes from specifications
CO 3	Implement interfaces, inheritance, and polymorphism as programming techniques
CO 4	Apply exceptions handling.
18EC6P11	**Technical Seminar**
CO 1	Define the real world problems
CO 2	Acquire knowledge to solve and address the problem
CO 3	Improve presentation skills and writing skills
CO 4	Involve in both theoretical and practical survey work
	VII SEMESTER(IV BTECH -I SEM)
18EC7T01	**Digital Image Processing**
CO 1	Exploration of the limitations of the computational methods on digital images
CO 2	Expected to implement the spatial and frequency domain image transforms on enhancement and restoration of images
CO 3	Elaborate understanding on image enhancement techniques
CO 4	Understand image segmentation techniques
CO 5	Expected to define the need for compression and evaluate the basic compression algorithms
18EC7T02	**Microwave Engineering**
CO 1	Gain Knowledge of Transmission Lines and Waveguide Structures and How They Are Used as Elements in Impedance Matching and Filter Circuits
CO 2	Apply Analysis Methods to Determine Circuit Properties of Passive or Active Microwave Devices
CO 3	Gain Knowledge and Understanding of Microwave Analysis Methods
CO 4	Distinguish Between M-Type and O-Type Tubes
CO 5	Analyze and Measure Various Microwave Parameters Using a Microwave Test Bench
18EC7T03	**Wireless Sensor Network**
CO 1	To know the basic concepts of Sensor Networks
CO 2	To understand the concept of Deployment and Configuration
CO 3	To know Routing Protocals
CO 4	To understand the concept of Transport Layer And Security Protocols
CO 5	To know Data storage & Manipulations

18EC7T06	**Satellite Communication**
CO 1	Understand the basic concepts, applications, frequencies used and types of satellite communications
CO 2	Understand the concept of look angles, launches and launch vehicles and orbital effects in satellite Communications
CO 3	Understand the various satellite subsystems and its functionality
CO 4	Understand the concepts of satellite link design and calculation of C/N ratio
CO 5	Understand the concepts of multiple access and various types of multiple access techniques in satellite Systems
18EC7T09	**Computer Architecture & Organization**
CO 1	To know the Basic Structure of computers
CO 2	To know the Register Transfer Language And Micro operations
CO 3	To understand the memory concepts
CO 4	To know the memory systems
CO 5	To understand the concept of input output organization
18EC7L12	**Microwave & OC Lab**
CO 1	The student will be able to understand the characteristic of Optical fiber
CO 2	The student will be able to Differentiate analog and digital link
CO 3	The student will be able to Measure the power and attenuation of optical and microwave devices
CO 4	The student will be able to Microwave parameter measurement of Gunn diode and Reflex Klystron
CO 5	Able to determine numerical aperture and attenuation of optical fiber
18EC7P13	**Industrial Internship**
CO 1	Understand the real world problems
CO 2	Aquitaine with industry interaction skills
CO 3	Gain knowledge to solve and address the problem
CO 4	Improve presentation skills and writing skills
CO 5	Involve in industrial needs related work
	VIII SEMESTER(IV BTECH -II SEM)
18EC8T01	**Coding Theory & Techniques**
CO 1	Design the channel performance using Information theory
CO 2	Comprehend various error control code properties
CO 3	Apply linear block codes for error detection and correction
CO 4	Apply convolution codes for performance analysis & cyclic codes for error detection and correction
CO 5	Design BCH & RS codes for Channel performance improvement against burst errors
18EC8T04	**Electronic Measurements & Instrumentation**
CO 1	Recognize the evolution and history of units and standards in Measurements

CO 2	Identify the various parameters that are measurable in electronic instrumentation
CO 3	Employ appropriate instruments to measure given sets of parameters
CO 4	Practice the construction of testing and measuring set up for electronic systems
CO 5	To have a deep understanding about instrumentation concepts which can be applied to Control systems
18EC8T05	**Operating Systems**
CO 1	Understand the functionalities of an operating system and Evaluate different CPU scheduling algorithms
CO 2	Apply synchronization to cooperating processes and handle the deadlocks
CO 3	Learn various management techniques for efficient utilization of system memory
CO 4	Understand and analyze theory and implementation of files and Evaluate different disk scheduling algorithms
CO 5	Analyze the functionalities in various operating systems
18EC8T08	**Data Communication & Networking**
CO 1	to understand basic knowledge of data sharing, transmission media and their protocols
CO 2	to have the basic knowledge of computer networks
CO 3	To Focus on information sharing and networks
CO 4	To Introduce flow of data, categories of network, different topologies
CO 5	To Focus on different coding schemes
18EC8P11	**Project**
CO 1	Identification of real world problems.
CO 2	Analyze real world problems.
CO 3	Identify advanced tools & programming in problem solving.
CO 4	Simulate and implement the design.
CO 5	Technical report writing.

PROGRAMME OUTCOMES (POs)

PO1: Graduates will be able to apply the principles of basic sciences, mathematics, and engineering fundamentals in finding solutions to complex problems.

PO2: Graduates will acquire critical thinking skills, problem solving abilities, and familiarity with the computational procedures essential to the field.

PO3: Graduates will be able to design various types of systems required for technical advancements and societal needs.

PO4: Graduates will be able to use research-based knowledge to conduct experiments and interpret experimental data.

PO5: Graduates gain hands on experience in using latest software and hardware tools for obtaining solutions to engineering problems.

PO6: Graduates will be able to apply their knowledge to tackle societal, health, safety, legal and cultural issues.

PO7: Graduates will possess adequate knowledge required for technological development keeping in view environmental effects and real time problems.

PO8: Graduates will have professional ethics and the culture of practicing the established norms of engineering.

PO9: Graduates will acquire the capability of working productively as individuals, as members or leaders in diverse environment.

PO10: Graduates will be able to articulate their ideas clearly with excellent soft skills and prepare technical reports.

PO11: Graduates will acquire knowledge required for project and finance management.

PO12: Graduates will have ability to engage in lifelong learning to keep abreast of ever-changing technology.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING	
COURSE OUTCOMES (MIC18)	
I SEMESTER (I BTECH-I SEM)	
18CS1T1	**ENGLISH-1**
CO 1	Use English language, both written and spoken, competently and correctly
CO 2	Improve comprehension and fluency of speech.
CO 3	Gain confidence in using English in verbal situations.
CO 4	Hone the communication skills to meet the challenges of their careers very successfully.
CO 5	Strengthen communication skills in different contexts like formal and informal
18CS1T2	**LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS**
CO 1	Apply the knowledge to solve a system of homogeneous and non-homogeneous linear equations
CO 2	Optimize functions of several variables and able to find extreme values of constrained functions
CO 3	Able to analyze the real-life situations, formulate the differential equations and then applying the methods
CO 4	Apply the knowledge to solve the linear differential equations
CO 5	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
18CS1T3	**APPLIED PHYSICS**
CO 1	Study of lasers and optical fibers with an emphasis of their application in communication in particular.
CO 2	Outline the principles of Quantum mechanics to understand the principles of solid state materials for use in engineering applications
CO 3	The Analytical study of response of materials to Electromagnetic fields.
CO 4	To study various magnetic and dielectric materials and their Engineering applications.
CO 5	To Gain knowledge on the physics of semiconductors for their engineering applications
18CS1T4	**PROBLEM SOLVING APPROACHES**
CO 1	To formulate simple algorithms for arithmetic, logical problems and translate them to programs in c language.
CO 2	To implement conditional branching, iteration and recursion.
CO 3	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
CO 4	To use arrays, pointers and structures to formulate algorithms and programs.
CO 5	To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
18CS1T05	**ENGINEERING GRAPHICS**

CO 1	Draw the polygons, ellipse, parabola, hyperbola, cycloids and involutes for various types of profiles.
CO 2	Construction of various scales like plain, diagonal and venier scales .Draw the orthographic projections of the points, lines.
CO 3	Draw the projections of planes
CO 4	Draw the projections of solids
CO 5	Convert Orthographic projections to isometric projection and vice versa.
18CS1L06	**ENGLISH COMMUNICATION SKILLS LAB-1**
CO 1	The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
18CS1T07	**APPLIED PHYSICS LAB**
CO 1	Implement the basic principles of Optics through various phenomena of light.
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
18CS1L08	**PROBLEM SOLVING LAB USING C AND PYTHON**
CO 1	Demonstrate Knowledge on various concepts of a C language.
CO 2	Able to draw flowcharts and write algorithms.
CO 3	Able design and development of C problem solving skills.
CO 4	Able to design and develop modular programming skills.
CO 5	Able to trace and debug a program
18CS1T09	**ENVIRONMENTAL STUDIES**
CO 1	The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth
CO 2	The concepts of the ecosystem and its function in the environment
CO 3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO 4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO 5	The environmental legislations of India and Social issues and the possible means and EIA
18CS2T01	**ENGLISH-II**
CO 1	Use English language in various contexts
CO 2	Improve comprehension and fluency of speech
CO 3	Appreciate a literary text
CO 4	Hone the communication skills to meet the challenges of their careers very successfully
CO 5	Understand the need for lifelong learning
18CS2T02	**NUMERICAL METHODS &VECTOR CALCULUS**

CO 1	Determine the solution of transcendental & linear equations by different numerical methods
CO 2	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries
CO 3	Determine the areas and volumes using multiple integration
CO 4	Interpret the divergence, gradient and curl physically
CO 5	Apply complex functions in the study of thermodynamics and electric fields
18CS2L03	**APPLIED CHEMISTRY**
CO 1	Study of polymers and composite materials enable us to use them in a good number of engineering fields
CO 2	Industries are run by the quality of fuels and energy crisis can be met by broad understanding of different fuels
CO 3	Electrochemical principles form the basis of batteries that are being developed. Destruction of metals and alloys can be prevented by understanding the science of corrosion.
CO 4	Study of the existing developed materials forms a basis for developing more number of advanced materials
CO 5	Methods of purification of water can be known so that more of them can be developed
18CS2T04	**BIOLOGY FOR ENGINEERS**
CO 1	Understand how biological observations lead to major discoveries and the morphological ,Biochemical and ecological classification of organisms
CO 2	Understand that all forms of life have the same building blocks and their involvement in the maintenance and metabolic processes of living organisms
CO 3	Classify enzymes and distinguish between different mechanisms of enzyme action and study the chemical reactions that are catalyzed by enzymes. Apply thermodynamic principles to biological systems and able to understand major chemical process that occur within a living organism in order to maintain life
CO 4	Identify DNA as genetic material in the molecular basis of information transfer
CO 5	Identify and classify micro-organisms, Understand media compositions and growth of microorganisms
18CS2T05	**BASIC ELECTRONICS & ELECTRICAL ENGINEERING**
CO 1	Understand basic semiconductor devices
CO 2	Observe characteristics diodes
CO 3	Analyze applications of Semiconductor diodes
CO 4	Characterize the Bipolar Junction Transistor in different modes
CO 5	Understand the construction and working of Field Effect Transistor
CO 6	To understand the concepts and applications of electronic devices
18CS2T06	**DATA STRUCTURES USING C**
CO 1	Understand the properties, interfaces, and behaviors of basic abstract data types.

CO 2	Understand and apply linked lists
CO 3	Apply Stacks and Queue data structures.
CO 4	Demonstrate different methods for traversing trees.
CO 5	Demonstrate the application of Graphs
18CS2L07	APPLIED CHEMISTRY LAB
CO 1	Student is exposed to different methods of chemical analysis and use of some commonly employed instruments, they thus acquire some experimental skills
18CS2L08	BASIC ELECTRONICS & ELECTRICAL ENGINEERING LAB
CO 1	Measure voltage, frequency and phase of any waveform using CRO
CO 2	Generate sine, square and triangular waveforms with required frequency and amplitude using function generator
CO 3	Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers, amplifiers etc.
18CS2L09	DATA STRUCTURES USING C LAB
CO1	Understand the properties, interfaces, and behaviors of basic abstract data types.
CO2	Understand and apply linked lists
CO3	Apply Stacks and Queue data structures.
CO4	Demonstrate different methods for traversing trees.
CO5	Demonstrate the application of Graphs
18CS3T01	PROBABILITY THEORY & STOCHASTIC PROCESSES
CO 1	Understand random variables and discrete probability distributions
CO 2	Determine probabilities based on practical situations using the normal distributions
CO 3	Apply different distributions to compute confidence intervals
CO 4	Test the hypothesis concerning means and proportions
CO 5	Understand the concept of least square estimation linear regression
18CS3T02	OBJECT ORIENTED PROGRAMMING
CO 1	Understand the principles of object oriented concepts. Define classes and objects by identifying real world entities, their properties and functionalities.
CO 2	Reuse the existing classes by using inheritance and understand the concepts of packages and exception handling.
CO 3	Make use of built-in classes in Java and understand the concept of thread.
CO 4	Develop user interfaces using applets, AWT and Event handling in java.
CO 5	Create portable GUI applications using Swing components.
18CS3T03	DIGITAL LOGIC DESIGN
CO 1	Apply Boolean laws & theorems to digital Logic functions; simplify the Boolean functions to the minimum number of literals

CO 2	Design different types of combinational logic circuits using Adders, Subtractors, Decoders, Multiplexers and Magnitude Comparators
CO 3	Design clocked sequential logic circuits using flip flops
CO 4	Design different types of Counters, Registers
CO 5	Contrast Programmable logic devices(PROM, PAL, and PLA) and its design
18CS3T04	**EFFECTIVE TECHNICAL COMMUNICATION**
CO 1	Learn different ways of enhancing their range of vocabulary
CO 2	Improve their writing skills
CO 3	Identify common errors in writing
CO 4	Hone their skills needed for making presentations and succeed at interviews
CO 5	Gain practical knowledge about the soft skills required
18CS3L08	**ADVANCED DATA STRUCTURES LAB**
CO 1	Develop indices.
CO 2	Implement various search trees.
CO 3	Create a graph and traverse the graph
CO 4	Develop code for shortest path problems.
CO 5	Develop indices.
18CS3L09	**R PROGRAMMING LAB**
CO 1	Implement the basic concepts and data structures of R.
CO 2	Implement loops and functions in R
CO 3	Implement mathematical functions and handling files
CO 4	Apply the different distributions
CO 5	Use various graphical tools in R
18CS3T06	**CONSTITUTION OF INDIA**
CO 1	Know the sources, features and principles of Indian Constitution.
CO 2	Learn about Union Government, State government and its administration.
CO 3	Get acquainted with Local administration and Pachayati Raj.
CO 4	Be aware of basic concepts and developments of Human Rights.
18CS4T01	**DISCRETE MATHEMATICS**
CO 1	Apply mathematical logic to design new programming languages
CO 2	Illustrate the properties of sets and functions to design a modelling software system
CO 3	Explain a structure of an algebra which is useful to understand the theory of sequential machines, formal languages and coding theory

CO 4	Apply the techniques of recursion for representing the data in the analysis of algorithms
CO 5	Provide the knowledge of graphs such as trees which is useful in maintaining files and directories by OS
18CS4T02	**DATABASE MANAGEMENT SYSTEMS**
CO 1	Describe a database and different database models
CO 2	Design Entity Relationship models And Relational Model
CO 3	Design and implement queries using Structured Query Language
CO 4	Design database schema using normalization.
CO 5	Understand the characteristics of database transaction management.
18CS4T03	**COMPUTER ORGANIZATION & ARCHITECTURE**
CO 1	Understand the architecture of a modern computer with its various processing units.
CO 2	Understand RTL, micro operations, instruction cycle
CO 3	Understand the features of hardwired and micro programmed control units.
CO 4	Analyze the memory hierarchy system and performance improvement by cache memory.
CO 5	Analyze the communication methods of I/O devices and standard I/O interfaces.
18CS4T04	**OPERATING SYSTEMS**
CO 1	Understand the functionalities of an operating system and Evaluate different CPU scheduling algorithms.
CO 2	Apply synchronization to cooperating processes and handle the deadlocks
CO 3	Learn various management techniques for efficient utilization of system memory.
CO 4	Understand and analyze theory and implementation offiles and Evaluate different disk scheduling algorithms.
CO 5	Analyze the functionalities in various operating systems.
18CS4T05	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
CO 1	The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand.
CO 2	One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs.
CO 3	One has to understand the nature of different markets and Price Output determination under various market conditions.
CO 4	One should equipped with the knowledge of different Business Units
CO 5	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.
18CS4T06	**PROFESSIONAL ETHICS**
CO 1	It gives a comprehensive understanding of a various issues that are encountered by every professional in discharging professional duties

CO 2	It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.
18CS4L07	**OPERATING SYSTEMS &LINUX PROGRAMMINGLAB**
CO 1	Implement various basic functionalities of operating systems
CO 2	Illustrate kernel functionalities using LINUX
18CS4L08	**DATABASE MANAGEMENT SYSTEMS LAB**
CO 1	Create own database.
CO 2	Manipulate data in database using SQL language.
CO 3	Experiment with various SQL queries with database created
CO 4	Write programs using PL/SQL language.
CO 5	Create triggers using PL/SQL.
18CS4L09	**PYTHON PROGRAMMING LAB**
CO 1	Structure simple Python programs for solving problems.
CO 2	Decompose a Python program into functions.
CO 3	Represent compound data using Python lists, tuples, and dictionaries.
CO 4	Read and write data from/to files in Python Programs.
18CS5T01	**DATA MINING & WAREHOUSING**
CO 1	Identify the scope and necessity of Data Mining & Warehousing for the society.
CO 2	Describe the design of Data Warehousing so that it can be able to solve the root problems.
CO 3	To understand various tools of Data Mining and their techniques to solve the real time problems.
CO 4	To develop ability to design various algorithms based on data mining tools.
CO 5	To develop further interest in research and design of new Data Mining Techniques.
18CS5T02	**WEB TECHNOLOGIES**
CO 1	Analyze a web page and identify its elements and attributes.
CO 2	Create web pages using HTML and Cascading Styles sheets.
CO 3	Build dynamic web pages and client-side scripts using AJAX
CO 4	Build web applications using PHP.
CO 5	Develop interactive web pages that include databases
18CS5T03	**DESIGN AND ANALYSIS OF ALGORITHMS**
CO 1	Understand the performance Analysis of an Algorithm using Space and Time Complexities
CO 2	Describe, apply and analyze the complexity of divide and conquer strategy.
CO 3	Synthesize efficient Algorithms for common engineering problems using Greedy Method.
CO 4	Apply and analyze the complexity of dynamic programming strategy.
CO 5	Ability to solve complex problems using Back Tracking and Branch & Bound.

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18CS5T04	**FORMAL LANGUAGES & AUTOMATA THEORY**
CO 1	Understand the basic concepts of Automata Theory
CO 2	Infer the equivalence of languages described by finite automata and regular expressions.
CO 3	Devise regular, context free grammars while recognizing the strings and tokens and able to Normalize grammars.
18CS5T05	**OBJECT ORIENTED ANALYSIS AND DESIGN**
CO 1	Understand the necessity of Object Modeling
CO 2	Represent classes, responsibilities and states using UML notation.
CO 3	Demonstrate knowledge about the conceptual Model of UML.
CO 4	Model the event driven state of object and transform them into implementation specific layouts.
CO 5	Identify, Analyze the subsystems, various components and collaborate them interchangeably.
18CS5T09	**OPTIMIZATION TECHNIQUES**
CO 1	Understand the methodology of Operations Research & concepts of linear programming
CO 2	Formulate the solutions to transportation problems
CO 3	Explain the solutions for various sequencing problems
CO 4	Apply game theory to solve real world problems
CO 5	Illustrate the solutions to different replacement policies
18CS5L16	**DATA MINING LAB**
CO 1	Learn about WEKA tool and its applications
CO 2	Extract knowledge using Data Mining techniques.
CO 3	Adapt to new Data Mining tools.
CO 4	Explore recent trends in Data Mining such as Web mining, spatial-temporal mining,
18CS5L10	**WEB TECHNOLOGIES LAB**
CO 1	Knowledge of HTML, Java Script and XML to develop web applications
CO 2	Understanding about JDBC connections and Java Mail API
CO 3	Acquire Knowledge of the design and development process of a complete web application
18CS5L17	**ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**
CO 1	Understand the significance of Indian Traditional Knowledge
CO 2	Classify the Indian Traditional Knowledge
CO 3	Compare Modern Science with Indian Traditional Knowledge system.
CO 4	Analyze the role of Government in protecting the Traditional Knowledge
CO 5	Understand the impact of Philosophical tradition on Indian Knowledge System.
18CS6T01	**COMPILER DESIGN**

CO 1	Acquire knowledge in different phases and passes of Compiler.
CO 2	Demonstrate knowledge about scanning of tokens and perform the syntax analysis by using Top-down parsing techniques.
CO 3	Perform the syntax analysis by using Bottom Up parsing techniques for more complex grammars.
CO 4	Compare different memory management techniques in runtime environment.
CO 5	Demonstrate knowledge about compiler generation tools and techniques.
18CS6T02	**COMPUTER NETWORKS**
CO 1	Independently enumerate the layers of the OSI model and TCP/IP
CO 2	Identify the different types of network topologies and protocols.
CO 3	Compare and contrast methods to identify Errors and correct them.
CO 4	Differentiate between various network routing algorithms.
CO 5	Understand WWW and HTTP Architectures.
18CS6T03	**SOFTWARE ENGINEERING**
CO 1	Understand the perspective of various software process models
CO 2	Understand the Requirements Engineering Process and compile an SRS
CO 3	Analyze the requirements and perform a Design
CO 4	Apply testing principles on software project and understand the maintenance concepts.
CO 5	Identify risks, manage the change to assure quality in software projects
18CS6T06	**UNIX & SHELL PROGRAMMING**
CO 1	Create powerful data processing applications using UNIX shell and commands
CO 2	Manage data, files and programs at command line using UNIX
CO 3	Create and modify data files and documents using editors and tools
CO 4	Demonstrate knowledge of creating new commands.
CO 5	Develop Scripts and programs that demonstrate effective use of structured programming.
18CS6T07	**EMPLOYABILITY SKILLS: QUANTITATIVE APTITUDE & REASONING**
CO 1	Understand the basics concepts of Numerical Ability & Reasoning Skills
CO 2	Use the logical thinking and analytical abilities to solve Quantitative aptitude questions from companies specific and other competitive tests
CO 3	Solve questions related to time and distance, time and work ,percentages, simple interest and compound interest etc.
CO 4	Solve questions related to coding and decoding, number series, directions, puzzles ,etc.
CO 5	Understand and solve puzzle related questions for competitive and campus placements exams.
18CS6L21	**COMPUTER NETWORKS LAB**

CO 1	Practical orientation of networking concepts
CO 2	To teach students various forms of IPC through UNIX and socket Programming
CO 3	
18CS6L22	SOFTWARE ENGINEERING LAB
CO 1	Prepare SRS document, design document, test cases and software configuration management and risk management related document.
CO 2	Develop function oriented and object oriented software design using tools like rational rose.
CO 3	Design and develop Test Cases for a system
CO 4	Track the progress of a project using various tools.
18CS6T23	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE
CO 1	Understand the concept of Traditional knowledge and its importance
CO 2	Know the need and importance of protecting traditional knowledge
CO 3	Know the various enactments related to the protection of traditional knowledge.
CO 4	Understand the concepts of Intellectual property to protect the traditional knowledge
18CS7T01	BIG DATA & HADOOP
CO 1	Understand methods for data summarization, query, and analysis.
CO 2	Apply data modeling techniques to large data sets
CO 3	Creating applications for Big Data analytics
CO 4	Building a complete business data analytic solution.
CO 5	Understand programming tools PIG & HIVE in Hadoop eco-system.
18CS7T02	Cryptography & Network Security
CO 1	Understand the need of information security and its importance.
CO 2	Apply symmetric security mechanisms for confidentiality
CO 3	Apply asymmetric security mechanisms for confidentiality
CO 4	Apply digital signature techniques for authentication
CO 5	Understand network security designs using available secure solutions (such asPGP, SSL, IPSec)
18CS7T05	DATA ANALYTICS
CO 1	Understand big data and data analytics life cycle.
CO 2	Explore various supervised learning methods.
CO 3	Explore various unsupervised learning methods.
CO 4	Understand and apply ARIMA model on time series data.
CO 5	Learn various technology and tools in big data analytics.
18CS7T07	SOFTWARE TESTING METHODOLOGIES
CO 1	Have an ability to apply software testing knowledge and engineering methods.

CO 2	Ability to identify the needs of software test automation, and define a test tool to support test automation.
CO 3	Understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
CO 4	Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.
CO 5	Apply techniques and skills to use modern software testing tools to support software testing projects.
18CS7T19	**GLOBAL ENVIRONMENT TRENDS**
CO 1	To impart the students about the knowledge on Global Environments
CO 2	To understand about Trade Theories and their applications
CO 3	To learn and understand about International Marketing
CO 4	To learn and understand about Financial Management
CO 5	To learn and understand about Human Resources and Management
18CS7L20	**BIG DATA & HADOOP LAB**
CO 1	Preparing for data summarization, query and analysis.
CO 2	Applying data modeling techniques to large data sets.
CO 3	Creating applications for Big data Analytics.
CO 4	Building a complete business data analytic solution.
18CS8T01	**CLOUD COMPUTING**
CO 1	Explain and characterize different cloud deployment models and service models
CO 2	Understand different cloud programming platforms and tools
CO 3	Illustrate Virtualization for Data-Center Automation.
CO 4	Identify the security issues in cloud computing
CO 5	Understand various basic concepts related to cloud computing technologies
18CS8T05	**HUMAN COMPUTER INTERACTION**
CO 1	Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
CO 2	Apply an interactive design process and universal design principles to designing HCI systems.
CO 3	Understand the importance of Natural Languages in computing interactions.
CO 4	Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
CO 5	Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.
18CS8T08	**SATELLITE COMMUNICATION**
CO 1	Understand the basic concepts, applications, frequencies used and types of satellite communications

CO 2	Understand the concept of look angles, launches and launch vehicles and orbital effects in satellite Communications
CO 3	Understand the various satellite subsystems and its functionality
CO 4	Understand the concepts of satellite link design and calculation of C/N ratio
CO 5	Understand the concepts of multiple access and various types of multiple access techniques in satellite Systems
18CS8T05	**ADDITIVE MANUFACTURING**
CO 1	Understand the working principle and process parameters of AM processes
CO 2	Explore the applications of AM processes in various fields
CO 3	Apply the suitable process and material for fabricating a given product
CO 4	Use the suitable post process based on product application
CO 5	Design and develop a product for AM Process

PROGRAMME OUTCOMES (POs)

PO1: An Ability to apply knowledge of basic sciences and mathematical foundation to engineering problems.

PO2: An ability to analyze and solve the problems effectively with appropriate logical and analytical skills.

PO3: An ability to design, develop and test software systems by applying algorithmic principles and programming process.

PO4: An ability to interpret the data and amalgamate the information to provide solutions to real world problems.

PO5: An ability to acquire and apply the modern techniques and tools to complex engineering problems.

PO6: An ability to develop computing solutions for public safety and legal issues to serve the needs of the society.

PO7: An ability to analyze the local and global impact of computing discipline on environmental issues and sustainable development

PO8: An ability to apply the ethical principles in engineering practice.

PO9: An ability to work effectively on projects either individually or in teams.

PO10: An ability to communicate effectively in written and oral forms on technical as well as general aspects.

PO11: An ability to apply engineering and management principles for effective development of projects.

PO12: An ability to recognize the need for lifelong learning in the world of ever changing technology.

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DEPARTMENT OF INFORMATION TECHNOLOGY

MIC 18 REGULATION

I SEMESTER(I BTECH -I SEM)	
18IT1T01	**English-I**
CO 1	Use English language, both written and spoken, competently and correctly
CO 2	Improve comprehension and fluency of speech
CO 3	Gain confidence in using English in verbal situations
CO 4	Hone the communication skills to meet the challenges of their careers very successfully
CO 5	Strengthen communication skills in different contexts like formal and informal
CO6	Develop knowledge of different fields and serve the society accordingly
18IT1T02	**Linear Algebra &Differential Equations**
CO 1	Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations
CO 2	Illustrate the methods of computing eigen values and eigen vectors
CO 3	Able to analyze the real life situations, formulate the differential equations then apply the solving methods
CO 4	Explain the techniques of solving the linear differential equations
CO 5	Optimize functions of several variables and able to find extreme values of constrained functions
18IT1T03	**Applied Physics**
CO 1	Study of lasers and optical fibers with an emphasis of their application in communication in particular
CO 2	Outline the principles of Quantum mechanics to understand the principles of solid state materials for use in engineering applications
CO 3	The Analytical study of response of materials to Electromagnetic fields
CO 4	To study various magnetic and dielectric materials and their Engineering applications
CO 5	To Gain knowledge on the physics of semiconductors for their engineering applications
18IT1T04	**Problem Solving Approaches**
CO 1	To formulate simple algorithms for arithmetic, logical problems and translate them to programs in c language
CO 2	To implement conditional branching, iteration and recursion.
CO 3	To decompose a problem into functions and synthesize a complete program using divide and conquer approach
CO 4	To use arrays, pointers and structures to formulate algorithms and programs
CO 5	To apply programming to solve matrix addition and multiplication problems and

	searching and sorting problems
CO6	To use structures and files
18IT1T05	**Engineering Graphics**
CO 1	Draw the polygons, ellipse, parabola, hyperbola, cycloids and involutes for various types of profiles
CO 2	Construction of various scales like plain, diagonal and venierscales.Draw the orthographic projections of the points, lines
CO 3	Draw the projections of planes
CO 4	Draw the projections of solids
CO 5	Convert Orthographic projections to isometric projection and vice versa
18IT1L06	**English Communication Skills Lab-I**
CO 1	The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
18IT1L07	**Applied Physics Lab**
CO 1	Implement the basic principles of Optics through various phenomena of light.
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
18IT1L08	**Problem Solving Approaches Lab**
CO 1	Able to draw flowcharts and write algorithms.
CO 2	Able design and development of C problem solving skills.
CO 3	Able to design and develop modular programming skills.
CO 4	Able to trace and debug a program
18IT2L09	**IT Workshop**
CO 1	Identify, assemble and update the components of a computer
CO 2	Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems
CO 3	Make use of tools for converting pdf to word and vice versa
CO 4	Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex
II SEMESTER(1 BTECH -II SEM)	
18IT2T01	**English-II**

CO 1	Use English language in various contexts.
CO 2	Improve comprehension and fluency of speech.
CO 3	Appreciate a literary text
CO 4	Hone the communication skills to meet the challenges of their careers very successfully.
CO 5	Understand the need for lifelong learning
18IT2T02	**Vector Calculus & Fourier Transforms**
CO 1	Determine the areas and volumes using multiple integration
CO 2	Interpret the divergence, gradient and curl physically
CO 3	Analyze the general periodic functions in the form of an infinite convergent sine and cosine series
CO 4	Explain the techniques of Fourier transforms
CO 5	Illustratethe methods to solve the boundary value problems
18IT2T03	**Applied Chemistry**
CO 1	Study of polymers and composite materials enable us to use them in a good number of engineering fields
CO 2	Industries are run by the quality of fuels and energy crisis can be met by broad understanding of different fuels
CO 3	Electrochemical principles form the basis of batteries that are being developed. Destruction of metals and alloys can be prevented by understanding the science of corrosion
CO 4	Study of the existing developed materials forms a basis for developing more number of advanced materials
CO 5	Methods of purification of water can be known so that more of them can be developed
CO6	The importance of engineering materials in the domestic and engineering fields can be understood
18IT2T04	**Biology for Engineers**
CO 1	Understand how biological observations lead to major discoveries and the morphological,Biochemical and ecological classification of organisms
CO 2	Understand that all forms of life have the same building blocks and their involvement in the Maintenance and metabolic processes of living organisms
CO 3	Classify enzymes and distinguish between different mechanisms of enzyme action andStudy the chemical reactions that are catalyzed by enzymes. Apply thermodynamic, Principles to biological systems and able to understand major chemical processes that occur. Within a living organism in order to maintain life

CO4	Identify DNA as a genetic material in the molecular basis of information transfer
CO 5	Identify and classify microorganisms, understand media compositions and growth of Microorganisms
18IT2T05	**Basic Electrical & Electronics Engineering**
CO 1	Analyze various electrical networks.
CO 2	Understand operation of DC generators, single-phase transformer and acquire proper knowledge and working of 3-phase alternator and 3-phase induction motors
CO 3	Understand operation of Sources of Energy & power transmission and distribution using single line diagrams.
CO 4	Analyze operation of half wave, full wave bridge rectifiers and OP- AMPs.
CO 5	Understanding operations of CE amplifier and basic concept of feedback amplifier
18IT2L06	**Data Structures Through C**
CO 1	Understand the properties, interfaces, and behaviors of basic abstract data types.
CO 2	Understand and apply linked lists
CO 3	Apply Stacks and Queue data structures.
CO 4	Demonstrate different methods for traversing trees.
CO 5	Demonstrate the application of Graphs
18IT2L07	**Applied Chemistry Lab**
CO 1	student is exposed to different methods of chemical analysis abd use of some commonly employed instruments.they thus acquire some expermental skills
18IT2L08	**Data Structures Through C Lab**
CO 1	Understand the properties, interfaces, and behaviors of basic abstract data types.
CO 2	Understand and apply linked lists
CO 3	Apply Stacks and Queue data structures.
CO 4	Demonstrate different methods for traversing trees.
CO 5	Demonstrate the application of Graphs
18IT2L09	**Environmental Studies**
CO 1	The importance of environment. Natural resources and current global

	environmental challenges for the sustenance of the life on planet earth
CO 2	The concepts of the ecosystem and its function in the environment
CO 3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO 4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO 5	The environmental legislations of India and Social issues and the possible means
CO6	Environmental assessment and the stages involved in EIA.

III B.TECH I SEMESTER	
18IT3T01	**Probability and statistics**
CO 1	Understand random variables and discrete probability distributions
CO 2	Determine probabilities based on practical situations using the normal distributions
CO 3	Apply different distributions to compute confidence intervals
CO 4	Test the hypothesis concerning means and proportions
CO 5	Understand the concept of least square estimation linear regression
18IT3T02	**Object Oriented Programming**
CO 1	Understand the principles of object oriented concepts. Define classes and objects by identifying real world entities, their properties and functionalities.
CO 2	Reuse the existing classes by using inheritance and understand the concepts of packages and exception handling.
CO 3	Make use of built-in classes in Java and understand the concept of thread.
CO 4	Develop user interfaces using applets, AWT and Event handling in java
CO 5	Create portable GUI applications using Swing components.
18IT3T03	**Advanced Data Structures**
CO 1	Create hash based index for efficient search
CO 2	Analyze the efficiency of various tree data structures
CO 3	Understand the concept of priority queues and its applications
CO 4	Implement tree data structures for multi-way search
CO 5	Identify and implement shortest path in various real time problems.
18IT3T04	**Digital Logic Design**
CO 1	Apply Boolean laws & theorems to digital Logic functions; simplify the Boolean functions to the minimum number of literals
CO 2	Design different types of combinational logic circuits using Adders, Subtractors, Decoders, Multiplexers and Magnitude Comparators.
CO 3	Design clocked sequential logic circuits using flip flops
CO 4	Design different types of Counters, Registers.
CO 5	Contrast Programmable logic devices(PROM, PAL, and PLA) and its design.

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18IT3T05	**Effective Technical Communication**
CO 1	learn different ways of enhancing their range of vocabulary
CO 2	improve their writing skills
CO 3	identify common errors in writing
CO 4	hone their skills needed for making presentations and succeed at interviews
CO 5	gain practical knowledge about the soft skills required
18IT3T06	**Indian Constitution**
CO 1	Know the sources, features and principles of Indian Constitution.
CO 2	Learn about Union Government, State government and its administration.
CO 3	Get acquainted with Local administration and Pachayati Raj.
CO 4	Be aware of basic concepts and developments of Human Rights.
CO 5	Gain knowledge on roles and functioning of Election Commission
18IT3L07	**Object Oriented Programming Lab**
CO 1	Understand the behavior of primitive data types, object references, and arrays
CO 2	Implement Java classes from specifications
CO 3	Implement interfaces, inheritance, and polymorphism as programming techniques
CO 4	Apply exception handling.
18IT3L08	**Advanced Data Structures Lab**
CO 1	Develop indices.
CO 2	Implement various search trees.
CO 3	Crate a graph and traverse the graph
CO 4	Develop code for shortest path problems.
18IT3L09	**R Programming Lab**
CO 1	Implement the basic concepts and data structures of R.
CO 2	Implement loops and functions in R
CO 3	Implement mathematical functions and handling files
CO 4	Apply the different distributions, use various graphical tools in R

CO 5	Use various graphical tools in R
CO 6	Describe the properties of discrete and continuous distribution functions
	IV SEMESTER(II BTECH -II SEM)
18IT4T01	**Discrete Mathematical Structures**
CO 1	Apply mathematical logic to design new programming languages
CO 2	Illustrate the properties of sets and functions to design a modelling software system
CO 3	Explain a structure of an algebra which is useful to understand the theory of sequential machines, formal languages and coding theory
CO 4	Apply the techniques of recursion for representing the data in the analysis of algorithms
CO 5	Provide the knowledge of graphs such as trees which is useful in maintaining files and directories by OS
18IT4T02	**Data Base Management Systems**
CO 1	Describe a database and different database models
CO 2	Design Entity Relationship models And Relational Model
CO 3	Design and implement queries using Structured Query Language
CO 4	Design database schema using normalization.
CO 5	Understand the characteristics of database transaction management.
18IT4T03	**Computer Organization and Architecture**
CO 1	Understand the architecture of a modern computer with its various processing units.
CO 2	Understand RTL, micro operations, instruction cycle
CO 3	Understand the features of hardwired and micro programmed control units.
CO 4	Analyze the memory hierarchy system and performance improvement by cache memory.
CO 5	Analyze the communication methods of I/O devices and standard I/O interfaces.
18IT4T04	**Operating Systems**
CO 1	Understand the functionalities of an operating system and Evaluate different CPU scheduling algorithms.
CO 2	Apply synchronization to cooperating processes and handle the deadlocks
CO 3	Learn various management techniques for efficient utilization of system memory.
CO 4	Understand and analyze theory and implementation of files and Evaluate different disk scheduling algorithms.
CO 5	Analyze the functionalities in various operating systems.

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18IT4T05	**Managerial Economics and Financial Analysis**
CO 1	The knowledge of estimating the Demand and demand elasticity's for a product
CO 2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
CO 3	to understand the nature of different markets and Price Output determination under various market conditions
CO 4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
CO 5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques
18IT4T06	**Professional Ethics**
CO 1	It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties
CO 2	It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.
18IT4L07	**OperatingSystems and Linux Programming Lab**
CO 1	Implement various basic functionalities of operating systems
CO 2	Illustrate kernel functionalities using LINUX
18IT4L08	**Data Base Management Systems Lab**
CO 1	Create own database.
CO 2	Manipulate data in database using SQL language.
CO 3	Experiment with various SQL queries with database created
CO 4	Write programs using PL/SQL language.
CO 5	Create triggers using PL/SQL.
18IT4L09	**Python Programming Lab**
CO 1	Structure simple Python programs for solving problems.
CO 2	Decompose a Python program into functions.
CO 3	Represent compound data using Python lists, tuples, and dictionaries.
CO 4	Read and write data from/to files in Python Programs.
CO 5	To build software for real needs.
	V SEMESTER(III BTECH -I SEM)
18IT5T01	**Data Mining and Warehousing**
CO 1	Design data warehouse with dimensional modeling and apply OLAP operations.
CO 2	Understand the Data Mining Principles and need of preprocessing
CO 3	Compare and evaluate different data mining techniques like classification and prediction.

CO 4	Identify the frequent patterns from transactional data.
CO 5	Compare and evaluate different clustering techniques.
18IT5T02	**Web Technologies**
CO 1	Analyze a web page and identify its elements and attributes.
CO 2	Create web pages using HTML and Cascading Styles sheets.
CO 3	Build dynamic web pages and client-side scripts using AJAX
CO 4	Build web applications using PHP.
CO 5	Develop interactive web pages that include databases
18IT5T03	**Design and Analysis of Algorithms**
CO 1	Understand the performance Analysis of an Algorithm using Space and Time Complexities
CO 2	Describe, apply and analyze the complexity of divide and conquer strategy.
CO 3	Synthesize efficient Algorithms for common engineering problems using Greedy Method.
CO 4	Apply and analyze the complexity of dynamic programming strategy.
CO 5	Ability to solve complex problems using Back Tracking and Branch & Bound.
18IT5T04	**Formal languages and Automata Theory**
CO 1	Understand the basic concepts of Automata Theory
CO 2	Infer the equivalence of languages described by finite automata and regular expressions.
CO 3	Devise regular, context free grammars while recognizing the strings and tokens and able to Normalize grammars.
CO 4	Apply Pushdown Automata for problem solving.
CO 5	Understand basic properties and compute using Turing Machines.
18IT5T06	**Unix and Shell Programming**
CO 1	Create powerful data processing applications using UNIX shell and commands
CO 2	Manage data, files and programs at command line using UNIX
CO 3	Create and modify data files and documents using editors and tools
CO 4	Demonstrate knowledge of creating new commands.
CO 5	Develop Scripts and programs that demonstrate effective use of structured programming.
18IT5T09	**Optimization Techniques**
CO 1	Understand the methodology of Operations Research & concepts of linear programming
CO 2	Formulate the solutions to transportation problems
CO 3	Explain the solutions for various sequencing problems
CO 4	Apply game theory to solve real world problems

CO5	Illustrate the solutions to different replacement policies
18IT5L16	**Data Mining Lab**
CO 1	Learn about WEKA tool and its applications
CO 2	Extract knowledge using Data Mining techniques.
CO 3	Adapt to new Data Mining tools.
CO 4	Explore recent trends in Data Mining such as Web mining,spatial-temporal mining,
18IT5L17	**Web Technologies Lab**
CO 1	Knowledge of HTML, Java Script and XML to develop web applications
CO 2	Understanding about JDBC connections and Java Mail API
CO 3	Acquire Knowledge of the design and development process of a complete web application
	VI SEMESTER(III BTECH -II SEM)
18IT6T01	**Compiler Design**
CO 1	Acquire knowledge in different phases and passes of Compiler.
CO 2	Demonstrate knowledge about scanning of tokens and perform the syntax analysis by using Topdown parsing techniques.
CO 3	Perform the syntax analysis by using Bottom Up parsing techniques for more complex grammars.
CO 4	Compare different memory management techniques in runtime environment.
CO 5	Demonstrate knowledge about compiler generation tools and techniques.
18IT6T02	**Computer Networks**
CO 1	Independently enumerate the layers of the OSI model and TCP/IP
CO 2	Identify the different types of network topologies and protocols.
CO 3	Compare and contrast methods to identify Errors and correct them.
CO 4	Differentiate between various network routing algorithms.
CO 5	Understand WWW and HTTP Architectures.
18IT6T03	**Software Engineering**
CO 1	Understand the perspective of various software process models
CO 2	Understand the Requirements Engineering Process and compile an SRS
CO 3	Analyze the requirements and perform a Design
CO 4	Apply testing principles on software project and understand the maintenance concepts.
CO 5	Identify risks, manage the change to assure quality in software projects
18IT6T05	**UML and Design Pattern**
CO 1	Identify the purpose and methods of use of common object-oriented design patterns

CO 2	Select and apply these patterns in their own designs for simple programs
CO 3	Represent the data dependencies of a simple program using UML
CO 4	Represent user and programmatic interactions using UML
CO 5	Create design documentation outlining the testable and complete design of a simple Program
18IT6T07	**Employability Skills: Quantitative Aptitude & Reasoning**
CO 1	Understand the basics concepts of Numerical Ability & Reasoning Skills
CO 2	Use the logical thinking and analytical abilities to solve Quantitative aptitude questions from companies specific and other competitive tests
CO 3	Solve questions related to time and distance, time and work ,percentages, simple interest and compound interest etc.
CO 4	Solve questions related to coding and decoding, number series, directions, puzzles ,etc.
CO 5	Understand and solve puzzle related questions for competitive and campus placements exams.
18IT6L21	**Computer Networks Lab**
CO 1	Implement programs on networking concepts using various services.
CO 2	Implement networking applications using IPC mechanism of UNIX.
CO 3	Compare routing algorithms.
CO 4	Understand the working principles of various communication services using protocols.
CO 5	Practice packet/file transmission between nodes.
18IT6L22	**Software Engineering Lab**
CO 1	Prepare SRS document, design document, test cases and software configuration management and risk management related document.
CO 2	Develop function oriented and object oriented software design using tools like rational rose.
CO 3	Design and develop Test Cases for a system
CO 4	Track the progress of a project using various tools.
18IT6T23	**Essence of Indian Traditional Knowledge**
CO 1	Understand the concept of Traditional knowledge and its importance
CO 2	Know the need and importance of protecting traditional knowledge
CO 3	Know the various enactments related to the protection of traditional knowledge.
CO 4	Understand the concepts of Intellectual property to protect the traditional knowledge
CO 5	Evaluate strategies to increase the protection of TK.
	VII SEMESTER(IV BTECH -I SEM)
18IT7T01	**Big Data &Hadoop**

CO 1	Understand methods for data summarization, query, and analysis.
CO 2	Apply data modeling techniques to large data sets
CO 3	Creating applications for Big Data analytics
CO 4	Building a complete business data analytic solution
CO 5	Understand programming tools PIG & HIVE in Hadoop eco-system.
18IT7T02	**E-Commerce**
CO 1	Identify and analyze stake holder needs
CO 2	Understand electronic payment systems
CO 3	Acquire Knowledge on Intra organizational commerce
CO 4	Design and prepare marketing strategies for corporate digital Library
CO 5	Design and prepare accurate e-commerce related presentations of multimedia information taking into account technical and aesthetic considerations
18IT7T04	**Software Testing Methodologies**
CO 1	Have an ability to apply software testing knowledge and engineering methods.
CO 2	Ability to identify the needs of software test automation, and define a test tool to support test automation.
CO 3	Understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
CO 4	Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.
CO 5	Apply techniques and skills to use modern software testing tools to support software testing projects
18IT7T07	**Mobile Computing**
CO 1	Develop new mobile applications.
CO 2	Identify solutions to the technical issues in the mobile communication paradigm.
CO 3	Understand the ad hoc network applications and/or algorithms/protocols
CO 4	Understand & develop any existing or new protocol related to mobile environment.
CO 5	Understand the platforms and protocols used in mobile environment
18IT7T19	**Global Environment Trends**
CO 1	The Learning objective of this paper is to understand the concept and nature of business environment at global level and various elements of international business.
CO 2	To familiarize about the international trade, trade theories & practices, Analysis.
CO 3	To understand the nature of international markets, marketing practices like pricing branding, mode of entry into international markets and operations
CO 4	To learn different Accounting Systems at international level, preparation of Financial Statement and FDI, currency exchange rates

	systems
CO 5	To study and understand the concept of HRM at international level, recruitment policy, practices and successful implementation of strategies.
18IT7L20	**Big Data &Hadoop Lab**
CO 1	Preparing for data summarization, query, and analysis
CO 2	Applying data modeling techniques to large data sets
CO 3	Creating applications for Big Data analytics.
CO 4	Building a complete business data analytic solution.
18IT7L21	**Mini Project/Internship**
	VIII SEMESTER(IV BTECH -II SEM)
18IT8T01	**Cloud Computing**
CO 1	Explain and characterize different cloud deployment models and service models
CO 2	Understand different cloud programming platforms and tools.
CO 3	Illustrate Virtualization for Data-Center Automation
CO 4	Identify the security issues in cloud computing
CO 5	Understand various basic concepts related to cloud computing technologies
18IT8T05	**Human Computer Interaction**
CO 1	Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
CO 2	Apply an interactive design process and universal design principles to designing HCI systems.
CO 3	Understand the importance of Natural Languages in computing interactions.
CO 4	Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
CO 5	Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design
18IT8T08	**Satellite communication**
CO 1	Understand the basic concepts, applications,frequencies used and types of satellite communications.
CO 2	Understand the concept of look angles, launches and launch vechicles and orbital effects in satellite communications.
CO 3	Understand the various satellite subsystems and its functionality.
CO 4	Understand the concepts of satellite link design and calculation of C/N ratio.
CO 5	Understand the concepts of multiple access and various types of multiple access techniques in satellite systems.

18IT8T20	**Additive Manufacturing**
CO 1	Describe various CAD issues for 3D printing and rapid prototyping and related operations for STL model manipulation.
CO 2	Formulate and solve typical problems on reverse engineering for surface reconstruction from physical prototype models through digitizing and spline-based surface fitting.
CO 3	Formulate and solve typical problems on reverse engineering for surface reconstruction from digitized mesh models through topological modelling and subdivision surface fitting.
CO 4	Explain and summarize the principles and key characteristics of additive manufacturing technologies and commonly used 3D printing and additive manufacturing systems.
CO 5	Explain and summarize typical rapid tooling processes for quick batch production of plastic and metal parts.
18IT8L22	**Major Project**

PROGRAM OUTCOMES (POs)

PO1: An Ability to apply knowledge of basic sciences and mathematical foundation to engineering problems. (Engineering Knowledge)

PO2: An ability to analyze and solve the problems effectively with appropriate logical and analytical skills. (Problem Analysis)

PO3: An ability to design, develop and test software systems by applying algorithmic principles and programming prowess. (Design/development of solutions)

PO4: An ability to interpret the data and amalgamate the information to provide solutions to real world problems. (Investigations)

PO5: An ability to acquire and apply the modern techniques and tools to complex engineering problems. (Modern Tools)

PO6: An ability to develop computing solutions for public safety and legal issues to serve the needs of the society. (Engineer and Society)

PO7: An ability to analyze the local and global impact of computing discipline on environmental issues and sustainable development. (Sustainability)

PO8: An ability to apply the ethical principles in engineering practice. (Ethics)

PO9: An ability to work effectively on projects either individually or in teams. (Team Work)

PO10: An ability to communicate effectively in written and oral forms on technical as well as general aspects. (Communication)

PO11: An ability to apply engineering and management principles for effective development of projects. (Project Management)

PO12: An ability to recognize the need for lifelong learning in the world of ever changing technology. (Lifelong learning)

PRINCIPAL

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DEPARTMENT OF CIVIL ENGINEERING	
COURSE OUTCOMES MIC20 REGULATION	
I SEMESTER(I BTECH -I SEM)	
20CE1T01	**LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS**
CO 1	Apply the knowledge to solve a system of homogeneous and non-homogeneous linear equations
CO 2	Illustrate the methods of computing Eigen values and Eigen vectors
CO 3	Able to analyze the real life situations, formulate the differential equations and then applying the methods
CO 4	Determine the solutions of linear differential equations
CO 5	Optimize functions of several variables and able to find extreme values of constrained functions
20CE1T02	**ENGINEERING PHYSICS**
CO 1	Impart knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes
CO 2	Gain knowledge of applications of lasers and optical fibers in various fields .
CO 3	Classify magnetic and dielectric materials and their Engineering applications.
CO 4	Impart knowledge of architectural acoustics and Study of Ultrasonics.
CO 5	Classify crystal systems and analyze the crystalline structure using various X-ray diffraction techniques .
20CE1T03	**ENGLISH**
CO 1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
CO 2	ask and answer general questions on familiar topics
CO 3	employ suitable strategies to master the art of letter writing and email writing
CO 4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
CO 5	form sentences using proper grammatical structures and correct word forms
20CE1T04	**BUILDING CONSTRUCTION AND MATERIALS**
CO 1	Identify different building materials and their importance in building construction.
CO 2	Differentiate brick masonry, stone masonry
CO 3	Construction and use of lime and cement in various constructions.
CO 4	Importance of building components and finishings.
CO 5	Know the classification of aggregates, sieve analysis and moisture content
20CE1T05	**ENGINEERING GRAPHICS**
CO 1	Understand the techniques of constructing various polygons and curves
CO 2	Understand the concepts of projections and draw projections for simple entities such as points and lines.

CO 3	Draw orthographic projections of planes and simple solids
CO 4	Analyze the 2D drawings and convert to 3D isometric views
20CE1L06	**ENGLISH COMMUNICATION SKILLS LAB**
CO 1	Acquire basic proficiency in English by learning functional aspects of English language
CO 2	Learn the methods of enhancing vocabulary
CO 3	Acquaint himself/herself with nuances of Phonetics
20CE1L07	**ENGINEERING PHYSICS LAB**
CO 1	Implement the basic principles of Optics through various phenomena of light.
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
20CE1L08	**CIVIL ENGINEERING WORKSHOP**
CO 1	To outline the process of identification of various building components and their estimation
CO 2	To provide knowledge on operation of the various survey instruments used for linear and angular measurements.
CO 3	To explain the concept of measurement of discharge and velocity in a pipe and density of water
CO 4	To demonstrate automatic weather station
	II SEMESTER(I BTECH -II SEM)
20CE2T01	**TRANSFORM TECHNIQUES**
CO 1	Able to analyze a class of integrals in terms of beta and gamma functions
CO 2	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
CO 3	Analyze the general periodic functions in the form of an infinite convergent sine and cosine series
CO 4	Illustrate the methods to solve the boundary value problems
CO 5	Determine a solution of a discrete system using Z- transforms
20CE2T02	**ENGINEERING CHEMISTRY**
CO 1	Analyze the different types of composite plastic materials and interpret the mechanism of conduction in counducting polymers
CO 2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion
CO 3	synthesize nanomaterials for modern advances of engineering technology Summarize the techniques that detect and measure changes of state of reaction
CO 4	Differentiate petroleum, petrol, synthetic petrol and have knowledge how they are

	produced. Study alternate fuels and analyse flue gases
CO 5	Analyze the suitable methods for purification and treatment of hard water and brackish water.
20CE2T03	**ENGINEERING MECHANICS**
CO 1	Identify and classify different types of forces acting on static structural systems and Model the problem using free-body diagrams and equilibrium equations
CO 2	Identify and model various types of loading and support conditions that act on structural systems
CO 3	Determine the centroid and moment of inertia for various structural elements
CO 4	Analyze motions of rigid body with concepts of dynamics.
CO 5	Analyze static structural frames subjected to loading by method of joints and method of section
20CE2T04	**BUILDING PLANNING AND DRAWING**
CO 1	Plan various buildings as per the building by-laws.
CO 2	Distinguish the relation between the plan, elevation and cross section
CO 3	Identify the form and functions among the buildings.
CO 4	Learn the skills of drawing building elements
CO 5	Plan the buildings as per requirements.
20CE2T05	**PROBLEM SOLVING THROUGH C**
CO 1	To formulate simple algorithms for arithmetic, logical problems and translate them to programs in c language.
CO 2	To implement conditional branching, iteration and recursion.
CO 3	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
CO 4	To use arrays, pointers and structures to formulate algorithms and programs.
CO 5	To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
CO 6	To use structures and files
20CE2L06	**ENGINEERING CHEMISTRY LAB**
CO 1	student is exposed to different methods of chemical analysis abd use of some commonly employed instruments.they thus acquire some expermental skills
20CE2L07	**COMPUTER AIDED BUILDING DRAWING LAB**
CO 1	Master the usage of Auto cad commands for drawing 2D & 3D building drawings required for different civil engineering applications
20CE2L08	**PROBLEM SOLVING THROUGH C LAB**
CO1	Demonstrate Knowledge on various concepts of a C language.
CO2	Able to draw flowcharts and write algorithms.
CO3	Able design and development of C problem solving skills.
CO4	Able to design and develop modular programming skills.
CO5	Able to trace and debug a program

20CE2M09	**ENVIRONMENTAL SCIENCE**
CO 1	The importance of environment current global environmental challenges for the sustenance of the life on planet earth.
CO 2	The concepts of the ecosystem and its function in the environment
CO 3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO 4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO 5	The environmental legislations of India and Social issues and the possible means and EIA
	III SEMESTER (II BTECH -I SEM)
20CE3T01	**NUMERICAL METHODS & VECTOR CALCULUS**
CO 1	Determine the solution of transcendental equations by different numerical methods. Provide the interpolation techniques which analyze the data of an unknown function
CO 2	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries
CO 3	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries.
CO 4	Evaluate areas and volumes using double & triple integrals.
CO 5	Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals.
20CE3T02	**STRENGTH OF MATERIALS**
CO 1	Compute the fundamentals of stress and strain concepts
CO 2	Calculate stresses and deformations in beams subjected to different loadings
CO 3	Estimate the effect of torsion in shafts and springs
CO 4	Determine deformations of simple members
CO 5	Calculate the stresses and strains associated with thin and thick cylinder
20CE3T03	**FLUID MECHANICS**
CO 1	An ability to measure the flow of fluid through orifices or mouth pieces
CO 2	An ability to determine the stability of floating- submerged bodies
CO 3	An ability to measure the flow of fluid through pipes
CO 4	An ability to measure the flow of fluid through orifices or mouth pieces
CO 5	An ability to classify the flows in the pipes
20CE3T04	**CONCRETE TECHNOLOGY**
CO 1	To able to understand the properties and testing of cement and be able to decide the type of admixtures to be used for concreting based on its properties.
CO 2	to understand the properties and testing of aggregates
CO 3	to understand the properties of fresh concrete
CO 4	to understand the properties of hardened concrete & curing methods and its problems.
CO 5	Perform mix design and engineering properties of special concretes such as high-

	performance concrete, self-compacting concrete, and fibre reinforced concrete
20CE3T05	**SURVEYING**
CO 1	Gain a broad understanding of Land Survey
CO 2	Get accustoms with the angular and linear measurements.
CO 3	Trained with recording the field information and necessary plot.
CO 4	Computation of vertical and horizontal angles with and with out obstructions
CO 5	Train on utilization of surveying instruments like EDM, Total station and GPS.
20CE3L06	**STRENGTH OF MATERIALS LAB**
CO 1	Compute the tensile and shear properties of materials using UTM
CO 2	Compute the torsion and impact strength using respective test setup
CO 3	Compute the response of the beam by deflection method
CO 4	Exhibit ethical principles in engineering practices
CO 5	Perform task as an individual and / or team member to manage the task in time
20CE3L07	**SURVEYING FIELD WORK**
CO 1	To familiarize with surveying equipment/ instruments like chain, compass, levelling instruments, theodolite and total station
CO 2	To impart the knowledge on linear, angular measurement
20CE3L08	**CONCRETE TECHNOLOGY LAB**
CO 1	To develop the skill of testing the building materials like cement & aggregates.
CO 2	To impart the knowledge on properties of fresh concrete.
CO 3	To familiarize with the strength properties of hardened Concrete.
CO 4	To introduce the concepts of non-destructive testing.
20CE3S09	**AUTO CAD 2D&3D (SOC – 1)**
CO 1	Use the Autocad commands for drawing 2D & 3D building drawings required for different civil Engg applications
CO 2	Plan and draw Civil Engineering Buildings as per aspect and orientation
CO 3	Presenting drawings as per user requirements and preparation of technical report
	IV SEMESTER (II BTECH -II SEM)
20CE4T01	**COMPLEX VARIABLES AND STATISTICAL METHODS**
CO 1	Determine analytic and non-analytic functions
CO 2	Analyze the analytic function into a power series which is useful in the study of communication systems
CO 3	Understand random variables and probability distributions
CO 4	Apply different distributions to compute confidence intervals
CO 5	Test the hypothesis concerning means and proportions
20CE4T02	**ENGINEERING GEOLOGY**
CO 1	Identify and classify the geological minerals
CO 2	Classify and measure the earthquake prone areas to practice the hazard zonation

CO 3	Prepares, analyses and interpret the Engineering Geologic maps
CO 4	Analyses the ground conditions through geophysical surveys.
CO 5	Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc…
20CE4T03	**HYDRAULICS AND HYDRAULIC MACHINERY**
CO 1	To understand the Solving of uniform open channel flow problems.
CO 2	To understand the Solving non uniform open channel flow problems
CO 3	Understand the basics of Turbo Machinery.
CO 4	Know the principles of various hydraulic Turbines.
CO 5	Know the different types and characteristics of pumps.
20CE4T04	**STRUCTURAL ANALYSIS - I**
CO 1	Able to analyse the determinate and in-determinate structures
CO 2	Able to understand the behavior of Structural systems
CO 3	Able to evaluate the response of structural systems subjected to static and moving loads
CO 4	Able to analyse the continuous beams
CO 5	Able to evaluate the response of structural systems subjected to moving loads
20EE4T05	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
CO 1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product
CO 2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
CO 3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units
CO 4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
CO 5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making
20CE4L06	**ENGINEERING GEOLOGY LAB**
CO 1	Understand the method and ways of investigations required for Civil Engineering projects
CO 2	Identify the various rocks, minerals depending on geological classifications
CO 3	Learn to couple geologic expertise with the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects and the quantification of processes such as rock slides and settlement.
CO 4	Write a technical laboratory report
20CE4L07	**FLUID MECHANICS AND HYDRAULICS MACHINERY LAB**
CO 1	To impart the knowledge on flow measurement through closed conduit/tank/channel.
CO 2	To familiarize with various losses in closed conduits.

CO3	To familiarize with performance curves for various hydraulic turbines and pumps.
20CE4L08	ADVANCE SURVEYING LAB
CO1	To familiarize with surveying equipment/ instruments like chain, compass, levelling instruments, theodolite and total station
CO2	To impart the knowledge on linear, angular measurement
20CE4L09	REVIT ARCHITECTURE (SKILL ORIENTED COURSE -2)
CO 1	Use the Revit commands for different civil Engg applications
CO 2	Student able to undestand the basic knowledge on revit architecht softwear
CO 3	Learn basic designs from autocad 2D & 3D
20CE4M10	CONSTITUTION OF INDIA
CO1	Understand historical background of the constitution making, importance for building a democratic India, features and principles of Indian Constitution.
CO2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary
CO3	Understand the roles and powers of State Government and its Administration and value of the fundamental rights and duties for becoming good citizen of India.
CO4	Understand and analyze the decentralization of power between Union, State and Local self-Government and local administration.
CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission, UPSC, Welfare commissions for sustaining democracy.
	V SEMESTER(III BTECH -I SEM)
20CE5T01	GEOTECHNICAL ENGINEERING-1
CO 1	Definition of the various parameters related to soil mechanics and establish their inter-relationships and various index properties of the soils
CO 2	to estimate permeability and seepage through soils
CO 3	stresses under various loading conditions and compaction characteristics.
CO 4	To analyze compressability and to determine rate of consolidation settlement.
CO 5	To understand the concept of shear strength of soils, with various drainage conditions.
20CE5T02	TRANSPORTATION ENGINEERING-1
CO 1	Understand the longitudinal and cross sectional elements of a highway.
CO 2	Design the horizontal and vertical alignment of roads.
CO 3	Understanding the concept of intersections, interchanges and parking parameters.
CO 4	Judge suitability of pavement materials and Construct and maintain highways
CO 5	To design flexible and rigid pavements
20CE5T03	DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
CO 1	Compare and Design the singly reinforced, doubly reinforced and flanged sections.
CO 2	To be able to design shear , bond, torsion of beams
CO 3	Distinguish and Design the one-way and two-way slabs.
CO 4	Design the axially loaded, uniaxial and biaxial bending columns.

CO 5	Classify the footings and Design the isolated square, rectangular and circular footings.
20HS5T01	**QUANTITATIVE APTITUDE AND REASONING**
CO 1	Understand the basics concepts of Numerical Ability and Reasoning Skills
CO 2	Use the logical thinking and analytical abilities to solve Quantitative Aptitude questions from Companies specific and other competitive tests.
CO 3	Solve questions related to Time and Distance, Time and Work , Percentages, Simple interest , Compound interest. Etc.
CO 4	Solve questions related to Coding and Decoding, Number series, Directions, Puzzles etc.
CO 5	Understand and solve Puzzle related questions for Competitive and Campus Placement exams.
20CE5T06	**STRUCTURAL ANALYSIS-II**
CO 1	Understand the importance of various methods of slop and deflections for determinate structures.
CO 2	Analyze the two hinged arches.
CO 3	Solve statically indeterminate beams and portal frames using classical methods
CO 4	Formulate the multistoried buildings by approximate methods
CO 5	Formulate the stiffness matrix and analyze the beams by matrix methods
20CE5L10	**GETECHNICAL ENGINEERING LAB**
CO1	To obtain index and engineering properties of locally available soils, and to understand the behavior of these soil under various loads.
20CE5L11	**TRANSPORTATION ENGINEERING LAB**
CO 1	To test crushing value, impact resistance, specific gravity and water absorption,Percentage attrition, percentage abrasion, flakiness index and elongation indexfor the given road aggregates.
CO 2	To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
CO 3	To test the stability for the given bitumen mix
CO 4	To carry out surveys for traffic volume, speed and parking.
20CE5S12	**STAAD PRO LAB**
CO 1	Understand the details of STAAD.Pro software package.
CO 2	To prepare input data of STAAD.Pro.
CO 3	Run STAAD.Pro for analysis and desing of structures.
CO 4	Design different components of structures.
20CE5M13	**ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**
CO 1	Understand the significance of Indian Traditional Knowledge
CO 2	Classify the Indian Traditional Knowledge
CO 3	Compare Modern Science with Indian Traditional Knowledge system.
CO 4	Analyze the role of Government in protecting the Traditional Knowledge

CO 5	Understand the impact of Philosophical tradition on Indian Knowledge System.
20CE5I14	SUMMER INTERNSHIP
CO 1	Identify different works to be carried out in the Project.
CO 2	Select the most efficient method from the available choices based on preliminary investigation
CO 3	Design the required elements of the project as per standard Practice.
CO 4	Prepare working drawings for the project
CO 5	Prepare project report.
	VI SEMESTER (III BTECH -II SEM)
20CE6T01	DESIGN AND DRAWING OF STEEL STRUCTURES
CO 1	Analyze and Design the beams including built-up sections and beam and connections..
CO 2	To be able to Design flexural members
CO 3	To design the tension members, compression members
CO 4	To be able to Design coloumns and column bases
CO 5	Identify and Design the various components of welded plate girder Including
20CE6T02	WTAER RESOURCES ENGINEERING-1
CO 1	Understand the different concepts and terms used in engineering hydrology
CO 2	To identify and explain various formulae used in estimation of surface
CO 3	Understand the concept of hydrograph used in runoff estimation
CO 4	To identify Ground water hydrology components
CO 5	To identify different canal systems
20CE6T03	ENVIRONMENTAL ENGINEERING
CO 1	Assess characteristics of water and wastewater and their impacts
CO 2	Estimate quantities of water and waste water and plan conveyance components
CO 3	To identify characteristics of sewage and plumbing system arrangement
CO 4	Design components of water and waste water treatment plants
CO 5	Be conversant with issues of air pollution and control
20CE6T04	GEOTECHNICAL ENGINEERING-II
CO 1	The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
CO 2	The student must be able to design Piles based on the principles of bearing capacity.
CO 3	The student must be able to identify different components of well foundation and soil sampling methods
CO 4	student must be able to analyse slope stability
CO 5	To be able to estimate earth pressure using various theories
20EE6T08	RENEWABLE ENERGY SOURCES
CO 1	know the need of various renwable energy systems
CO 2	understand the concepts of bio energy

CO 3	Acquire the knowledge of OTEC,tidal
CO 4	To identify and use fuel cells technologies.
CO 5	Acquire the knowledge of solar enrgy system
20CE6L10	**ENVIRONMENTAL ENGINEERING LAB**
CO 1	Understand about the equipment used to conduct the test procedures
CO 2	Perform the experiments in the lab
CO 3	Examine and Estimate water, waste water, air and soil Quality
CO 4	Compare the water, air quality standards with prescribed standards set by the local governments
CO 5	Develop a report on the quality aspect of the environment
20CE6L11	**DESIGN AND DRAWING OF IRRIGATION STRUCTURES**
CO 1	To understand design principle of various irrigation structures
20CE6L12	**GEOGRAPHICAL INFORMATION SYSTEMS LAB**
CO1	Describe fundamental concepts related to GIS
CO2	Work with vector data
CO3	Work with raster data
CO4	Perform data digitalization and process
CO5	Work with attributes, external files
CO6	Prepare map
20CE6S13	**SOFT SKILLS (SOC)**
CO1	The student will acquaint himself with various nuances of Soft Skills and Personality development besides aspects related to Campus Recruitment Process.
20CE6M14	**DISASTER MANAGEMENT**
CO1	Differentiate the types of disasters, causes and their impact on environment and society
CO2	Assess vulnerability and various methods of risk reduction measures as well as mitigation.
CO3	Draw the hazard and vulnerability profile of India, Scenarios in the Indian context
CO4	Analyze the Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.
CO5	Understand about Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment
VII SEMESTER(IV BTECH -I SEM)	
20CE7T01	**TRANSPORTATION ENGINERING -2**
CO 1	To be able to identify components of railway system.
CO 2	Design geometrics in a railway track.
CO 3	To be able to identify different controlling and signal systems
CO 4	To Design airport geometrics

CO 5	To design airfield pavements.
20CE7T05	**WATER RESOURCES ENGINEERING-II**
CO 1	Estimate irrigation water requirements
CO 2	Design irrigation canals and canal network and can plan and canal irrigation system
CO 3	Find the capacity of a reservoir
CO 4	Analyze stability of gravity dams
CO 5	Apply suitable spillways and energy dissipation works
20CE7T09	**ESTIMATION,SPECIFICATION AND CONTRACTS**
CO 1	To be able to know the general working principles of quntity estimation
CO 2	To know the rate analysis of different works
CO 3	student should be able to determine the quantities of earth work
CO 4	Identify the contracts and specifications to follow.
CO 5	The student should be capable of finalizing the value of structures.
20IT7T10	**INTERNET OF THINGS**
CO 1	Design and deployment of IOT
CO 2	Design and comparing M2M with IOT
CO 3	Understand platform design and modelling of IOT
CO 4	Apply IOT in different devices using python
CO 5	Implement IOT and cloud platforms
20ME7T13	**SOLAR ENERGY SYSTEMS**
CO 1	Significance of renewable energy and describe thSignificance of renewable energy and describe the principles of solar radiation. Analyze various solar collectors principles of solar radiation. Analyze various solar collectors
CO 2	Know the various storage methods and application of solar energy
CO 3	Understand the concept of converting wind energy into electrical energy using both horizontal and vertical axis wind machines
CO 4	Know biomass disasters, functional operation of geothermal systems. Generalize the operation of ocean, tidal and wave energy systems
CO 5	understand the operating principle of direct energy conversion systems .and to recognize the need and ability to engage in lifelong learning for further developments in this field.
20CE7T17	**UNIVERSAL HUMAN VALUES 2 UNDERSTANDING HARMONY**
CO 1	understand the significance of value inputs in a classroom,distinguish between values and skills understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and doa correct appraisel of the current scenario in the society.
CO 2	Distinguish between self and the body, understand the meaning of harmony in the self the co-existence of self and body

CO 3	Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a garmonious society.
CO 4	Understood the harmony in nature and existence,and work out their mutually fulfilling participation in the nature.
CO 5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.
20CE7S09	E TABS
CO 1	To introduce concepts of etabs in design of structures.
20CE7I10	INDUSTRIAL / RESEARCH INTERNSHIP
CO 1	Identify different works to be carried out in the Project.
CO 2	Select the most efficient method from the available choices based on preliminary investigation
CO 3	Design the required elements of the project as per standard Practice.
CO 4	Prepare working drawings for the project
CO 5	Prepare project report.
	VIII SEMESTER(IV BTECH -II SEM)
20CE8P01	PROJECT
CO 1	Identify different works to be carried out in the Project.
CO 2	Select the most efficient method from the available choices based on preliminary investigation
CO 3	Design the required elements of the project as per standard Practice.
CO 4	Prepare working drawings for the project
CO 5	Prepare project report.

PROGRAMME OUTCOMES (POs)

PO1- Engineering knowledge: An ability to apply knowledge of mathematics, science and engineering.

PO2- Problem analysis: An ability to design and conduct experiments, as well as to analyze and interpret data.

PO3- Design/development of solutions: An ability to design a system, component, or process To meet desired needs within realistic constraints such as economic, environmental, social, political

PO4- Investigations of complex problems: An ability to function on multidisciplinary teams.

PO5- Modern tool usage An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

PO6- The engineer and society: An ability to understand the impact of engineering solutions in a global, economic, environmental and societal context.

PO7- Environment and sustainability: An ability to communicate effectively.

PO8- Ethics: An understanding of professional and ethical responsibility.

PO9- Individual and team work: An understanding of critical issues for professional practice such as the procurement of work and the interaction with contractors during the construction

PO10- Communication: A knowledge of contemporary issues.

PO11- Project management and finance: An ability to identify, formulate and solve engineering problems.

PO12- Life-long learning: A recognition of the need for and an ability to engage in life-long learning.

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING	
COURSE OUTCOMES MIC20	
I SEMESTER(I BTECH -I SEM)	
20EE1T01	**LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS**
CO 1	Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations
CO 2	Illustrate the methods of computing eigen values and eigen vectors
CO 3	Able to analyze the real life situations, formulate the differential equations and then applying the methods
CO 4	Determine the solutions of linear differential equations
CO 5	Optimize functions of several variables and able to find extreme values of constrained functions
20EE1T02	**APPLIED PHYSICS**
CO 1	Impart knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes
CO 2	Gain knowledge of applications of lasers and optical fibers in various fields
CO 3	Classify magnetic and dielectric materials and their Engineering applications
CO 4	Understand basic quantum mechanics and free electron theories.
CO 5	Obtain the concept of concept of holes and electrons in semiconductors
20EE1T03	**ENGLISH**
CO 1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
CO 2	ask and answer general questions on familiar topic
CO 3	employ suitable strategies to master the art of letter writing and email writing
CO 4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
CO 5	form sentences using proper grammatical structures and correct word forms
20EE1T04	**BASIC MECHANICAL ENGINEERING**
CO 1	Understand the concept of systems of forces
CO 2	Learn about various pumps, turbines and their working principles.
CO 3	understand the concept of hydroelectric power plant, its components and principle.
CO 4	learn about thermodynamics, laws and applications
CO 5	know with power cycle and refrigeration cycles.
20EE1T05	**ENGINEERING GRAPHICS**

CO 1	Understand the concepts of projections and draw projections for simple entities such as points and lines
CO 2	Draw orthographic projections of planes and simple solids.
CO 3	Understand the concept of sections and sectional views.
CO 4	Develop the surfaces for various simple solids and understand the concept of intersection of two solids
CO 5	Analyze the 2D drawings and convert to 3D isometric views
CO 6	Learn computer aided drafting with AutoCAD and draw simple 2D part drawings and orthographic views using the software.
20EE1L06	ENGLISH COMMUNICATION SKILLS LAB
CO 1	Acquire basic proficiency in English by learning functional aspects of English language
CO 2	Learn the methods of enhancing vocabulary
CO 3	Acquaint himself/herself with nuances of phonetics
20EE1L07	APPLIED PHYSICS LAB
CO 1	The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
CO 2	Implement the basic principles of Mechanics to measure different physical parameter
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
20EE1L08	ELECTRICAL ENGINEERING WORKSHOP
CO 1	Explain the limitations, tolerances, safety aspects of electrical systems and wiring
CO 2	Select wires/cables and other accessories used in different types of wiring
CO 3	Measure current, voltage and power in a circuit
CO 4	Measure current, voltage and power in a circuit
	II SEMESTER(I BTECH -II SEM)
20EE2T01	TRANSFORM TECHNIQUES
CO 1	Able to analyze a class of integrals in terms of beta and gamma functions
CO 2	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
CO 3	Analyze the general periodic functions in the form of an infinite convergent sine and cosine series
CO 4	Illustrate the methods to solve the boundary value problems
CO 5	Determine a solution of a discrete system using Z- transforms
20EE2T02	APPLIED CHEMISTRY
CO 1	Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers
CO 2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new

	engineering products and categorize the reasons for corrosion and study methods to control corrosion
CO 3	Synthesize nanomaterials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors
CO 4	Design models for energy by different natural sources. Analyze the principles of different analytical instruments and their applications
CO 5	Obtain the knowledge of green chemistry and molecular machines
20EE2T03	**ELECTRICAL CIRCUIT ANALYSIS – I**
CO 1	Various electrical networks in presence of active and passive elements
CO 2	R, L, C network with sinusoidal excitation & R, L, network with variation of any one of the parameters i.e R, L, C and f.
CO 3	Electrical networks with network topology concepts.
CO 4	Any magnetic circuit with various dot conventions
CO 5	Electrical networks by using principles of network theorems .
20EE2T04	**POWER SYSTEMS-I**
CO 1	Determine the significance of various components of the Thermal Power Stations
CO 2	Determine the significance of various components of the power generation plants
CO 3	Describe the use of solar energy and the various components used in the energy production
CO 4	Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications
CO 5	Appreciate the Economic Aspects different types of tariff.
20EE2T05	**PROBLEM SOLVING THROUGH C**
CO 1	Understand the basic concepts of programming
CO 2	Understand and Apply loop construct for a given problem
CO 3	Understand and Apply loop construct for a given problem
CO 4	Understand and Apply loop construct for a given problem
CO 5	Understand File I/O operations
20EE2L06	**APPLIED CHEMISTRYLAB**
CO 1	The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills
20EE2L07	**ENGINEERING & IT WORKSHOP**
CO 1	Demonstrate Knowledge on various concepts of a C language
CO 2	Able to draw flowcharts and write algorithms
CO 3	Able design and development of C problem solving skills

CO 4	Able to design and develop modular programming skills
CO 5	Able to trace and debug a program
20EE2L08	PROBLEM SOLVING THROUGH C LAB
CO1	Demonstrate Knowledge on various concepts of a C language
CO2	Able to draw flowcharts and write algorithms
CO3	Able design and development of C problem solving skills
CO4	Able to design and develop modular programming skills
CO5	Able to trace and debug a program
20EE2M09	ENVIRONMENTAL SCIENCE
CO1	The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.
CO2	The concepts of the ecosystem and its function in the environment.
CO3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices. .
CO5	The environmental legislations of India and Social issues and the possible means.
CO6	Environmental assessment and the stages involved in EIA.
	III SEMESTER (II BTECH -I SEM)
20EE3T01	NUMERICAL METHODS AND VECTOR CALCULUS
CO 1	Determine the solution of transcendental equations by different numerical methods
CO 2	Provide the interpolation techniques which analyze the data of an unknown function
CO 3	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries
CO 4	Evaluate areas and volumes using double & triple integrals
CO 5	Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals.
20EE3T02	ELECTRICAL CIRCUIT ANALYSIS-II
CO 1	Solve three- phase circuits under balanced condition

CO 2	Solve three- phase circuits under unbalanced condition
CO 3	Find the transient response of electrical networks for different types of excitations
CO 4	Find parameters for different types of network
CO 5	Realize electrical equivalent network for a given network transfer function
20EE3T03	**ANALOG ELECTRONICS-I**
CO 1	Describe the characteristics of various diodes
CO 2	Understand operation & design aspects of diode circuits
CO 3	Understand characteristics of various BJT configuration & analyze transistor amplifier
CO 4	Understand the operation & characteristics of FET & Power semiconductor devices
CO 5	Understand the concepts of feedback and its role in amplifier and oscillator
20EE3T04	**ELECTRICAL MACHINES-I**
CO 1	Assimilate the concepts of electromechanical energy conversion.
CO 2	Mitigate the ill-effects of armature reaction and improve commutation in dc machines
CO 3	Understand the torque production mechanism and control the speed of dc motors
CO 4	Analyze the performance of single phase transformers& Predetermine regulation, losses and efficiency of single phase transformers
CO 5	Analyze the three phase transformers and achieve three phase to two phase conversion
20EE3T05	**ELECTROMAGNETIC FIELDS**
CO 1	Understand the production of electric field and potentials due to different configurations of static charges
CO 2	Understand the concepts of conduction and convection current densities
CO 3	Understand the concept of magnetic field and Maxwell equations
CO 4	Calculate the magnetic force
CO 5	Understand the time varying fields

20EE3L06	**ELECTRICAL CIRCUITS LAB**
CO 1	Able to apply various thermos, determination of self and mutual inductances, two port parameters of a given electric circuits
CO 2	Able to draw locus diagrams. Waveforms and phasor diagram for lagging and leading networks
20EE3L07	**ELECTRICAL MACHINES LAB-I**
CO 1	Determine and predetermine the performance of DC machines and Transformers
CO 2	Control the speed of DC motor
CO 3	Achieve three phase to two phase transformation
20EE3L08	**ANALOG ELECTRONICS LAB**
CO 1	Understand the diode and transistor characteristics
CO 2	Verify the rectifier circuits using diodes and implement them using hardware
CO 3	Design the biasing circuits like self-biasing
CO 4	Design various amplifiers like CE, CC, common source amplifiers and implement them using hardware and also observe their frequency responses
CO 5	Analyze the concepts of SCR,UJT &FET and observe its characteristics
20EE3S09	**PYTHON PROGRAMMING (Skill Oriented Course)**
CO 1	Structure simple Python programs for solving problems
CO 2	Decompose a Python program into functions.
CO 3	Represent compound data using Python lists, tuples. and dictionaries
CO 4	Read and write data from/to files in Python Programs.
CO 5	To build software for real needs.
IV SEMESTER(II BTECH -II SEM)	
20EE4T01	**COMPLEX VARIABLES AND STATISTICAL METHODS**
CO 1	Determine analytic and non-analytic functions

CO 2	Analyze the analytic function into a power series which is useful in the study of communication systems
CO 3	Understand random variables and probability distributions
CO 4	Apply different distributions to compute confidence intervals
CO 5	Test the hypothesis concerning means and proportions
20EE4T02	ELECTRICAL MACHINES-II
CO 1	Explain the operation and performance of three phase induction machine.
CO 2	Explain the operation and performance of single phase induction motor
CO 3	Perform winding design and predetermine the regulation of synchronous generators
CO 4	Understand the parallel operation of synchronous generators & load sharing
CO 5	Avoid hunting phenomenon, implement methods of staring and correction of power factor with synchronous motor
20EE4T03	ELECTRICAL MEASUREMENTS
CO 1	Choose right type of instrument for measurement of voltage and current for ac and dc.
CO 2	Choose right type of instrument for measurement of power and energy
CO 3	Use potentiometer and instrumentation transformer
CO 4	Select suitable bridge for measurement of electrical parameters
CO 5	Measure frequency and phase difference between signals using CRO. Able to use digital instruments in electrical measurements
20EE4T04	POWER SYSTEMS – II
CO 1	Understand parameters of various types of transmission lines during different operating conditions.
CO 2	Understand the performance of short and medium transmission lines
CO 3	Understand the performance of long transmission lines.
CO 4	Understand various factors related to Mechanical design of lines & corona.
CO 5	Analyse performance of line insulators and constructional aspects of power cables

20EE4T05	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
CO 1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product
CO 2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
CO 3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units
CO 4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
CO 5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making
20EE4L06	**ELECTRICAL MACHINES LAB-II**
CO 1	Able to assess the performance of single phase and three phase induction motors.
CO 2	Able to control the speed of three phase induction motor.
CO 3	Able to predetermine the regulation of three–phase alternator by various methods
CO 4	Able to find the Xd/ Xqratio of alternator and asses the performance of three–phase synchronous motor
20EE4L07	**ELECTRICAL MEASUREMENTS LAB**
CO 1	To measure the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance
CO 2	To test transformer oil for its effectiveness
CO 3	To measure the parameters of inductive coil
20EE4L08	**DATA STRUCTURES THROUGH C LAB**
CO 1	Use basic data structures such as arrays and linked list.
CO 2	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths
CO 3	Use various searching and sorting algorithms
CO 4	Understand and use Trees for complex operations

20EE4S09	**INTRODUCTION TO MATLAB (Skill Oriented Course)**
CO1	To understand the basic fundamentals of Matlab functions
CO2	To Perform Plots and GUI related operations
CO3	To Perform Simulink related functions to different models and sub sysytems
CO4	To study and perform with different tool boxes
	V SEMESTER(III BTECH -I SEM)
20EE5T01	**POWER ELECTRONICS**
CO1	Explain the characteristics of various power semiconductor devices and analyze the static and dynamic characteristics of SCR's
CO2	Explain the operation of single phase & three Phase full–wave converters and analyze harmonics in the input current.
CO3	Analyze the operation of different types of DC-DC converters.
CO4	Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation
CO5	Analyze the operation of AC-AC regulators
20EE5T02	**ELECTRICAL MEASUREMENTS**
CO1	Choose right type of instrument for measurement of voltage and current current for ac and dc
CO2	Choose right type of instrument for measurement of power and energy
CO3	Use potentiometer and instrumentation transformer
CO4	Select suitable bridge for measurement of electrical parameters
CO5	Measure frequency and phase difference between signals using CRO
20EE5T03	**PYTHON PROGRAMMING**

CO1	Identify the type of NoSQL database to implement based on business requirements
CO2	Apply NoSQL data modeling from application specific queries
CO3	Understand NoSQL Storage Architecture
CO4	Use Atomic Aggregates and denormalization as data modeling techniques to optimize query processing
CO5	Apply indexing and ordering of data sets
20EE5T04	**EFFECTIVE TECHNICAL COMMUNICATION**
CO1	Able to speak with fluent vocabulary
CO2	Able to write with proper sentence formation
CO3	Able to identify errors in writing.
CO4	Able to communicate orally
CO5	Able to analyze different life skills
20EE5T07	**QUANTATIVE APTITUDE AND REASONING**
CO1	Understand the basics concepts of Numerical Ability & Reasoning Skills
CO2	Use the logical thinking and analytical abilities to solve Quantitative aptitude questions from companies specific and other competitive tests
CO3	Solve questions related to time and distance, time and work ,percentages, simple interest and compound interest etc.
CO4	Solve questions related to coding and decoding, number series, directions, puzzles ,etc.
CO5	Understand and solve puzzle related questions for competitive and campus placements exams.
20EE5L08	**ELECTRICAL MACHINES -II LAB**

CO1	Able to assess the performance of single phase and three phase induction motors
CO2	Able to control the speed of three phase induction motor
CO3	Able to predetermine the regulation of three–phase alternator by various methods.
CO4	Able to find the Xd/ Xqratio of alternator and asses the performance of three–phase synchronous motor
20EE5L09	ELECTRICAL MEASUREMENTS LAB
CO1	Able to measure the electrical parameters voltage & current
CO2	Able to find electrical characteristics of resistance, inductance and capacitance
CO3	Able to calibrate different measuring instruments
CO4	Able to measure the electrical parameters power and energy.
CO5	Able to test transformer oil for its effectiveness
20EE5L10	PYTHON PROGRAMMING LAB
CO1	Identify the type of NoSQL database to implement based on business requirements
CO2	Apply NoSQL data modeling from application specific queries
CO3	Understand NoSQL Storage Architecture
CO4	Use Atomic Aggregates and denormalization as data modeling techniques to optimize query processing
CO5	Apply indexing and ordering of data sets
20EE5T11	CONSTITUTION OF INDIA
CO1	Importance for building a democratic India, features and principles of Indian Constitution.

CO2	The functioning of three wings of the government ie., executive, legislative and judiciary.
CO3	The roles and powers of State Government
CO4	The decentralization of power between Union, State and Local self-Government and local administration
CO5	Election Commission, UPSC, Welfare commissions for sustaining democracy
	VI SEMESTER (III BTECH -II SEM)
20EE6T01	**MICROPROCESSORS AND MICROCONTROLLERS**
CO1	To be able to understand the microprocessor capability in general and explore the evaluation of microprocessors.
CO2	To be able to understand the addressing modes of microprocessors
CO3	To be able to understand the micro controller capability
CO4	To be able to program microprocessor and microcontroller
CO5	To be able to interface microprocessor and microcontroller with other electronic devices
20EE6T02	**SWITCHGEAR AND PROTECTION**
CO1	Able to understand the principles of arc interruption for application to High voltage circuit breakers of air, oil, vacuum, SF6 gas type
CO2	Ability to understand the working principle and operation of different Types of electromagnetic protective relays.
CO3	Students acquire knowledge of faults and protective schemes for high power generator and transformers and understand various types of protective schemes
CO4	Able to understand different types of static relays and their applications
CO5	Able to understand different types of over voltages and protective

	schemes required for insulation co–ordination
20EE6T03	**OOPS THROUGH JAVA**
CO1	Implement java applications using OOP principles and proper program structuring.
CO2	Develop java programs using packages, inheritance and interfaces
CO3	Implement error and exception handling techniques.
CO4	Design event driven GUI and real-time web related applications
20EE6T04	**MANAGEMENT SCIENCE**
CO1	Understand the concepts related to Business
CO2	Demonstrate the roles, skills and functions of management
CO3	Analyze effective application of PPM knowledge to diagnose
CO4	solve organizational problems and develop optimal managerial decisions.
CO5	Understand the complexities associated with management of human resources in the organizations
20EE6T08	**ENERGY AUDIT CONSERVATION AND MANAGEMENT**
CO1	Explain energy efficiency, conservation and various technologies. Design energy efficient lighting systems.
CO2	Calculate power factor of systems and propose suitable compensation techniques.
CO3	Explain energy conservation in HVAC systems
CO4	Calculate life cycle costing analysis and return on investment on energy efficient technologies.
CO5	Design energy efficient lighting systems

20EE6L07	**MICROPROCESSORS AND MICROCONTROLLERS LAB**
CO1	To write assembly language program using 8086 microprocessor based on arithmetic, logical, and shift operations
CO2	To do modular programming using 8086 micro processor
CO3	To interface 8086 with I/O and other devices
CO4	To do serial communication using 8051 micro controllers
CO5	To interface 8051 with I/O and other devices.
20EE6L08	**POWER ELECTRONICS & SIMULATION LAB**
CO1	Obtain static characteristics of semiconductor devices to discuss their Performance
CO2	Trigger the SCR by different methods
CO3	Verify the performance of single phase controlled full wave rectifier and AC voltage controller with R and RL loads
CO4	Verify the performance of single phase full bridge inverter connected to resistive load
CO5	Ability to experiment about switching characteristics various switches
20EE6L09	**OOPS THROUGH JAVA LAB**
CO1	Understand the behavior of primitive data types, object references, and arrays.
CO2	Implement Java classes from specifications
CO3	Implement interfaces, inheritance, and polymorphism as programming techniques
CO4	Apply exceptions handling.
	VII SEMESTER(IV BTECH -I SEM)
20EE7T01	**DIGITAL SIGNAL PROCESSING**
CO1	Perform time, frequency, and Z -transform analysis on signals and systems

CO2	Understand the inter-relationship between DFT and various transforms.
CO3	Understand the significance of various filter structures and effects of round off errors
CO4	Design a digital filter for a given specification.
CO5	Understand the fast computation of DFT and appreciate the FFT processing.
20EE7T02	**POWER SYSTEM OPEARTION AND CONTROL**
CO1	Develop Power flow solutions using iterative techniques
CO2	Compute symmetrical and unsymmetrical fault analysis of given power system.
CO3	Perform stability analysis of a power system.
CO4	Analyse the performance of generators in thermal power station for economical operation
CO5	Analyse Load frequency control of power system.
20EE7T04	**RENEWABLE ENERGY SOURCES**
CO1	Know the need of various renewable energy systems
CO2	understand the concepts of bio-energy
CO3	Acquire the knowledge of OTEC, tidal
CO4	Acquire the knowledge of geothermal and Alternative energy sources
20EE7T08	**SPECIAL ELECTRICAL MACHINES**
CO1	Distinguish between brush dc motor and brush less dc motor
CO2	Explain the performance and control of stepper motors, and their applications
CO3	Explain theory of operation and control of switched reluctance motor.
CO4	Explain the theory of travelling magnetic field and applications of linear motors.

CO5	Understand the significance of electrical motors for traction drives.
20EE7T03	**ELECTRIC VEHICLES**
CO1	Assess the performance, societal and environmental impact of EHVs having known their past history
CO2	Implement various drive train topologies and control strategies in Electric and Hybrid vehicles
CO3	Recommend, Design/Size and Control different electric propulsion units and other components of EHVs and BEVs
CO4	Appropriately select the energy storage system and strategize its management in EHVs
20EE7L09	**DIGITAL SIGNAL PROCESSING LAB**
CO1	Apply the difference equations concept in the analyzation of Discrete time systems
CO2	Use the FFT algorithm for solving the DFT of a given signal
CO3	Design a Digital filter (FIR&IIR) from the given specifications
CO4	Realize the FIR and IIR structures from the designed digital filter.
20EE7L10	**POWER SYSTEMS & SIMULATION LAB**
CO1	Students are able to determine parameters of transmission line.
CO2	Students are able to understand the concept of fault analysis of alternator.
CO3	Students are able to check the dielectric strength of transformer oil.
CO4	Students are able to write the program for analysing energy management systems functions at load dispatch centre.
VIII SEMESTER (IV BTECH -II SEM)	
20EE8T01	**UTILIZATION OF ELECTRICAL ENERGY**

CO1	Student should be able to identify a suitable motor for electric drives and industrial applications
CO2	Student should able to identify most appropriate heating or welding techniques for suitable applications
CO3	Student should able to understand various level of illuminosity produced by different illuminating sources.
CO4	Student shold able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.
CO5	Student should able to determine the speed/time characteristics of different types of traction motors and estimate energy consumption levels
20EE8T02	**POWER ELECTRONIC CONTROL OF ELECTRIC DRIVES**
CO1	Identify different electric drive system
CO2	Understand the operation of rectifier fed DC drives, chopper fed DC drives and closed loop control of DC motor
CO3	Analyse the slip power recovery schemes of Induction motor and speed control of converter fed induction motor & synchronous motor.
CO4	Evalute the performance of speed control of synchronuous motor by CSI and VSI
20EE8T05	**HVDC & FACTS**
CO1	To Understand basic concepts of HVDC Transmission
CO2	Analyze the converter configuration and the operation of converters.
CO3	The control of converter and HVDC Transmission.
CO4	Analyze the basic concepts of FACTS.
CO5	To learn the operation of different FACTS devices
20EE8T10	**POWER QUALITY**

CO1	Differentiate between different types of power quality problems.
CO2	Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power System.
CO3	Analyze power quality terms and power quality standards
CO4	Explain the principle of voltage regulation and power factor improvement methods
CO5	Explain the power quality monitoring concepts and the usage of measuring Instruments

PROGRAMME OUTCOMES (POs)

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: 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 practice.

PO 9: Individual and team work: 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 presentation, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team. To manage projects and in multidisciplinary environments.

Po 12: Life-long learning: recognize the need for , and have the preparation and ability to engage in independent and life – long learning in the broadest context of technological change.

DVR & Dr. HS
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DEPARTMENT OF MECHANICAL ENGINEERING	
COURSE OUTCOMES (MIC20)	
I SEMESTER (I BTMEH-I SEM)	
20ME1T01	**LINEAR ALGEBRA & DIFFERENTIAL CALCULUS**
CO 1	Apply the knowledge to solve a system of homogeneous and non-homogeneous linear equations
CO 2	Illustrate the methods of computing Eigen values and Eigen vectors
CO 3	Able to analyze the real life situations, formulate the differential equations and then applying the methods
CO 4	Determine the solutions of linear differential equations
CO 5	Optimize functions of several variables and able to find extreme values of constrained functions
20ME1T02	**ENGINEERING PHYSICS**
CO 1	Impart knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes
CO 2	Gain knowledge of applications of lasers and optical fibers in various fields .
CO 3	Classify magnetic and dielectric materials and their Engineering applications.
CO 4	Impart knowledge of architectural acoustics and Study of Ultrasonics.
CO 5	Classify crystal systems and analyze the crystalline structure using various X-ray diffraction techniques .
20ME1T03	**ENGLISH**
CO 1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
CO 2	ask and answer general questions on familiar topics
CO 3	employ suitable strategies to master the art of letter writing and email writing
CO 4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
CO 5	form sentences using proper grammatical structures and correct word forms
20ME1T04	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
CO 1	Analyze various electrical networks.
CO 2	Understand operation of DC generators, single-phase transformer and acquire proper knowledge and working of 3-phase alternator and 3-phase induction motors
CO 3	Understand operation of Sources of Energy & power transmission and distribution using single line diagrams.
CO 4	Analyze operation of half wave, full wave bridge rectifiers and OPAMPs.
CO 5	Understanding operations of CE amplifier and basic concept of feedback amplifier.
20ME1T05	**ENGINEERING GRAPHICS**
CO 1	Understand the concepts of projections and draw projections for simple entities such as points and lines.
CO 2	Draw orthographic projections of planes and simple solids.
CO 3	Understand the concept of sections and sectional views.

CO 4	Develop the surfaces for various simple solids and understand the concept of intersection of two solids.
CO 5	Analyze the 2D drawings and convert to 3D isometric views.
CO 6	Learn computer aided drafting with AutoCAD and draw simple 2D part drawings and orthographic views using the software.
20ME1L06	**ENGLISH COMMUNICATION SKILLS LAB**
CO 1	Acquire basic proficiency in English by learning functional aspects of English language
CO 2	Learn the methods of enhancing vocabulary
CO 3	Acquaint himself/herself with nuances of Phonetics
20ME1L07	**ENGINEERING PHYSICS LAB**
CO 1	Implement the basic principles of Optics through various phenomena of light.
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
20ME1L08	**Basic Electrical & Electronics Engineering Lab**
CO 1	Compute the efficiency of DC shunt machine without actual loading of the machine
CO 2	Estimate the efficiency and regulation at different load conditions and power factors for single phase transformer with OC and SC tests
CO 3	Analyze the performance characteristics and to determine efficiency of DC shunt motor & 3-Phase induction motor.
CO 4	Control the speed of dc shunt motor using Armature voltage and Field flux control methods.
CO 5	Draw the characteristics of PN junction diode & transistor
CO 6	Determine the ripple factor of half wave & full wave rectifiers.
	II SEMESTER (I BTMEH-II SEM)
20ME2T01	**TRANSFORM TECHNIQUES**
CO 1	Able to analyze a class of integrals in terms of beta and gamma functions
CO 2	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
CO 3	Analyze the general periodic functions in the form of an infinite convergent sine and cosine series
CO 4	Illustrate the methods to solve the boundary value problems
CO 5	Determine a solution of a discrete system using Z- transforms
20ME2T02	**ENGINEERING CHEMISTRY**
CO 1	Analyze the different types of composite plastic materials and interpret the mechanism of conduction in counducting polymers
CO 2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion
CO 3	synthesize nanomaterials for modern advances of engineering technology Summarize the techniques that detect and measure changes of state of reaction

CO 4	Differentiate petroleum, petrol, synthetic petrol and have knowledge how they are produced. Study alternate fuels and analyse flue gases
CO 5	Analyze the suitable methods for purification and treatment of hard water and brackish water.
20ME2T03	ENGINEERING MECHANICS
CO 1	Identify and classify different types of forces acting on static structural systems and Model the problem using free-body diagrams and equilibrium equations
CO 2	Identify and model various types of loading and support conditions that act on structural systems
CO 3	Determine the centroid and moment of inertia for various structural elements
CO 4	Analyze motions of rigid body with concepts of dynamics.
CO 5	Analyze static structural frames subjected to loading by method of joints and method of section
20ME2T04	THERMODYNAMICS
CO 1	understand the basic laws of thermodynamics
CO 2	apply the laws of thermodynamics
CO 3	understand the concept of entropy, Availability and Irreversibility
CO 4	understand the properties of Steam and use of Steam Tables
CO 5	understand the use of standard cycles and their applications.
20ME2T05	PROBLEM SOLVING THROUGH C
CO 1	Understand the basic concepts of programming
CO 2	Understand and Apply loop construct for a given problem
CO 3	Demonstrate the use pointers
CO 4	Understand the use of functions and develop modular reusable code
CO 5	Understand File I/O operations
20ME2L06	ENGINEERING CHEMISTRY lab
CO 1	student is exposed to different methods of chemical analysis abd use of some commonly employed instruments.they thus acquire some expermental skills
20ME2L07	ENGG.WORKSHOP & IT WORKSHOP
CO 1	Use basic data structures such as arrays and linked list.
CO 2	Develop fundamental programs in python programming language.
CO 3	Able to draw flowcharts and write algorithms.
CO 4	Able design and development of C problem solving skills.
CO 5	Able to design and develop modular programming skills.
CO 6	Able to trace and debug a program
20ME2L08	PROBLEM SOLVING THROUGH C LAB
CO 1	Demonstrate Knowledge on various concepts of a C language.
CO 2	Able to draw flowcharts and write algorithms.
CO 3	Able design and development of C problem solving skills.
CO 4	Able to design and develop modular programming skills.

CO 5	Able to trace and debug a program
20ME1M09	**ENVIRONMENTAL SCIENCE**
CO 1	The concepts of the ecosystem and its function in the environment The importance of environment current global environmental challenges for the sustenance of the life on planet earth.
CO 2	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO 3	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO 4	The environmental legislations of India and Social issues and the possible means and EIA
III SEMESTER (II BTECH-I SEM)	
20ME3T01	**Numerical Methods and Vector Calculus**
CO 1	Determine the solution of transcendental equations by different numerical methods
CO 2	Provide the interpolation techniques which analyze the data of an unknown function
CO 3	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries
CO 4	Evaluate areas and volumes using double & triple integrals
CO 5	Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals.
20ME3T02	**Material Science & Metallurgy**
CO 1	Analyze the basic fundamentals of metals, alloys.
CO 2	Understand the properties and classification of cast irons and steels.
CO 3	Analyze properties and applications of non ferrous metals and understand the stability of phases, various heat treatment and strengthening processes.
CO 4	Understand the concepts of powder metallurgy.
CO 5	Understand the concepts of ceramics, composite materials and nano materials.
20ME3T03	**Production Technology**
CO 1	Identify the steps involved in casting, requirements and applications of casting
CO 2	Illustrate the insight into sand casting, types of furnaces, melting and solidification of casting andapplication of other casting processes
CO 3	Demonstrate the basic knowledge on gas welding and arc welding processes and their applications
CO 4	Identify appropriate bulk forming processes on materials for suitable applications
CO 5	Identify various sheet metal forming operations and their principles
20ME3T04	**Mechanics of Solids**
CO 1	Understand the concept of simple stress and strains. Solve the problems related to the theory of elasticity and strain energy.
CO 2	Analyze the different beams with various loading conditions for shear force, Bending moment, slope and deflection
CO 3	Analyze bending and shear stresses induced in beam sections.
CO 4	Analyze the slope and deflection of various beams

CO 5	Understand the concepts necessary to analyze the pressure vessels Subjected to combined loads
20ME3T05	**Fluid mechanics & hydraulic machines**
CO 1	Recite fluid properties and fluid statics
CO 2	Understand and analyze fluid kinematics and fluid dynamics
CO 3	Analyze the flow of fluid through pipes and its measurement
CO 4	Acquire the knowledge on fundamentals of turbo machinery
CO 5	Analyze the performance of various types of hydraulic turbines and Pumps
20ME3L06	**Production Technology Lab**
CO 1	Make single piece and split piece pattern making and prepare components using sand casting
CO 2	Find sand properties and able to apply metal forming operations
CO 3	Make single piece and split piece patterns using wood turning lathe machine
CO 4	Make use of plastics materials with injection moulding technique and blow moulding technique
CO 5	Make use of resistance spot welding, manual metal arc welding operations and soldering
20ME3L07	**Fluid mechanics & Hydraulic machines lab**
CO 1	Determine the efficiency of the jet
CO 2	Determine the efficiencies of pelton wheel. Francis and Kaplan turbines.
CO 3	Determine the efficiencies of pumps.
CO 4	Determine the Coefficient of discharge of flow measuring devices
CO 5	Determine the friction factor of a given pipeline & Determine the coefficient of contraction of a given pipe line
20ME3L08	**Mechanics of Solids & Metallurgy LAB**
CO 1	Predict the behavior of ferrous and non-ferrous metals and alloys by studying the microstructure
CO 2	Conduct experiment to find out the hardness of various treated and untreated steels.
CO 3	Conduct tensile, compression, impact and hardness tests to determine the mechanical properties of engineering materials
CO 4	Develop communication and self-learning skills through viva-voce and experiments
20ME3L09	**Computer aided drafting and modeling Lab**
CO 1	Demonstrate the conventional representations of materials and machine components.
CO 2	Model riveted, welded and key joints using CAD system.
CO 3	Create solid models and sectional views of machine components.
CO 4	Generate solid models of machine parts and assemble them.
CO 5	Create manufacturing drawing with dimensional and geometric tolerances.
	IV SEMESTER (II BTECH-II SEM)
20ME4T01	**Complex Variables and Statistical Methods**
CO 1	Determine analytic and non-analytic functions

CO 2	Analyze the analytic function into a power series which is useful in the study of communication systems.
CO 3	Understand random variables and probability distributions
CO 4	Apply different distributions to compute confidence intervals
CO 5	Test the hypothesis concerning means and proportions
20ME4T02	**Design of Machine Elements**
CO 1	Apply general and manufacturing considerations in the design of various machine components.
CO 2	Design the machine components using various theories of failures and predict the stress concentration and fatigue in parts subjected to cyclic loads
CO 3	Design riveted, welded and bolted joints.
CO 4	Design the keys, cotters and knuckle joints.
CO 5	Design the shafts, shaft couplings and springs.
20ME4T03	**IC Engines & Air Compressors**
CO 1	Discuss various losses occur in actual fuel air cycles. & Classify various types of IC Engines and Discuss its lubrication, ignition, fuel meteringand fuel supply systems
CO 2	Distinguish normal and abnormal combustion phenomena in SI and CI engines
CO 3	Perform testing on engines to evaluate engine performance parameters
CO 4	Expalin working of reciprocating and predicts its performance
CO 5	Explain working of rotary compressors and predicts its performance
20ME4T04	**Kinematics of Machinery**
CO 1	Classify, understand and analyze different types of links and mechanisms
CO 2	Acquire knowledge on straight-line motion mechanisms and on hooks joint.
CO 3	Solve the forces, velocities and accelerations in different mechanisms
CO 4	Construct cam profile for different follower motion
CO 5	Describes the power transmission through gears, belts, ropes, and chain drives
20ME4T05	**Managerial Economics & Financial Analysis**
CO 1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product
CO 2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
CO 3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units
CO 4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
CO 5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making
20ME4L06	**Proficiency Through Reading & Writing Lab**
CO 1	build their vocabulary by following various strategies and use the vocabulary to write meaningful and effective paragraphs
CO 2	learn to identify and avoid the common errors in writing

CO 3	read and review various kinds of books
20ME4L07	**Computer Aided Machine Drawing Lab**
CO 1	Demonstrate the conventional representations of materials and machine components.
CO 2	Model riveted, welded and key joints using CAD system.
CO 3	Create solid models and sectional views of machine components.
CO 4	Generate solid models of machine parts and assemble them.
CO 5	Create manufacturing drawing with dimensional and geometric tolerances.
20ME4L08	**Thermal engineering Lab**
CO 1	Demonstrate suction, ignition, compression and exhaust processes on I.C Engines by opening and closing of valves /ports.
CO 2	Conduct performance test and evaluate performance parameters on 2 stroke/4 strokes diesel/ petrol IC engines.
CO 3	Conduct experiments to evaluate friction power on IC Engines
CO 4	Prepare heat balance sheet on CI/SI engine.
20ME4S09	**Programming through MATLAB**
CO 1	To understand the basic fundamentals of Matlab functions
CO 2	To Perform Plots and GUI related operations
CO 3	To Perform Simulink related functions to different models and sub sysytems
CO 4	To study and perform with different tool boxes
20ME3M10	**Constitution of India**
CO1	Importance for building a democratic India, features and principles of Indian Constitution.
CO2	The functioning of three wings of the government ie., executive, legislative and judiciary.
CO3	The roles and powers of State Government
CO4	The decentralization of power between Union, State and Local self-Government and local administration
CO5	Election Commission, UPSC, Welfare commissions for sustaining democracy
	V SEMESTER (III BTECH-I SEM)
20ME5T01	**Dynamics of Machines**
CO 1	Analyze stabilization of sea vehicles, aircrafts and automobile vehicles
CO 2	Compute frictional losses, torque transmission of mechanical systems
CO 3	Analyze dynamic force analysis of slider crank mechanism and design of flywheel.
CO 4	Understand balancing of reciprocating and rotary masses.
CO 5	Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.
20ME5T02	**Turbo machines**
CO 1	Evaluate performance of thermal power plant with Rankine cycle and analyze flue gas composition.
CO 2	Describes the working and analyze the performance of boilers.
CO 3	analyze and evaluate the performance of steam nozzles and steam turbines

CO 4	analyze and evaluate the performance of steam turbines and steam condensers
CO 5	Aanalyze and evaluate the performance of Gas turbine and jet engines.
20ME5T03	MC&MT
CO 1	Apply the elementary theory of metal cutting and principles in material removal processes
CO 2	Understand the working principles and operations that can be performed on different lathe machines
CO 3	Identify the working principles and operations that can be performed on shaper, slotter, planner machines and drilling machines calculate the material removal rates
CO 4	Understand the working principles and operations that can be performed for producing various features using milling machine tool and select appropriate machining processes for finishing operation with the desired quality
CO 5	Apply appropriate jigs and fixtures on machine tools and write simple CNC programs and conduct CNC machining
20HS5T01	QUANTATIVE APTITUDE AND REASONING
CO 1	Understand the basics concepts of Numerical Ability & Reasoning Skills
CO 2	Use the logical thinking and analytical abilities to solve Quantitative aptitude questions from companies specific and other competitive tests
CO 3	Solve questions related to time and distance, time and work ,percentages, simple interest and compound interest etc.
CO 4	Solve questions related to coding and decoding, number series, directions, puzzles ,etc.
CO 5	Understand and solve puzzle related questions for competitive and campus placements exams.
20ME5T08	Refrigeration & Air Conditioning
CO 1	Illustrate the fundamental principles and applications of refrigeration and air conditioning system
CO 2	Obtain cooling capacity and coefficient of performance by conducting test on vapour compression refrigeration systems
CO 3	Present the properties, applications and environmental issues of different refrigerants
CO 4	Calculate cooling load for air conditioning systems used for various
CO 5	Operate and analyze the refrigeration and air conditioning systems.
20ME5L09	Theory of machines Lab
CO 1	Examine the motion of a motorized gyroscope when the couple is applied along its spin axis.
CO 2	Find the frequency of undamped and damped free vibration of an equivalent spring mass system.
CO 3	Find the position of sleeve against controlling force and speed of a Hartnell governor and to plot the characteristic curve of radius of rotation
CO 4	Interpret the static and dynamic balancing using rigid blocks
CO 5	Interpret the moment of inertia of a flywheel and Determine whirling speed of shaft theoretically and experimentally
20ME5L10	Machine Tools & Computer Aided Manufacturing Lab

CO 1	Make use of Lathe machine tool to produce step turning, taper turning, knurling and threading features on the given workpiece.
CO 2	Understand the working of Milling machine tool to produce grooves.
CO 3	Utilize Drilling machine tool to produce features of cylindrical holes on flat and round surfaces and perform tapping operation
CO 4	Make use of Shaper and Planer machine tools to produce features of slots and pockets on flat surfaces to the desired quality.
CO 5	Utilize Grinding machine tool to produce finished surfaces and grind cutting tools
CO 6	Understand the concepts of simple machine parts and assemblies from the part drawings using standard CAM packages.
CO 7	Understand the concepts of CNC Turning codes for different operations using standard CAM packages.
CO 8	Solve CNC Milling codes for different operations using standard CAM packages.
20ME5S11	**Simulation of Mechanical Systems Lab**
CO 1	Analyze the concept of spring mass damper systems.
CO 2	Understand the concept of friction in mechanical components both translation and rotational.
CO 3	Understand the concept of linkage and steering mechanisms.
CO 4	Analyze the mode shapes and natural frequency in various spring mass damper systems.
20ME5M12	**Essence of Indian Traditional Culture**
CO 1	Understand the significance of Indian Traditional Knowledge
CO 2	Classify the Indian Traditional Knowledge
CO 3	Compare Modern Science with Indian Traditional Knowledge system.
CO 4	Analyze the role of Government in protecting the Traditional Knowledge
CO 5	Understand the impact of Philosophical tradition on Indian Knowledge System.
20ME5I13	**Summer Internship**
CO 1	Apply the academic knowledge either in Industry or any training program.
CO 2	Understand administrative functions and ethical principles of the organisation.
CO 3	Analyze and develop the concepts by practical observation.
CO 4	Improve the report writing skills.
VI SEMESTER (III BTECH-II SEM)	
20ME6T01	**Design of Transmission Elements**
CO 1	The student will able to select the suitable bearing based on the application of the loads and predict the life of the bearing
CO 2	Design of IC Engines parts
CO 3	Design power transmission elements such as gears, belts, chains, pulleys, ropes, levers and power screws.
CO 4	Design power transmission elements such as gears, belts, chains, pulleys, ropes, levers and power screws.
CO 5	Design and analyze of machine tool elements
20ME6T02	**Heat Transfer**

CO 1	Find heat transfer rate for 1D, steady state composite systems with heat generation and performance of pins.
CO 2	Understand the concepts transient heat conduction and basic laws involved in the convection heat transfer
CO 3	Illustrate the concepts of radiation heat transfer
CO 4	Examine the rate of heat transfer in the heat exchangers
CO 5	Examine the rate of heat transfer with phase change
20ME6T03	**Metrology and measurements**
CO 1	Interpret the principles of different types of limits and fits and explain the operating principles of linear and angular measurements.
CO 2	Understanding the principles of surface roughness measurement and apply the knowledge of flatness measurement
CO 3	Illustrate the concepts of gear and screw thread measurements.
CO 4	Construction of various transducers for displacement measurement and to Understand the working principles of speed measuring instruments
CO 5	Illustrate the operating principles of force and torquemeasurements and to Classify and study the different types of temperature, pressure and sound measuring devices.
20ME6T04	**Finite Element Methods**
CO 1	Understand the basic concepts of finite element. Method
CO 2	Formulate simple problems into finite elements.
CO 3	Solve structural and thermal problems.
CO 4	Solve complicated 2D structural problems for stress analysis under various loads
CO 5	Analyze and formulate 1D and 2D problems under steady load conditions. Formulate finite element model under dynamic load conditions.
20HS6T01	**OPERATIONS RESEARCH**
CO 1	Understand the methodology of Operations Research& concepts of linear programming
CO 2	Formulate the solutions to transportation problems
CO 3	Explain the solutions for various sequencing problems
CO 4	Illustrate the solutions to different replacement policies
CO 5	Apply game theory to solve real world problems
20ME6L09	**Metrology & Instrumentation Lab**
CO 1	Measure length, height, diameter and angles using various instruments
CO 2	Measure surface roughness with roughness measurement instrument and alignment tests on Lathe Machine tool
CO 3	Apply resistant temperature detector for temperature measurement
CO 4	Utilize LVDT transducer and of rotameter
CO 5	Utilize displacement strain measurement trainer and capacitance measurement trainer
20ME6L10	**Heat Transfer Lab**
CO 1	Find the thermal conductivity of different materials, composite slabs and powders.

CO 2	Solve heat transfer coefficient for free and forced convection and pin fin efficiency for forced and free convection
CO 3	Examine the Stefan Boltzmann Constant and emissivity of grey body.
CO 4	Compare parallel and counter flow heat exchanger performance characteristics and investigation of Lambert's cosine law
CO 5	Solve the heat transfer rate through lagged pipes and heat transfer rate in film and drop wise condensation
20ME6L11	**CAE & CFD Lab**
CO 1	Classify the types of Trusses (Plane Truss & Spatial Truss) and Beams (2D & 3D) with various cross sections to determine Stress, Strains and deflections under static, thermal and combined loading
CO 2	Generalize Plane stress, plane strain conditions & axis-symmetric loading on inplane members to predicting the failure behavior and finding the SCF
CO 3	Analyse connecting rod with tetrahedron and brick elements, performing static analysis on flat & curved shells to determine stresses, strains with different boundary conditions.
CO 4	Predict the natural frequencies and modes shapes using Modal, Harmonic analysis. Also finding the critical load using Buckling analysis
CO 5	Simulate steady state heat transfer analysis of chimney, Transient heat transfer of castings, Non-linear, Buckling analysis of shells &CFD analysis
CO 6	Have a working knowledge of a variety of computational techniques that can be used for solving engineering problems.
CO 7	To develop an understanding for the major theories, approaches and methodologies used in CFD;
CO 8	To gain experience in the application of CFD analysis to real engineering designs.
20ME6S12	**Soft skills**
CO 1	Make presentations on various technical and non-technical topics
CO 2	Learn various nuances of the interview process like building an effective resume, cracking JAM/GD/HR interviews
CO 3	Enhance understanding of soft skills and life skills
20ME6T23	**Disaster Management**
CO 1	Differentiate the types of disasters, causes and their impact on environment and society
CO 2	Assess vulnerability and various methods of risk reduction measures as well as mitigation.
CO 3	Draw the hazard and vulnerability profile of India
CO 4	Analyze the Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster
CO 5	Understand about Risk Assessment, Response and Recovery Phases of Disaster
20ME6P14	**Community Service Project**
CO 1	Positive impact on students' academic learning
CO 2	Improves students' ability to apply what they have learned in "the real world"

CO 3	Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
CO 4	Improved ability to understand complexity and ambiguity
CO 5	Improved social responsibility and citizenship skills
VII SEMESTER (IV BTECH-I SEM)	
20ME7T02	**Power Plant Engineering**
CO 1	Select the suitable site for a power plant and propose ash handling,coal handling methods for power plants
CO 2	Explain the layout with auxiliaries, construction and working of IC and Gas turbine power plants
CO 3	Explain the basic concepts of hydro electric power plant and Explain working principle of different types of nuclear power plant
CO 4	Explain working principle of different types of Non-Conventional Sources
CO 5	Understand Environmental consideration of power plant and Calculate load factor,
20ME7T06	**Advanced Machining Processes**
CO 1	Explain need for Nontraditional processes
CO 2	Explain working principles and applications of various machining processes in advanced machining processes.
CO 3	Understand the working principles and application of EDM, WEDM, ECM
CO 4	Understand the working principles and application of LBM, PAM, EBM
CO 5	Understand the applications of CNC Part Programming, Indexing and CNC applications.
20ME7T08	**Automobile Engineering**
CO 1	Describe the basic lay-out of an automobile and its components and classify various lubricating and cooling systems of an automobile.
CO 2	Describe various fuel supply and electrical systems and ignition systems in SI and CI engines
CO 3	Understand the concept of power transmission system and vehicle controlling.
CO 4	Explain the principles of suspension and braking System
CO 5	Explain the principles of safety systems and emission standards.
20IT7T10	**INTERNET OF THINGS**
CO 1	Design and Deployment of IoT.
CO 2	Design and comparing M2M with IoT.
CO 3	Understand Platform design and modeling of IoT
CO 4	Apply IoT in different devices using Python
CO 5	Implement IoT and cloud platforms.
20MB7T03	**TOTAL ENGINEERING QUALITY MANAGEMENT**
CO 1	To understand the fundamentals of quality
CO 2	To understand the role of TQM tools and techniques in elimination of wastages and reduction of defects
CO 3	To develop quality as a passion and habit

CO 4	To Facilitate the understanding of Quality Management principles and process.
CO 5	The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.
20ME7T14	**Universal Human Values 2: Understanding Harmony**
CO 1	Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society
CO 2	Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body
CO 3	Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society
CO 4	Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature
CO 5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work
20ME7S15	**Python Programming Lab**
CO 1	Identify the type of NoSQL database to implement based on business requirements
CO 2	Apply NoSQL data modeling from application specific queries
CO 3	Understand NoSQL Storage Architecture
CO 4	Use Atomic Aggregates and denormalization as data modeling techniques to optimize query processing
CO 5	Apply indexing and ordering of data sets
20ME7I16	**Industrial Internship**
CO 1	Apply the academic knowledge in Industry or any advanced technology.
CO 2	Understand administrative functions and ethical principles of the organisation
CO 3	Analyze and develop the concepts by practical observation
CO 4	Improve the report writing skills.

VIII SEMESTER (IV BTECH-II SEM)

20ME8P01	**Project (Project work/internship)**
CO 1	Implement the concepts of mechanical engineering
CO 2	Formulate and solve theoretical or practical engineering problems.
CO 3	Analyze the concepts by practical observation.
CO 4	Implement the knowledge in the report writing skills.
CO 5	Manage and plan the work as a team.

DVR & Dr. HS
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Accredited by NAAC With Grade A

ISO 9001:2015 Certified

PROGRAMME OUTCOMES (POs)

PO1: Able to apply the basic knowledge of mathematics, science, engineering fundamentals and comprehensive knowledge of thermal, design and manufacturing engineering to solve complex engineering problems. [Engineering Knowledge].

PO2: Able to identify, formulate and solve mechanical engineering problems using principles of engineering sciences, mathematics and appropriate engineering standards. [Problem Analysis].

PO3: Able to design mechanical systems/components as per engineering standards to meet desired specifications and requirements with suitable consideration for economy, environment and safety norms. [Design and development of Solutions].

PO4: Able to conduct investigations by analyzing and interpreting data using tools, techniques and research to find solutions for complex engineering problems. [Investigation].

PO5: Able to model, simulate and analyze engineering problems using modern tools. [Modern Tool].

PO6: Able to understand responsibilities associated with the use of technology and processes on societal & legal issues of concern in respect of health, safety and culture. [Engineer and Society].

PO7: Able to understand contemporary issues in sustainable development and in providing technological solutions considering impact of socio-economic and environmental aspects. [Environment and Sustainability].

PO8: Able to understand and implement ethical and professional responsibilities in engineering practice. [Ethics].

PO9: Able to function effectively, as a member or team leader, in executing projects under multidisciplinary environments. [Team Work].

PO10: Able to communicate effectively in written, oral and graphical forms and present the results in a professional manner. [Communication].

PO11: Able to apply knowledge of engineering and management principles for effective project and finance management. [Project Management].

PO12: Able to recognize the need for lifelong learning and adapt to latest technological developments. [Life Long Learning].

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING	
COURSE OUTCOMES (MIC20)	
I SEMESTER(I BTECH -I SEM)	
20EC1T01	**Linear Algebra and Differential Equations**
CO 1	Apply the knowledge to solve a system of homogeneous and non-homogeneous linear equations
CO 2	Illustrate the methods of computing Eigen values and Eigen vectors
CO 3	Able to analyze the real life situations, formulate the differential equations and then applying the methods
CO 4	Determine the solutions of linear differential equations
CO 5	Optimize functions of several variables and able to find extreme values of constrained functions
20EC1T02	**Applied Physics**
CO 1	Impart knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes
CO 2	Gain knowledge of applications of lasers and optical fibers in various fields .
CO 3	Classify magnetic and dielectric materials and their Engineering applications.
CO 4	Understand basic quantum mechanics and free electron theories.
CO 5	Obtain the concept of concept of holes and electrons in semiconductors.
20EC1T03	**English**
CO 1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
CO 2	ask and answer general questions on familiar topics
CO 3	employ suitable strategies to master the art of letter writing and email writing
CO 4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
CO 5	form sentences using proper grammatical structures and correct word forms
20EC1T04	**Electronic Devices**
CO 1	Understand basic semiconductor devices
CO 2	Observe characteristics diodes
CO 3	Analyze applications of Semiconductor diodes
CO 4	Characterize the Bipolar Junction Transistor in different modes
CO 5	Understand the construction and working of Field Effect Transistor
20EC1T05	**Problem solving through C**
CO 1	Understand the basic concepts of programming
CO 2	Understand and Apply loop construct for a given problem
CO 3	Demonstrate the use pointers
CO 4	Understand the use of functions and develop modular reusable code
CO 5	Understand File I/O operations

20EC1L06	**English Communication Skills Lab**
CO 1	Acquire basic proficiency in English by learning functional aspects of English language
CO 2	Learn the methods of enhancing vocabulary
CO 3	Acquaint himself/herself with nuances of Phonetics
20EC1L07	**Applied Physics Lab**
CO 1	Implement the basic principles of Optics through various phenomena of light.
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
20EC1L08	**Problem solving through C Lab**
CO 1	Demonstrate Knowledge on various concepts of a C language.
CO 2	Able to draw flowcharts and write algorithms.
CO 3	Able design and development of C problem solving skills.
CO 4	Able to design and develop modular programming skills.
CO 5	Able to trace and debug a program
20EC1L09	**Electronic Devices Lab**
CO 1	Measure voltage, frequency and phase of any waveform using CRO
CO 2	Generate sine, square and triangular waveforms with required frequency and amplitude using function generator
CO 3	Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers
	II SEMESTER(I BTECH -II SEM)
20EC2T01	**Transform Techniques**
CO 1	Able to analyze a class of integrals in terms of beta and gamma functions
CO 2	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
CO 3	Analyze the general periodic functions in the form of an infinite convergent sine and cosine series
CO 4	Illustrate the methods to solve the boundary value problems
CO 5	Determine a solution of a discrete system using Z- transforms
20EC2T02	**Applied Chemistry**
CO 1	Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers
CO 2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion
CO 3	synthesize Nano materials for modern advance of engineering technology summarize the preparation of semiconductors analyses the application of liquid crystals and superconductors
CO 4	Design models for energy by different natural sources analyze the principles of different analytical and their application

CO 5	obtain the knowledge of green chemistry and molecular machines
20EC2T03	**Network Theory**
CO 1	Gain the knowledge on basic network elements and graph theory
CO 2	Understand Network Theorems and applications
CO 3	Analyze Coupled circuits and Resonance
CO 4	Will analyze the RLC circuit's behavior in detailed
CO 5	Gain the knowledge in characteristics of two port network parameters
20EC2T04	**Basic Electrical Technology**
CO 1	Understand the operation of DC generators.
CO 2	Able to understand the operation of DC motors, Speed control methods.
CO 3	Analyze the performance of transformer
CO 4	Explain the operation of 3-phase induction motors.
CO 5	Able to explain the operation of Stepper & BLDC motors.
20EC2T05	**Engineering Drawing**
CO 1	Understand the techniques of constructing various polygons and curves
CO 2	Understand the concepts of projections and draw projections for simple entities such as points and lines.
CO 3	Draw orthographic projections of planes and simple solids
CO 4	Analyze the 2D drawings and convert to 3D isometric views
20EC2L06	**Applied Chemistry Lab**
CO 1	Student is exposed to different methods of chemical analysis and use of some commonly employed instruments. they thus acquire some experimental skills
20EC2L07	**Engineering & IT Workshop**
CO 1	Design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint.
CO 2	Fabricate and model various basic prototypes in the trade of fitting such as Straight fit, V-fit.
CO 3	Produce various basic prototypes in the trade of Tin smithy such as rectangular tray, and open Cylinder.
CO 4	identify, assemble and update the components of computer
CO 5	configure evaluate and select hardware platforms for the implementation and execution of computer applications, services, and systems.
20EC2L08	**Basic Electrical Technology Lab**
CO 1	Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network
CO 2	Determination of time constant and steady state error & Two port network parameters
CO 3	Experimentation of network theorems
CO 4	Compute the efficiency of DC shunt machine without actual loading of the machine

CO 5	Estimate the efficiency and regulation at different load conditions and power factors for single phase transformer with OC and SC tests.
CO 6	Analyze the performance characteristics and to determine efficiency of DC shunt motor &3-Phase induction motor
20EC2M09	**Environmental Science**
CO1	The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth
CO2	The concepts of the ecosystem and its function in the environment.
CO3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
CO5	The environmental legislations of India and Social issues and the possible means
CO6	Environmental assessment and the stages involved in EIA.
III SEMESTER(II BTECH -I SEM)	
20EC3T01	**Complex Variables**
CO 1	Determine analytic and non-analytic functions
CO 2	Analyze the analytic function into a power series which is useful in the study of communication systems.
CO 3	Illustrate the techniques of the contour integration to determine the real integrals
CO 4	Determine the solution of boundary value problems by mapping complex domains into the standard domains
CO 5	Analyze the solutions of Bessel's and Legendre's equations using power series
20EC3T02	**Probability Theory and Stochastic Processes**
CO 1	Define and estimate probability of any random experiment and analyze random variable
CO 2	Analyze and apply special random variables to find moments, perform different operations on single random variable
CO 3	Perform several operations on multiple random variables
CO 4	Analyze random process and apply time averages
CO 5	Analyze relation between correlation and power spectrum
20EC3T03	**Digital Electronics**
CO 1	Understand different number systems and their conversions
CO 2	Analyze the logical operations and Boolean algebra
CO 3	Develop combinational circuits and perform logical operations and different programmable logic devices.
CO 4	Design the sequential logic functions
CO 5	Know finite state machines and Mealy and Moore Models for reduction

20EC3T04	**Signals & Systems**
CO 1	Characterize the signals and systems and principles of vector spaces, Concept of Orthogonality
CO 2	Analyze the Fourier series, Fourier transform and Laplace transform
CO 3	Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back
CO 4	Understand the relationships among the various representations of LTI systems
CO 5	Apply z-transform to analyze discrete-time signals and systems
20EC3T05	**Electronic Circuits Analysis**
CO 1	Design and analyze the small signal low and high frequency transistor amplifier using BJT
CO 2	Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT Identify and analyze the different feedback topologies
CO 3	Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept
CO 4	Know the classification of the power amplifiers and their analysis with performance comparison
20EC3L06	**Electronics Circuits Analysis Lab**
CO 1	Understand how the amplification under small signal models
CO 2	Analyzing frequency response of amplifiers
CO 3	Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications
CO 4	Utilize the Concepts of negative feedback to improve and importance of multi-vibrators
CO 5	Understand the concepts of sampling gates
20EC3L07	**Signals & Systems Lab**
CO 1	Have a thorough understanding of the fundamental concepts and techniques used
CO 2	To understand and examine the signals and its operations
CO 3	The ability to understand and analyze sampling process
CO 4	Ability to identify basic requirements for a transformation techniques in continuous and discrete time
20EC3L08	**Digital Electronics Lab**
CO 1	Understand working of logic gates and verify Boolean theorems
CO 2	Design, Test and evaluate various combinational circuits such as adders, Decoders, multiplexers, and de-Multiplexers
CO 3	Construct flips-flops, counters and shift registers and verify its functionality
20EC3S09	**Data Structures through C**
CO 1	Use basic data structures such as arrays and linked list
CO 2	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
CO 3	Use various searching and sorting algorithms.
CO 4	Understand and use Trees for complex operations

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IV SEMESTER(II BTECH -II SEM)	
20EC4T01	**Numerical Methods and Vector Calculus**
CO 1	Determine the solution of transcendental equations by different numerical methods
CO 2	Provide the interpolation techniques which analyze the data of an unknown function
CO 3	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries
CO 4	Evaluate areas and volumes using double & triple integrals
CO 5	Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals
20EC4T02	**Control Systems**
CO 1	Represent the mathematical model of a system
CO 2	Reduce the Block diagram and signal flow graph
CO 3	Determine the response of different order systems for various inputs in time domains
CO 4	Know the Frequency Response Using Different Graphical Networks
CO 5	Decompose the transfer function and Test Controllability and observability of a system
20EC4T03	**Analog Integrated Circuits**
CO 1	Understand about Logic Families with Diode-Transistor
CO 2	Design different Time base generators
CO 3	Design circuits using operational Amplifier for various applications
CO 4	Understand the concept of A/D & D/A Converters
CO 5	Analyze and design amplifiers and active filters using Op-amp
20EC4T04	**Electromagnetic Waves and Transmission lines**
CO 1	Know the basic principles of electrostatics
CO 2	Understand the primary laws in magneto statics and its importance
CO 3	Gain knowledge on functionalities of time varying fields
CO 4	Determine the parameters in EM Wave propagating conditions
CO 5	Derive and determine the conditions and constants in transmission lines
20EC4T05	**Managerial Economics and Financial Analysis**
CO 1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product
CO 2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
CO 3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units
CO 4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
CO 5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making

20EC4T06	**Analog and Digital Communications**
CO 1	Differentiate various Analog modulation schemes
CO 2	Analyze demodulation schemes and their spectral characteristics
CO 3	Analyze noise characteristics of various analog modulation methods
CO 4	Differentiate various Digital modulation schemes
CO 5	Analyze demodulation schemes and their spectral characteristics
20EC4L07	**Analog Integrated Circuits lab**
CO 1	Understand about Logic Families with Diode-Transistor
CO 2	Design different Time base generators
CO 3	Design circuits using operational Amplifier for various applications
CO 4	Analyze and design amplifiers and active filters using Op-amp
CO 5	Understand the concept of A/D & D/A Converters
20EC4L08	**Analog and Digital Communications Lab**
CO 1	Simulate modulation and demodulation circuits such as AM, DSB-SC in hardware and MATLAB simulation
CO 2	Understand of Sampling Process.
CO 3	Orientation to time-division multiplexing (TDM) systems
CO 4	Verification of ASK, FSK and PSK
CO 5	Understand of pulse code modulation technique
20EC4S09	**Python Programming**
CO 1	Structure simple Python programs for solving problems
CO 2	Decompose a Python program into functions
CO 3	Represent compound data using Python lists, tuples, and dictionaries.
CO 4	Read and write data from/to files in Python Programs
CO 5	To build software for real needs
20EC4M10	**Constitution of India**
CO 1	Understand historical background of the constitution making, importance for building a democratic India, features and principles of Indian Constitution.
CO 2	Understand the functioning of three wings of the government i.e., executive, legislative and judiciary
CO 3	Understand the roles and powers of State Government and its Administration and value of the fundamental rights and duties for becoming good citizen of India
CO 4	Understand and analyze the decentralization of power between Union, State and Local self-Government and local administration.
CO 5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission, UPSC, Welfare commissions for sustaining democracy
V SEMESTER(III BTECH -I SEM)	
20EC5T01	**Microprocessors and Microcontrollers**
CO 1	Understand the overview of 8086 microprocessor in general

CO 2	Understand the Assembly Language Programming in microprocessors
CO 3	Understand Interfacing I/O devices through PPI with microprocessor
CO 4	Understand the overview of microcontroller in general & ALP in microcontrollers
CO5	Understand the microcontroller interfacing with I/O devices using ALP
20EC5T02	**Antennas and Wave Propagation**
CO 1	Identify basic antenna parameters
CO 2	Design and analyze wire antennas, loop antennas
CO 3	Design and analyze antenna arrays
CO 4	Analyze antenna measurements to assess antenna's performance
CO 5	Identify the characteristics of radio wave propagation
20EC5T03	**Digital System Design using VHDL & VERILOG**
CO 1	Understand the concepts of Design Flow and Programming Statements
CO 2	Understand the concepts of Combinational logic circuits & sequential logic circuits in digital system
CO 3	Understand The Concepts of Verilog & Language Constructs and Conventions
CO 4	Understand The Concepts of Gate Level Modelling & Data Flow modelling
CO 5	Understand the concepts of behavioral modelling
20EC5T01	**Quantitative Aptitude & Reasoning**
CO 1	Understand the basics concepts of Numerical Ability & Reasoning Skills
CO 2	Use the logical thinking and analytical abilities to solve Quantitative aptitude questions from companies specific and other competitive tests
CO 3	Solve questions related to time and distance, time and work ,percentages, simple interest and compound interest etc.
CO 4	Solve questions related to coding and decoding, number series, directions, puzzles ,etc.
CO 5	Understand and solve puzzle related questions for competitive and campus placements exams.
20EC5T09	**Cellular and Mobile Communications**
CO 1	Understand the basic cellular concepts like frequency reuse, cell splitting, cell sectoring etc., and various cellular systems
CO 2	Understand the different types of interference s influencing cellular and mobile communications
CO 3	Understand the frequency management, channel assignment and various propagation effects in cellular environment
CO 4	Understand the different types antennas used at cell site and mobile
CO 5	Understand the concepts of handoff and types of handoffs
20EC5L10	**Microprocessors and Microcontrollers Lab**
CO 1	Design and implement programs on 8086 microprocessor
CO 2	Design interfacing circuits with 8086
CO 3	Design and implement 8051 microcontroller based systems

CO 4	Understand the concepts related to I/O and memory interfacing
20EC5L11	**Digital System Design using VHDL & VERILOG Lab**
CO 1	Understand the concepts of Design Flow and Programming Statements
CO 2	Understand the concepts of Combinational logic circuits in digital system
CO 3	Understand the concepts of sequential logic circuits in digital system
CO 4	Understand the concepts of Programmable logic devices & memories
CO 5	Understand the concepts of HDL modelling and logic families
20EC5S12	**JAVA Programming**
CO 1	Implement java applications using OOP principles and proper program structuring
CO 2	Develop java programs using packages, inheritance and interfaces
CO 3	Implement error and exception handling techniques
CO 4	Design event driven GUI and real-time web related applications
20EC5M13	**Essence of Indian Traditional Knowledge**
CO 1	Understand the significance of Indian Traditional Knowledge
CO 2	Classify the Indian Traditional Knowledge
CO 3	Compare Modern Science with Indian Traditional Knowledge system
CO 4	Analyze the role of Government in protecting the Traditional Knowledge
CO 5	Understand the impact of Philosophical tradition on Indian Knowledge System
20EC5I14	**Summer Internship**
CO 1	Identify engineering processes relevant to the industry
CO 2	Understand the usage of modern technologies & tools in the field of Electronics & Communication Engineering
CO 3	Adapt Communication & Presentation skills
CO 4	Improve the report writing skills
	VI SEMESTER(III BTECH -II SEM)
20EC6T01	**VLSI Design**
CO 1	Understand the insights of the MOS devices and its characteristics
CO 2	Implement the CMOS logic circuits
CO 3	Analyze Scaling and Circuit Concepts of CMOS logic circuits
CO 4	Implement the CMOS combinational logic and sequential circuits
CO 5	Perform implementation techniques
20EC6T02	**Digital Signal Processing**
CO 1	Apply the difference equations concept in the analyzation of Discrete time systems
CO 2	Use the FFT algorithm for solving the DFT of a given signal
CO 3	Design a Digital filter (FIR&IIR) from the given specifications
CO 4	Realize the FIR and IIR structures from the designed digital filter
CO 5	Use the Multi-rate processing concepts in various applications

20EC6T03	**Microwave Engineering**
CO 1	Gain Knowledge of Transmission Lines and Waveguide Structures and How They Are Used as Elements in Impedance Matching and Filter Circuits.
CO 2	Gain Knowledge of microstrip lines and cavity resonators
CO 3	Apply Analysis Methods to Determine Circuit Properties of Passive or Active Microwave Devices
CO 4	Gain Knowledge and Understanding of Microwave Analysis Methods. Distinguish Between M-Type and O-Type Tubes
CO 5	Gain knowledge in Gunn diodes with avalanche effects and Analyse and Measure Various Microwave Parameters Using a Microwave Test Bench
20EC6T04	**Embedded Systems**
CO 1	Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function
CO 2	Understand how to integrate hardware and firmware of an embedded system using real time operating system
CO 3	Understand the Task communication of RTOS
CO 4	The various embedded firmware design approaches on embedded environment
CO 5	Define the unique design problems and challenges of real-time systems
20CS6T07	**Introduction to Machine Learning**
CO 1	Realize the concepts of Analog MOS devices and current mirror circuits
CO 2	Design different configuration of Amplifiers and feedback circuits
CO 3	Analyze the characteristics of frequency response of the amplifier and its noise
CO 4	Analyze the performance of the stability and frequency compensation techniques of Op-Amp Circuits
CO 5	Construct switched capacitor circuits and PLLs
20EC6L10	**Microwave Engineering Lab**
CO 1	understand the characteristics of Reflex Klystron, GUNN Diode
CO 2	measure the attenuation of variable attenuator
CO 3	measure the scattering parameters of Circulator, Directional coupler and Magic Tee
CO 4	understand the characteristics of LED, LASER Diode and calculate the losses in analog optical Link
CO 5	determine numerical aperture and calculate the data rate in digital optical link.
20EC6L11	**VLSI Design Lab**
CO 1	Design and analyse the MOS at device, circuit and layout level using back end CAD tool
CO 2	Design of combinational circuits using CAD tool
CO 3	Design of Sequential combinational circuits using CAD tool
CO 4	Design static RAM Cell using CAD tool
CO 5	Design DAC using CAD tool
20EC6L12	**Digital Signal Processing Lab**

CO 1	Use MATLAB software to process different signals.
CO 2	Design the digital filters for generating desired signals.
CO 3	Simulation of system in Time and Frequency domain.
CO 4	Use Digital signal processing algorithms for implementation of DFT.
CO 5	understand the concept of interpolation and decimation
20EC6S13	**Soft Skills**
CO 1	Make presentations on various technical and non-technical topics
CO 2	Learn various nuances of the interview process like building an effective resume, cracking JAM/GD/HR interviews
CO 3	Enhance understanding of soft skills and life skills
20EC6M14	**Disaster Management**
CO 1	Differentiate the types of disasters, causes and their impact on environment and society
CO 2	Assess vulnerability and various methods of risk reduction measures as well as mitigation
CO 3	Draw the hazard and vulnerability profile of India. Scenarios in the Indian context
CO 4	Analyze the Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment
CO 5	Understand about Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment
20EC6P15	**Community Service Project**
CO 1	Positive impact on students' academic learning
CO 2	Improves students' ability to apply what they have learned in "the real world"
CO 3	Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
CO 4	Improved ability to understand complexity and ambiguity
CO 5	Improved social responsibility and citizenship skills
VII SEMESTER(IV BTECH -I SEM)	
20EC7T01	**CMOS Analog IC Design**
CO 1	Realize the concepts of Analog MOS devices and current mirror circuits
CO 2	Design different configuration of Amplifiers and feedback circuits
CO 3	Analyze the characteristics of frequency response of the amplifier and its noise
CO 4	Analyze the performance of the stability and frequency compensation techniques of Op-Amp Circuits
CO 5	Construct switched capacitor circuits and PLLs
20EC7T04	**Digital Image Processing**
CO 1	Understand digital image fundamentals and various image transform techniques
CO 2	Learn various image enhancement techniques
CO 3	Learn different causes for image degradation and overview of image restoration techniques
CO 4	Learn different techniques employed for image segmentation and understand different morphological image processing techniques

CO 5	Understand the need for compression and evaluate the basic compression algorithms
20EC7T09	**Satellite Communications**
CO 1	Understand the basic concepts, applications, frequencies used and types of satellite communications
CO 2	Understand the various satellite subsystems and its functionality
CO 3	Understand the concepts of satellite link design and calculation of C/N ratio
CO 4	Understand the concepts of multiple access and various types of multiple access techniques in satellite Systems
CO 5	Understand the concepts of satellite navigation, architecture and applications of GPS
20IT7T10	**Internet of Things**
CO 1	Design and Deployment of IoT
CO 2	Design and comparing M2M with IoT
CO 3	Understand Platform design and modeling of IoT
CO 4	Apply IoT in different devices using Python
CO 5	Implement IoT and cloud platforms
20MB7T03	**Total Engineering Quality Management**
CO 1	Understand the fundamentals of quality
CO 2	Understand the role of TQM tools and techniques in elimination of wastages and reduction of defects
CO 3	Develop quality as a passion and habit
CO 4	Facilitate the understanding of Quality Management principles and process
CO 5	Apply the tools and techniques of quality management to manufacturing and services processes
20EC7T16	**Universal Human Values 2 Understanding Harmony**
CO 1	Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society
CO 2	Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body
CO 3	Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society
CO 4	Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature
CO 5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work
20EC7S17	**Internet of Things Applications with Latest Boards**
CO 1	Understand Design, Charecterstics, and technologies in Internet of things
CO 2	Understand Raspberry pi platforms which is widely used in IoT applications

CO 3	Understand Web based services on IoT devices
CO 4	Understand different sensor technologies, for sensing real world entities and identify applications of IoT industry
20EC7I18	**Industrial Internship**
CO 1	Understand the real world problems
CO 2	Aquitaine with industry interaction skills
CO 3	Gain knowledge to solve and address the problem
CO 4	Improve presentation skills and writing skills
CO 5	Involve in industrial needs related work
VIII SEMESTER(IV BTECH -II SEM)	
20EC8P01	**Project work**
CO 1	Identification of real world problems.
CO 2	Analyze real world problems.
CO 3	Identify advanced tools & programming in problem solving.
CO 4	Simulate and implement the design.
CO 5	Technical report writing.

PROGRAMME OUTCOMES (POs)

PO1: Graduates will be able to apply the principles of basic sciences, mathematics, and engineering fundamentals in finding solutions to complex problems.

PO2: Graduates will acquire critical thinking skills, problem solving abilities, and familiarity with the computational procedures essential to the field.

PO3: Graduates will be able to design various types of systems required for technical advancements and societal needs.

PO4: Graduates will be able to use research-based knowledge to conduct experiments and interpret experimental data.

PO5: Graduates gain hands on experience in using latest software and hardware tools for obtaining solutions to engineering problems.

PO6: Graduates will be able to apply their knowledge to tackle societal, health, safety, legal and cultural issues.

PO7: Graduates will possess adequate knowledge required for technological development keeping in view environmental effects and real time problems.

PO8: Graduates will have professional ethics and the culture of practicing the established norms of engineering.

PO9: Graduates will acquire the capability of working productively as individuals, as members or leaders in diverse environment.

PO10: Graduates will be able to articulate their ideas clearly with excellent soft skills and prepare technical reports.

PO11: Graduates will acquire knowledge required for project and finance management.

PO12: Graduates will have ability to engage in lifelong learning to keep abreast of ever-changing technology.

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DEPARTMENT OF COMPUTER SCIENCE ENGINEERING	
COURSE OUTCOMES(MIC20)	
I SEMESTER(I BTECH -I SEM)	
20CS1T01	**LINEAR ALGEBRA & DIFFERENTIAL CALCULUS**
CO 1	Apply the knowledge to solve a system of homogeneous and non-homogeneous linear equations
CO 2	Illustrate the methods of computing Eigen values and Eigen vectors
CO 3	Able to analyze the real life situations, formulate the differential equations and then applying the methods
CO 4	Determine the solutions of linear differential equations
CO 5	Optimize functions of several variables and able to find extreme values of constrained functions
20CS1T02	**APPLIED CHEMISTRY**
CO 1	Importance of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
CO 2	Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
CO 3	Explain the preparation of semiconductors and nanomaterials, engineering applications of nanomaterials, superconductors and liquid crystals.
CO 4	Recall the increase in demand for power and hence alternative sources of power are studied due to depleting sources of fossil fuels. Advanced instrumental techniques are introduced
CO 5	Outline the basics of green chemistry and molecular switches
20CS1T03	**ENGLISH**
CO 1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
CO 2	ask and answer general questions on familiar topics
CO 3	employ suitable strategies to master the art of letter writing and email writing
CO 4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
CO 5	form sentences using proper grammatical structures and correct word forms
20CS1L04	**COMPUTER ENGINEERING WORKSHOP**
CO 1	Identify, assemble and update the components of a computer
CO 2	Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems
CO 3	Make use of tools for converting pdf to word and vice versa
CO 4	Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex

20CS1T05	**PROBLEM SOLVING THROUGH C**
CO 1	Understand the basic concepts of programming
CO 2	Understand and Apply loop construct for a given problem
CO 3	Demonstrate the use pointers
CO 4	Understand the use of functions and develop modular reusable code
CO 5	Understand File I/O operations
20CS1L06	**ENGLISH COMMUNICATION SKILLS LAB**
CO 1	Acquire basic proficiency in English by learning functional aspects of English language
CO 2	Learn the methods of enhancing vocabulary
CO 3	Acquaint himself/herself with nuances of Phonetics
20CS1L07	**APPLIED CHEMISTRY LAB**
CO 1	student is exposed to different methods of chemical analysis abd use of some commonly employed instruments.they thus acquire some expermental skills
20CS1L08	**PROBLEM SOLVING THROUGH C LAB**
CO 1	Demonstrate Knowledge on various concepts of a C language.
CO 2	Able to draw flowcharts and write algorithms.
CO 3	Able design and development of C problem solving skills.
CO 4	Able to design and develop modular programming skills.
CO 5	Able to trace and debug a program
20CS1M09	**ENVIRONMENTAL SCIENCE**
CO 1	The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.
CO 2	The concepts of the ecosystem and its function in the environment.
CO 3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO 4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
CO 5	The environmental legislations of India and Social issues and the possible means Environmental assessment and the stages involved in EIA.
II SEMESTER(I BTECH -II SEM)	
20CS2T01	**TRANSFORM TECHNIQUES**
CO 1	Able to analyze a class of integrals in terms of beta and gamma functions
CO 2	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
CO 3	Analyze the general periodic functions in the form of an infinite convergent sine and cosine series
CO 4	Illustrate the methods to solve the boundary value problems

CO 5	Determine a solution of a discrete system using Z- transforms
20CS2T02	APPLIED PHYSICS
CO 1	Impart knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes
CO 2	Gain knowledge of applications of lasers and optical fibers in various fields .
CO 3	Classify magnetic and dielectric materials and their Engineering applications.
CO 4	Understand basic quantum mechanics and free electron theories.
CO 5	Obtain the concept of concept of holes and electrons in semiconductors.
20CS2T03	DIGITAL LOGIC DESIGN
CO 1	Understand different number systems and their conversions.
CO 2	Analyze the logical operations and Boolean algebra
CO 3	Develop combinational circuits and perform logical operations.
CO 4	Design the sequential logic functions.
CO 5	Know finite state machines and different programmable logic devices.
20CS2T04	DATA STRUCTURES
CO 1	Understand the properties, interfaces, and behaviors of basic abstract data types.
CO 2	Understand and apply linked lists
CO 3	Apply Stacks and Queue data structures.
CO 4	Demonstrate different methods for traversing trees.
CO 5	Demonstrate the application of Graphs
20CS2T05	PYTHON PROGRAMMING
CO 1	Understand the fundamentals of Python programming language.
CO 2	Understand Data Structures
CO 3	Understand the use of functions in Python
CO 4	Understand the Object-Oriented Programming concepts of Python
CO 5	Apply regular expressions for different situations.
20CS2L06	APPLIED PHYSICS LAB
CO 1	The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
20CS2L07	DATA STRUCTUTES LAB
CO 1	Use basic data structures such as arrays and linked list.
CO 2	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
CO 3	Use various searching and sorting algorithms.

20CS2L08	**PYTHON PROGRAMMING LAB**
CO1	Develop fundamental programs in python programming language.
CO2	Develop Python programs for numerical and text-based problems.
CO3	Develop Python programs on object-oriented programming and regular expressions.
CO4	Develop python programs on data structures.
III SEMESTER (II BTECH -I SEM)	
20CS3T01	**NUMERICAL METHODS AND VECTOR CALCULUS**
CO 1	Determine the solution of transcendental equations by different numerical methods
CO 2	Provide the interpolation techniques which analyze the data of an unknown function
CO 3	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries
CO 4	Evaluate areas and volumes using double & triple integrals.
CO 5	Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals.
20CS3T02	**OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
CO 1	Understand the concepts of Object-Oriented Programming and Java programming constructs.
CO 2	Demonstrate the concepts – Strings, Inheritance and Interfaces.
CO 3	Build efficient and error-free codes using exception handling and demonstrate multi-threading.
CO 4	Design GUI applications using Event Handling and Abstract Window Toolkit.
CO 5	Develop real-time applications using Applets and Swings.
20CS3T03	**DATABASE MANAGEMENT SYSTEMS**
CO 1	Understand the concept of database, database models and familiarize with Entity Relationship models.
CO 2	Demonstrate the use of constraints, relational algebra operations.
CO 3	Apply SQL queries to interact with database and understand the basics of NOSQL.
CO 4	Apply normalization in database design to eliminate anomalies.
CO 5	Understand the basic concepts of transaction processing and concurrency control.
20CS3T04	**SOFTWARE ENGINEERING**
CO 1	Understand the software life cycle models.
CO 2	Understand the scrum approach to agile project management.

CO 3	Analyze the software requirements and generate SRS document
CO 4	Understand some of the different models that may be used to design.
CO 5	Understand various software testing approaches and quality control to ensure good quality software.
20CS3T05	**COMPUTER ORGANIZATION**
CO 1	Understand the architecture of a modern computer with its various processing units.
CO 2	Understand RTL, micro-operations, instruction cycle.
CO 3	Understand the features of hardwired and micro programmed control units.
CO 4	Analyze the memory hierarchy system and performance improvement by cache memory.
CO5	Analyze the communication methods of I/O devices and standard I/O interfaces.
20CS3L06	**OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**
CO 1	Implement java applications using OOP principles and proper program structuring.
CO 2	Develop java programs using packages, inheritance and interfaces.
CO 3	Implement error and exception handling techniques
CO 4	Design event driven GUI and real-time web related applications.
20CS3L07	**DATABASE MANAGEMENT SYSTEMS LAB**
CO 1	Design database schema for a given application and apply normalization
CO 2	Acquire skills in using SQL commands for data definition and data manipulation.
CO 3	Develop solutions for database applications using procedures, cursors and triggers
CO 4	Develop solutions using PL/SQL procedures.
20CS3L08	**SOFTWARE ENGINEERING LAB**
CO 1	Prepare SRS document, design document, test cases and software configuration management and risk management related document.
CO 2	Develop function oriented and object-oriented software design using tools like rational rose.
CO 3	Design and develop Test Cases for a system
CO 4	Track the progress of a project using various tools.
20CS3S09	**Python NumPy and Pandas (Skill Oriented Course)**
CO 1	Understand the workings of various numerical techniques, different descriptive measures of Statistics, correlation and regression to solve the engineering problems.
CO 2	Understand how to apply some linear algebra operations to n-dimensional arrays.
CO 3	Understand how NumPy perform common data wrangling and computational tasks in Python.

CO 4	Use Pandas to create and manipulate data structures like Series and DataFrames.
CO 5	Work with arrays, queries, and dataframes
20CS3M10	**CONSTITUTION OF INDIA**
CO 1	Understand historical background of the constitution making, importance for building a democratic India, features and principles of Indian Constitution.
CO 2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO 3	Understand the roles and powers of State Government and its Administration and value of the fundamental rights and duties for becoming good citizen of India.
CO 4	Understand and analyze the decentralization of power between Union, State and Local self-Government and local administration.
CO 5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission, UPSC, Welfare commissions for sustaining democracy.
IV SEMESTER (II BTECH -II SEM)	
20CS4T01	**PROBABILITY AND STATISTICS**
CO 1	Understand random variables and discrete probability distributions
CO 2	Determine probabilities based on practical situations using the normal distributions
CO 3	Apply different distributions to compute confidence intervals
CO 4	Test the hypothesis concerning means and proportions
CO 5	Understand the concept of least square estimation linear regression
20CS4T02	**DISCRETE MATHEMATICAL STRUCTURES**
CO 1	Apply mathematical logic to design new programming languages
CO 2	Illustrate the properties of sets and functions to design a modeling software system
CO 3	Explain a structure of an algebra which is useful to understand the theory of sequential machines, formal languages and coding theory.
CO 4	Apply the techniques of recursion for representing the data in the analysis of algorithms
CO 5	Provide the knowledge of graphs such as trees which is useful in maintaining files and directories by Operating Systems.
20CS4T03	**OPERATING SYSTEMS**
CO 1	Understand the importance, functions and structures of operating systems.
CO 2	Analyze and compare the performance of various CPU scheduling algorithms.
CO 3	Develop software or hardware-based solutions for process synchronization.
CO 4	Apply deadlock handling techniques to avoid deadlocks.
CO 5	Compare various Memory Management Schemes and analyze various disk Scheduling Algorithms.

20CS4T04	**ADVANCED DATA STRUCTURES**
CO 1	Illustrate several sorting algorithms.
CO 2	Construct Priority queues such as min heap and max heap for the given data.
CO 3	Apply various operations on AVL and Red Black trees
CO 4	Build Multi-Way Search Trees and perform various operations
CO 5	Demonstrate various operations of Digital Search Structures and Multi-Way Trees.
20CS4T05	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
CO 1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product
CO 2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
CO 3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units
CO 4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
CO 5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making
20CS4L06	**R PROGRAMMING LAB**
CO 1	Understand the use of operators in R
CO 2	Use Data Structures to implement programs in R
CO 3	Implement Mathematical functions in R
CO 4	Understand reading and writing files
CO 5	Analyze data from various sources
20CS4L07	**OPERATING SYSTEMS LAB**
CO 1	Implement CPU and disk scheduling algorithms.
CO 2	Demonstrate memory management techniques.
CO 3	Demonstrate algorithms for Deadlock Detection and prevention.
CO 4	Develop shell scripts in order to perform shell programming.
20CS4L08	**ADVANCED DATA STRUCTURES LAB**
CO 1	Develop programs for sorting.
CO 2	Develop programs for implementing trees and their traversal operations.
CO 3	Implement graph traversal algorithm
20CS4S09	**BASIC WEB PROGRAMMING (Skill Oriented Course)**
CO1	Understand and use various HTML Tags and apply CSS
CO2	Develop websites that include static pages
CO3	Design Front end for Web Applications

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V SEMESTER(III BTECH -I SEM)	
20CS5T01	**FORMAL LANGUAGES & AUTOMATA THEORY**
CO 1	Understand the basic concepts of Automata Theory
CO 2	Infer the equivalence of languages described by finite automata and regular expressions.
CO 3	Infer the equivalence of languages described by finite automata and regular expressions.
CO 4	Apply Pushdown Automata for problem solving.
CO 5	Understand basic properties and compute using Turing Machines.
20CS5T02	**DATA WAREHOUSING & DATA MINING**
CO 1	Understand the fundamentals concepts of data warehousing
CO 2	Understand KDD Process and data preprocessing.
CO 3	Discover interesting patterns from large volumes of Data using supervised (classification) learning techniques
CO 4	Characterize the kinds of patterns that can be discovered by Association Rule Mining
CO 5	Demonstrate unsupervised (clustering) learning techniques
20CS5T03	**DESIGN AND ANALYSIS OF ALGORITHMS**
CO 1	Understand the performance Analysis of an Algorithm using Space and Time complexities.
CO 2	Understand and Apply the Divide and Conquer strategy.
CO 3	Synthesize Efficient Algorithms for common engineering problems using Greedy Method
CO 4	Apply and analyze the complexity of dynamic programming strategy.
CO 5	Ability to solve complex problems using Back Tracking and Branch & Bound.
20CS5T06	**Artificial Intelligence**
CO 1	To Understand the history of Artificial Intelligence and its foundations.
CO 2	Apply various Artificial Intelligence Techniques for problem solving.
CO 3	Formalization of knowledge using the framework of predicate logic.
CO 4	Ability to apply knowledge representation and reasoning to real world problems.
CO 5	Derive conclusions from uncertain knowledge and quantify the uncertainty in the conclusions obtained.
20HS5T02	**Operations Research**
CO 1	Understand the methodology of Operations Research& concepts of linear programming

CO 2	Formulate the solutions to transportation problems
CO 3	Explain the solutions for various sequencing problems
CO 4	Illustrate the solutions to different replacement policies
CO 5	Apply game theory to solve real world problems
18CS5T09	**Optimization Techniques**
CO 1	Understand the methodology of Operations Research & concepts of linear programming
CO 2	Formulate the solutions to transportation problems
CO 3	Explain the solutions for various sequencing problems
CO 4	Apply game theory to solve real world problems
CO5	Illustrate the solutions to different replacement policies
20CS5L10	**Data Warehousing and Mining Lab Through Python**
CO 1	Learn about WEKA tool and its applications
CO 2	Extract knowledge using Data Mining techniques.
CO 3	Adapt to new Data Mining tools.
CO 4	Explore recent trends in Data Mining such as Web mining, spatial-temporal mining.
20CS5L11	**Design and Analysis of Algorithms Lab**
CO 1	Students will be able to sort the given numbers using various sorting algorithms.
CO 2	Students will be able to write programs for the problems using Divide and Conquer.
CO 3	Students will be able to write programs for the problems using Greedy Method.
20CS5S12	**Mobile Application Development**
CO 1	Install and configure Android application development tools.
CO 2	Design and develop user Interfaces for the Android platform.
CO 3	Save state information across important operating system events
20CS5M13	**Disaster Management**
CO 1	Differentiate the types of disasters, causes and their impact on environment and society
CO 2	Assess vulnerability and various methods of risk reduction measures as well as mitigation.
CO 3	Draw the hazard and vulnerability profile of India, Scenarios in the Indian context

CO 4	Analyze the Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.
CO 5	Understand about Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment
VI SEMESTER (III BTECH -II SEM)	
20CS6T01	**Machine Learning**
CO 1	Choose the learning techniques and investigate concept learning
CO 2	Identify the characteristics of decision tree and solve problems associated with it.
CO 3	Apply effectively neural networks for appropriate applications.
CO 4	Apply Bayesian techniques and derive effectively learning rules.
CO 5	Evaluate hypothesis and investigate instant based learning and reinforced learning
20CS6T02	**Computer Networks**
CO 1	Independently enumerate the layers of the OSI model and TCP/IP
CO 2	Identify the different types of network topologies and protocols.
CO 3	Compare and contrast methods to identify Errors and correct them.
CO 4	Differentiate between various network routing algorithms.
CO 5	Understand WWW and HTTP Architectures.
20CS6T03	**Big Data Analytics**
CO 1	Applying Java concepts for developing Map Reduce Programs.
CO 2	List the components of Hadoop and its eco-system.
CO 3	Working with Building Blocks of HDFS and Big Data.
CO 4	Building various Map Reduce Programs using Java.
CO 5	To introduce programming tools like PIG and HIVE in Hadoop eco-system.
20CS6T04	**Software Testing Methodologies**
CO 1	Have an ability to apply software testing knowledge and engineering methods.
CO 2	Ability to identify the needs of software test automation, and define a test tool to support test automation.
CO 3	Understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
CO 4	Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.

CO 5	Apply techniques and skills to use modern software testing tools to support software testing projects.
20HS6T02	**Quantitative Aptitude & Reasoning**
CO 1	Understand the basics concepts of Numerical Ability & Reasoning Skills
CO 2	Use the logical thinking and analytical abilities to solve Quantitative aptitude questions from companies specific and other competitive tests
CO 3	Solve questions related to time and distance, time and work ,percentages, simple interest and compound interest etc.
CO 4	Solve questions related to coding and decoding, number series, directions, puzzles ,etc.
CO 5	Understand and solve puzzle related questions for competitive and campus placements exams.
20CS6L10	**Machine Learning Lab**
CO 1	Understand the implementation procedures for the machine learning algorithms
CO 2	Design Java/Python programs for various Learning algorithms.
CO 3	Apply appropriate data sets to the Machine Learning algorithms
20CS6L11	**Computer Networks Lab**
CO 1	Practical orientation of networking concepts
CO 2	To teach students various forms of IPC through UNIX and socket Programming
20CS6L12	**Big Data Analytics Lab**
CO 1	Developing different Data Models in Big Data.
CO 2	Building HDFS.
CO 3	Building various MapReduce Programs.
CO 4	Programming using PIG.
20CS6S13	**SOFT SKILLS**
CO 1	The student will acquaint himself with various nuances of Soft Skills and Personality Development besides aspects related to Campus Recruitment Process.
20CS6M14	**Essence of Indian Traditional Knowledge**
CO 1	Understand the concept of Traditional knowledge and its importance
CO 2	Know the need and importance of protecting traditional knowledge
CO 3	Know the various enactments related to the protection of traditional knowledge.

CO 4	Understand the concepts of Intellectual property to protect the traditional knowledge
CO 5	Evaluate strategies to increase the protection of TK.
	VII SEMESTER(IV BTECH -I SEM)
20CS7T02	**CLOUD COMPUTING**
CO 1	Describe the principles of parallel and distributed computing and evaluation of cloud computing from existing technologies
CO 2	Illustrate Virtualization for Data-Center Automation.
CO 3	Explain and characterize different cloud deployment models and service models
CO 4	Program data intensive parallel applications in cloud.
CO 5	Understand commercial cloud computing technologies such as AWS, AZURE and App Engine
20CS7T03	**CRYPTOGRAPHY & NETWORK SECURITY**
CO 1	Understand the need of information security andits importance.
CO 2	Apply symmetric security mechanisms for confidentiality
CO 3	Apply asymmetric security mechanisms for confidentiality
CO 4	Apply digital signature techniques for authentication
CO 5	Understand network security designs using available secure solutions (such asPGP, SSL, IPSec)
20CS7T04	**Human Computer Interaction**
CO 1	Understand typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
CO 2	Understand the interactive design process and universal design principles to designing HCI systems.
CO 3	Understand the importance of Natural Languages in computing interactions.
CO 4	Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI Systems.
CO 5	Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.
20CS7T07	**Software Architecture and Design Patterns**
CO 1	Understand Software Architecture
CO 2	Analyze the Software Architectures.
CO 3	Apply Adaptive Resonance Theory
CO 4	Classify Design Patterns.
CO 5	Discuss usage of Architectural Structures.

20MB7T02	**DATA ANALYTICS**
CO 1	Understand big data and data analytics life cycle.
CO 2	Explore various supervised learning methods.
CO 3	Explore various unsupervised learning methods
CO 4	Understand and apply ARIMA model on time series data
CO 5	Learn various technology and tools in big data analytics
20CS5L16	**DATA ANALYSIS AND VISUALIZATION WITH PYTHON**
CO 1	Describes benefits of data science, facets of data
CO 2	Illustrates data science process and describes the need of machine learning
CO 3	Describes the problems of handling large data
CO 4	Introduces distributed data storage and processing frame works
CO 5	Describes about graph databases and text analytics
18CS8L22	**MAJOR PROJECT**
CO 1	Undertake problem identification, formulation and solution.
CO 2	Demonstrate a sound technical knowledge of their selected project topic.
CO 3	Design engineering solutions to complex problems utilising a systems approach.
CO 4	Conduct an engineering project.

PROGRAMME OUTCOMES (POs)

PO1: An Ability to apply knowledge of basic sciences and mathematical foundation to engineering problems.

PO2: An ability to analyze and solve the problems effectively with appropriate logical and analytical skills.

PO3: An ability to design, develop and test software systems by applying algorithmic principles and programming process.

PO4: An ability to interpret the data and amalgamate the information to provide solutions to real world problems.

PO5: An ability to acquire and apply the modern techniques and tools to complex engineering problems.

PO6: An ability to develop computing solutions for public safety and legal issues to serve the needs of the society.

PO7: An ability to analyze the local and global impact of computing discipline on environmental issues and sustainable development

PO8: An ability to apply the ethical principles in engineering practice.

PO9: An ability to work effectively on projects either individually or in teams.

PO10: An ability to communicate effectively in written and oral forms on technical as well as general aspects.

PO11: An ability to apply engineering and management principles for effective development of projects.

PO12: An ability to recognize the need for lifelong learning in the world of ever-changing technology.

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DEPARTMENT OF INFORMATION TECHNOLOGY

MIC 20 REGULATION

I B.TECH I SEMESTER	
20IT1T01	**Linear Algebra and Differential Equations**
CO1	Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations
CO2	Illustrate the methods of computing eigen values and eigen vectors
CO3	Able to analyze the real life situations, formulate the differential equations and then applying the methods
CO4	Determine the solutions of linear differential equations
CO5	Optimize functions of several variables and able to find extreme values of constrained functions
20IT1T02	**Applied Chemistry**
CO 1	Analyze the different types of composite plastic materials and interpret the mechanism ofconduction in conducting polymers.
CO 2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning newengineering products and categorize the reasons for corrosion and study methods to control corrosion.
CO 3	Synthesize nanomaterials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.
CO 4	Design models for energy by different natural sources. Analyze the principles of different analytical instruments and their applications.
CO 5	Obtain the knowledge of green chemistry and molecular machines
20IT1T03	**English**
CO1	understand social or transactional dialogues spoken by native speakers of English andidentifythecontext,topic,andpiecesofspecificinformation
CO2	ask and answer general questions on familiar topics
CO3	employ suitable strategies to master the art of letter writing and email writing
CO4	recognize paragraph structure and be able to match beginnings / endings / headings with paragraphs
CO5	form sentences using proper grammatical structures and correct word forms
20IT1L04	**Computer Engineering Workshop**

CO1	Identify, assemble and update the components of a computer
CO2	Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems
CO3	Make use of tools for converting pdf to word and vice versa
CO4	Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex
20IT1T05	**Problem Solving throughC**
CO1	Understand the basic concepts of programming
CO2	Understand and Apply loop construct for a given problem
CO3	Demonstrate the use pointers
CO4	Understand the use of functions and develop modular reusable code
CO5	Understand File I/O operations
20IT1L06	**EnglishCommunicationSkillsLab**
CO1	Acquire basic proficiency in English by learning functional aspects of English language
CO2	Learn the methods of enhancing vocabulary
CO3	Acquaint himself/herself with nuances of Phonetics
20IT1L07	**AppliedChemistryLab**
CO1	The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
20IT1L08	**Problem Solving through CLab**
CO1	Demonstrate Knowledge on various concepts of a C language.
CO2	Able to draw flowcharts and write algorithms.
CO3	Able design and development of C problem solving skills.
CO4	Able to design and develop modular programming skills.
CO5	Able to trace and debug a program
20IT1M09	**EnvironmentalScience**
CO1	The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.

CO2	The concepts of the ecosystem and its function in the environment.
CO3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
CO5	The environmental legislations of India and Social issues and the possible means
CO6	Environmental assessment and the stages involved in EIA.
	I B.TECH II SEMESTER
20IT2T01	**Transform Techniques**
CO1	Able to analyze a class of integrals in terms of beta and gamma functions
CO2	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
CO3	Analyze the general periodic functions in the form of an infinite convergent sine and cosine series
CO4	Illustrate the methods to solve the boundary value problems
CO5	Determine a solution of a discrete system using Z- transforms
20IT2T02	**Applied Physics**
CO1	Impart knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes
CO2	Gain knowledge of applications of lasers and optical fibers in various fields .
CO3	Classify magnetic and dielectric materials and their Engineering applications.
CO4	Understand basic quantum mechanics and free electron theories.
CO5	Obtain the concept of concept of holes and electrons in semiconductors.
20IT2T03	**Digital Logic Design**
CO1	Understand different number systems and their conversions.
CO2	Analyze the logical operations and Boolean algebra

CO3	Develop combinational circuits and perform logical operations.
CO4	Design the sequential logic functions.
CO5	Know finite state machines and different programmable logic devices.
20IT2T04	**Data Structures**
CO1	Understand the properties, interfaces, and behaviors of basic abstract data types
CO2	Understand and apply linked lists
CO3	Apply Stacks and Queue data structures.
CO4	Demonstrate different methods for traversing trees.
CO5	Demonstrate the application of Graphs
20IT2T05	**PYTHON PROGRAMMING**
CO1	Understand the fundamentals of Python programming language.
CO2	Understand Data Structures
CO3	Understand the use of functions in Python
CO4	Understand the Object-Oriented Programming concepts of Python
CO5	Apply regular expressions for different situations.
20IT2L06	**APPLIED PHYSICS LAB**
CO1	The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
CO2	Implement the basic principles of Mechanics to measure different physical parameters.
CO3	Enhance the knowledge of Usage of electronic devices in various applications
20IT2L07	**DATA STRUCTURES LAB**

CO1	Use basic data structures such as arrays and linked list.
CO2	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
CO3	Use various searching and sorting algorithms.
20IT2L08	**PYTHON PROGRAMMING LAB**
CO1	Develop fundamental programs in python programming language.
CO2	Develop Python programs for numerical and text-based problems.
CO3	Develop Python programs on object-oriented programming and regular expressions.
CO4	Develop python programs on data structures.
II B.TECH III SEMESTER	
20IT3T01	**NUMERICAL METHODS AND VECTOR CALCULUS**
CO1	Determine the solution of transcendental equations by different numerical methods
CO2	Providetheinterpolationtechniqueswhichanalyzethedataofanunknownfunction Provide the interpolation techniques which analyze the data of an unknown function
CO3	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries
CO4	Evaluate areas and volumes using double & triple integrals.
CO5	Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals.
20IT3T02	**OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
CO1	Understand the concepts of Object-Oriented Programming and Java programming constructs.
CO2	Demonstrate the concepts – Strings, Inheritance and Interfaces.

CO3	Build efficient and error-free codes using exception handling and demonstrate multi-threading.
CO4	Design GUI applications using Event Handling and Abstract Window Toolkit
CO5	Develop real-time applications using Applets and Swings.
20IT3T03	**DATABASE MANAGEMENT SYSTEMS**
CO1	Understand the concept of database, database models and familiarize with Entity Relationship models.
CO2	Demonstrate the use of constraints, relational algebra operations.
CO3	Apply SQL queries to interact with database and understand the basics of NOSQL.
CO4	Apply normalization in database design to eliminate anomalies.
CO5	Understand the basic concepts of transaction processing and concurrency control.
20IT3T04	**SOFTWARE ENGINEERING**
CO1	Understand the software life cycle models.
CO2	Understand the scrum approach to agile project management.
CO3	Analyze the software requirements and generate SRS document.
CO4	Understand some of the different models that may be used to design.
CO5	Understand various software testing approaches and quality control to ensure good quality software.
20IT3T05	**Computer Organization**
CO1	Understand the architecture of a modern computer with its various processing units.
CO2	Understand RTL, micro-operations, instruction cycle.
CO3	Understand the features of hardwired and micro programmed control units.

CO4	Analyze the memory hierarchy system and performance improvement by cache memory.
CO5	Analyze the communication methods of I/O devices and standard I/O interfaces.
20IT3L06	**OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**
CO1	Implement java applications using OOP principles and proper program structuring.
CO2	Develop java programs using packages, inheritance and interfaces.
CO3	Implement error and exception handling techniques.
CO4	Design event driven GUI and real-time web related applications.
20IT3L07	**DATABASE MANAGEMENT SYSTEMS LAB**
CO1	Design database schema for a given application and apply normalization
CO2	Acquire skills in using SQL commands for data definition and data manipulation.
CO3	Develop solutions for database applications using procedures, cursors and triggers
CO4	Develop solutions using PL/SQL procedures.
20IT3L08	**Software Engineering Lab**
CO1	Prepare SRS document, design document, test cases and software configuration management and risk management related document.
CO2	Develop function oriented and object-oriented software design using tools like rational rose.
CO3	Design and develop Test Cases for a system
CO4	Track the progress of a project using various tools.
20IT3S09	**Basic Web Programming**

CO1	Understand and use various HTML Tags and apply CSS
CO2	Develop websites that include static pages
CO3	Design Front end for Web Applications
20IT3M10	**CONSTITUTION OF INDIA**
CO1	Understand historical background of the constitution making, importance for building a democratic India, features and principles of Indian Constitution.
CO2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO3	Understand the roles and powers of State Government and its Administration and value of the fundamental rights and duties for becoming good citizen of India.
CO4	Understand and analyze the decentralization of power between Union, State and Local self-Government and local administration.
CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission, UPSC, Welfare commissions for sustaining democracy..
II B.TECH IV SEMESTER	
20IT4T01	**Probability and Statistics**
CO1	Understand random variables and discrete probability distributions
CO2	Determine probabilities based on practical situations using the normal distributions
CO3	Apply different distributions to compute confidence intervals
CO4	Test the hypothesis concerning means and proportions
CO5	Understand the concept of least square estimation linear regression
20IT4T02	**Discrete Mathematical Structures**

CO1	Apply mathematical logic to design new programming languages
CO2	Illustrate the properties of sets and functions to design a modeling software system
CO3	Explain a structure of an algebra which is useful to understand the theory of sequential machines, formal languages and coding theory.
CO4	Apply the techniques of recursion for representing the data in the analysis of algorithms
CO5	Provide the knowledge of graphs such as trees which is useful in maintaining files and directories by Operating Systems.
20IT4T03	**Operating Systems**
CO1	Understand the importance, functions and structures of operating systems.
CO2	Analyze and compare the performance of various CPU scheduling algorithms
CO3	Develop software or hardware-based solutions for process synchronization.
CO4	Apply deadlock handling techniques to avoid deadlocks.
CO5	Compare various Memory Management Schemes and analyze various disk Scheduling Algorithms.
20IT4T04	**Advanced Data Structures**
CO1	Illustrate several sorting algorithms.
CO2	Construct Priority queues such as min heap and max heap for the given data.
CO3	Apply various operations on AVL and Red Black trees
CO4	Build Multi-Way Search Trees and perform various operations.
CO5	Demonstrate various operations of Digital Search Structures and Multi-Way Trees.
20IT4T05	**Managerial Economics and Financial Analysis**

CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product
CO2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
CO3	The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units
CO4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
CO5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making
20IT4L06	**R Programming Lab**
CO1	Understand the use of operators in R
CO2	Use Data Structures to implement programs in R
CO3	Implement Mathematical functions in R
CO4	Understand reading and writing files
CO5	Analyze data from various sources
20IT4L07	**Operating Systems Lab**
CO1	Implement CPU and disk scheduling algorithms.
CO2	Demonstrate memory management techniques.
CO3	Demonstrate algorithms for Deadlock Detection and prevention.
CO4	Develop shell scripts in order to perform shell programming.
20IT4L0	**Advanced Data Structures Lab**

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CO1	Develop programs for sorting.
CO2	Develop programs for implementing trees and their traversal operations.
CO3	Implement graph traversal algorithm.
20IT4S09	**Mobile Application Development**
CO1	Identify various concepts of mobile programming that make it unique from programming for other platforms.
CO2	Critique mobile applications on their design pros and cons
CO3	Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces
CO4	Program mobile applications for the Android operating system that use basic and advanced phone features and
CO5	Deploy applications to the Android marketplace for distribution.
III B.TECH V SEMESTER	
20IT5T01	**Formal Languages & Automata Theory**
CO1	Understand the basic concepts of Automata Theory
CO2	Infer the equivalence of languages described by finite automata and regular expressions
CO3	Devise regular, context free grammars while recognizing the strings and tokens and able to Normalize grammars.
CO4	Apply Pushdown Automata for problem solving.
CO5	Understand basic properties and compute using Turing Machines.

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20IT5T02	**Data Warehousing & Data Mining**
CO1	Understand the fundamentals concepts of data warehousing
CO2	Understand KDD Process and data preprocessing.
CO3	Discover interesting patterns from large volumes of Data using supervised (classification) learning techniques
CO4	Characterize the kinds of patterns that can be discovered by Association Rule Mining
CO5	Demonstrate unsupervised (clustering) learning techniques
20IT5T03	**Computer Networks**
CO1	Independently enumerate the layers of the OSI model and TCP/IP.
CO2	Identify the different types of network topologies and protocols.
CO3	Compare and contrast methods to identify Errors and correct them
CO4	Differentiate between various network routing algorithms.
CO5	Understand WWW and HTTP Architectures.
20IT5T05	**E-Commerce**
CO1	Identify, interpret and analyze stake holder needs
CO2	Identify and apply relevant problem solving methodologies.
CO3	Design components, systems and/or processes to meet required specifications.
CO4	Design components, systems and/or processes to meet required specifications.
CO5	Demonstrate research skills.
20HS5T02	**Operations Research**
CO1	Understand the methodology of Operations Research & concepts of linear

	programming
CO2	Formulate the solutions to transportation problems
CO3	Explain the solutions for various sequencing problems
CO4	Illustrate the solutions to different replacement policies
CO5	Apply game theory to solve real world problems
20IT5L09	**Computer Networks Lab**
CO1	Practical orientation of networking concepts.
CO2	To teach students various forms of IPC through UNIX and socket Programming.
20IT5L10	**Data Warehousing and Mining Lab Through Python**
CO1	Understand Data Mining concepts and knowledge discovery process
CO2	Explore on data insights and preprocessing techniques
CO3	Extract association rules on frequent items in transaction data
CO4	Build and analyze the classification model using various algorithms
CO5	Perform clustering using partition algorithms
20IT5S11	**Testing Tools**
CO1	Completely got an idea about testing tools.
CO2	Use the tools and their importance of testing tools.
20IT5M12	**Disaster Management**
CO1	Differentiate the types of disasters, causes and their impact on environment and society
CO2	Assess vulnerability and various methods of risk reduction measures as well as mitigation.

CO3	Draw the hazard and vulnerability profile of India, Scenarios in the Indian context
CO4	Analyze the Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.
CO5	Understand about Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment
20IT5I13	**Internship**
III B.TECH VI SEMESTER	
20IT6T01	**Machine Learning**
CO1	Choose the learning techniques and investigate concept learning
CO2	Identify the characteristics of decision tree and solve problems associated with it
CO3	Apply effectively neural networks for appropriate applications.
CO4	Apply Bayesian techniques and derive effectively learning rules.
CO5	Evaluate hypothesis and investigate instant based learning and reinforced learning
20IT6T02	**Cloud Computing**
CO1	Describe the principles of parallel and distributed computing and evaluation of cloud computing from existing technologies
CO2	Illustrate Virtualization for Data-Center Automation.
CO3	Explain and characterize different cloud deployment models and service models
CO4	Program data intensive parallel applications in cloud.
CO5	Understand commercial cloud computing technologies such as AWS, AZURE and AppEngine
20IT6T03	**Big Data Analytics**
CO1	Applying Java concepts for developing MapReduce Programs.

CO2	List the components of Hadoop and its eco-system.
CO3	Working with Building Blocks of HDFS and Big Data.
CO4	Building various MapReduce Programs using Java
CO5	To introduce Programming tools like PIG and HIVE in Hadoop eco-system.
20IT6T05	**Compiler Design**
CO1	Acquire knowledge in different phases and passes of Compiler.
CO2	Demonstrate knowledge about scanning of tokens and perform the syntax analysis by using Top-down parsing techniques.
CO3	Perform the syntax analysis by using Bottom Up parsing techniques for more complex grammars.
CO4	Compare different memory management techniques in runtime environment.
CO5	Generate effective code by applying code optimization techniques.
20HS6T02	**Quantitative Aptitude & Reasoning**
CO1	**Understand the basics concepts of Numerical Abilites and Reasoning skills.**
CO2	Use the logical thinking and Analytical Abilites to solve Quantative Aptitude questions from Companies Specific and other Competitve tests.
CO3	Solve questions related to Time and Distance, Time and Work, Percentages, Simple interest and Compound interest etc.,
CO4	Solve questions related to Coding and Decoding, Number series, Directions. Puzzles. etc.
CO5	Understand and Solve puzzle related questions for Competive and Campus Placement exams.
20IT6L09	**Machine Learning Lab**
CO1	Understand the implementation procedures for the machine learning algorithms
CO2	Design Java/Python programs for various Learning algorithms.

CO3	Apply appropriate data sets to the Machine Learning algorithms
CO4	Identify and apply Machine Learning algorithms to solve real world problems
20IT6L10	**Cloud Computing Lab**
20IT6L11	**Hadoop Lab**
CO1	Developing different Data Models in Big Data.
CO2	Building HDFS
CO3	Building various MapReduce Programs.
CO4	Programming using PIG.
CO5	Working with Hive.
20IT6S12	**Soft Skills**
CO1	The student will acquaint himself with various nuances of Soft Skills and Personality Development besides aspects related to Campus Recruitment Process.
20IT6M13	**ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**
CO1	Understand the significance of Indian Traditional Knowledge
CO2	Classify the Indian Traditional Knowledge
CO3	Compare Modern Science with Indian Traditional Knowledge system.
CO4	Analyze the role of Government in protecting the Traditional Knowledge
CO5	Understand the impact of Philosophical tradition on Indian Knowledge System.
20IT6P14	**Community Service Project**
IV B.TECH VII SEMESTER	
20IT7T03	**Software Project Management**
CO1	Apply the process to be followed in the software development life-cycle models
CO2	Apply the concepts of project management & planning.

CO3	Implement the project plans through managing people, communications and change
CO4	Conduct activities necessary to successfully complete and close the Software projects
CO5	Implement communication, modeling, and construction & deployment practices in software development.
20IT7T05	**Information Security**
CO1	Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues
CO2	Ability to identify information system requirements for both of them such as client and server.
CO3	Ability to understand the current legal issues towards information security
20IT7T09	**Internet of Things**
CO1	Design and Deployment of IoT.
CO2	Design and comparing M2M with IoT
CO3	Understand Platform design and modeling of IoT
CO4	Apply IoT in different devices using Python
CO5	Implement IoT and cloud platforms.
20MB7T01	**Digital Media management**
CO1	Understand the principles and functions of management, review the history of digital marketing to give some perspective to your digital strategic plan.
CO2	Describe online market presence , segmentation and the marketing and their implications for digital marketing.
CO3	Discuss the opportunities and risks of integrated digital marketing, outline an approach to developing a digital marketing plan.
CO4	Examine how loyalty programmes are linked to successful customer relationship marketing, appraise the careful planning required to harness.
CO5	Select the options to support customer lifecycle ,communications with an integrated multi-channel database.
20MB7T03	**Total Engineering Quality Management**

CO1	To understand the fundamentals of quality
CO2	To understand the role of TQM tools and techniques in elimination of wastages and reduction of defects
CO3	To develop quality as a passion and habit
CO4	To Facilitate the understanding of Quality Management principles and process.
CO5	The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.
20IT7T14	**UNIVERSAL HUMAN VALUES 2 Understanding Harmony**
CO1	Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society
CO2	Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body
CO3	Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society
CO4	Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.
CO5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.
20IT7S15	**DATA VISUALIZATION USING TABLEAU**
CO1	To design effective dashboard for decision making at various levels.
CO2	To visualize data using charts, maps, tables, and other visual representations of data.
20IT7I16	**Industrial Internship**

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IV B.TECH VIII SEMESTER	
20IT8P01	**Project**

PROGRAM OUTCOMES (POs)

PO1: An Ability to apply knowledge of basic sciences and mathematical foundation to engineering problems. (Engineering Knowledge)

PO2: An ability to analyze and solve the problems effectively with appropriate logical and analytical skills. (Problem Analysis)

PO3: An ability to design, develop and test software systems by applying algorithmic principles and programming prowess. (Design/development of solutions)

PO4: An ability to interpret the data and amalgamate the information to provide solutions to real world problems. (Investigations)

PO5: An ability to acquire and apply the modern techniques and tools to complex engineering problems. (Modern Tools)

PO6: An ability to develop computing solutions for public safety and legal issues to serve the needs of the society. (Engineer and Society)

PO7: An ability to analyze the local and global impact of computing discipline on environmental issues and sustainable development. (Sustainability)

PO8: An ability to apply the ethical principles in engineering practice. (Ethics)

PO9: An ability to work effectively on projects either individually or in teams. (Team Work)

PO10: An ability to communicate effectively in written and oral forms on technical as well as general aspects. (Communication)

PO11: An ability to apply engineering and management principles for effective development of projects. (Project Management)

PO12: An ability to recognize the need for lifelong learning in the world of ever changing technology. (Lifelong learning)

DEPARTMENT OF ARTIFICIAL INTELLIGENCE	
COURESE OUTCOMES MIC - 20	
AIDS I SEMESTER (I BTECH I SEM)	
20AD1T01	**LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS**
CO 1	Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations
CO 2	Illustrate the methods of computing eigen values and eigen vectors
CO 3	Able to analyze the real life situations, formulate the differential equations and then applying the methods
CO 4	Determine the solutions of linear differential equations
CO 5	Optimize functions of several variables and able to find extreme values of constrained functions
20AD1T02	**APPLIED CHEMISTRY**
CO 1	Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers
CO 2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.
CO 3	Synthesize nano materials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.
CO 4	Design models for energy by different natural sources. Analyze the principles of different analytical instruments and their applications.
CO 5	Obtain the knowledge of green chemistry and molecular machines
20AD1T03	**ENGLISH**
CO 1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information.
CO 2	ask and answer general questions on familiar topics
CO 3	employ suitable strategies to master the art of letter writing and email writing
CO 4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
CO 5	form sentences using proper grammatical structures and correct word forms
20AD1L04	**COMPUTER ENGIENERING WORKSHOP**
CO 1	Identify, assemble and update the components of a computer
CO 2	Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems

CO 3	Make use of tools for converting pdf to word and vice versa
CO 4	Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex
20AD1T05	PROBLEM SOLVING THROUGH C
CO 1	Understand the basic concepts of programming
CO 2	Understand and Apply loop construct for a given problem
CO 3	Demonstrate the use pointers
CO 4	Understand the use of functions and develop modular reusable code
CO 5	Understand File I/O operations
20AD1L06	ENGLISH COMMUNICATION SKILLS LAB
CO 1	Acquire basic proficiency in English by learning functional aspects of English language
CO 2	Learn the methods of enhancing vocabulary
CO 3	Acquaint himself/herself with nuances of Phonetics
20AD1L07	APPLIED CHEMISTRY LAB
CO 1	The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
20AD1L08	P ROBLEM SOLVING THROUGH C LAB
CO 1	Demonstrate Knowledge on various concepts of a C language.
CO 2	Able to draw flowcharts and write algorithms.
CO 3	Able design and development of C problem solving skills.
CO 4	Able to design and develop modular programming skills.
CO 5	Able to trace and debug a program
20AD1M09	ENVIRONMENTAL SCIENCE

AIDS II SEMESTER (I BTECH II SEM)

20AD2T01	TRANSFORM TECHNIQUES
CO 1	Able to analyze a class of integrals in terms of beta and gamma functions
CO 2	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
CO 3	Analyze the general periodic functions in the form of an infinite convergent sine and cosine series
CO 4	Illustrate the methods to solve the boundary value problems
CO 5	Determine a solution of a discrete system using Z- transforms
20AD2T02	APPLIED PHYSICS
CO 1	Impart knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes

CO 2	Gain knowledge of applications of lasers and optical fibers in various fields
CO 3	Classify magnetic and dielectric materials and their Engineering applications.
CO 4	Understand basic quantum mechanics and free electron theories.
CO 5	Obtain the concept of concept of holes and electrons in semiconductors.
20AD2T03	**COMPUTER ORGANIZATION**
CO 1	Demonstrate an understanding of the design of the functional units of a digital computer system. Relate Postulates of Boolean algebra and minimize combinational functions.
CO 2	Design and analyze combinational and sequential circuits
CO 3	Implementation of computer arithmetic operations and to know the basic computer instruction formats
CO 4	Obtain how micro programmed control is used to interact with units of components of CPU
CO 5	Understanding of organization and architecture of input output and memory
20AD2T04	**DATA STRUCTURES**
CO 1	Understand the properties, interfaces, and behaviors of basic abstract types.
CO 2	Understand and apply linked lists
CO 3	Apply Stacks and Queue data structures.
CO 4	Demonstrate different methods for traversing trees.
CO 5	Demonstrate the application of Graphs
20AD2T05	**PYTHON PROGRAMMING**
CO 1	Understand the fundamentals of Python programming language.
CO 2	Understand Data Structures
CO 3	Understand the use of functions in Python
CO 4	Understand the Object-Oriented Programming concepts of Python
CO 5	Apply regular expressions for different situations
20AD2L06	**APPLIED PHYSICS LAB**
CO 1	The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
20AD2L07	**DATA STRUCTURES LAB**
CO 1	Use basic data structures such as arrays and linked list.
CO 2	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
CO 3	Use various searching and sorting algorithms.
20AD2L08	**PYTHON PROGRAMMING LAB**

CO 1	Develop fundamental programs in python programming language
CO 2	Develop Python programs for numerical and text-based problems
CO 3	Develop Python programs on object-oriented programming and regular expressions.
CO 4	Develop python programs on data structures.

AIDS I SEMESTER (II BTECH III SEM)

20AD3T01	**NUMERICAL METHODS & VECTOR CALCULUS**
CO 1	Determine the solution of transcendental equations by different numerical methods
CO 2	Provide the interpolation techniques which analyze the data of an unknown function.
CO 3	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries.
CO 4	Evaluate areas and volumes using double & triple integrals
CO 5	Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals.
20AD3T03	**Object Oriented Programming**
CO 1	Understand the concepts of Object-Oriented Programming and Java Programming constructs
CO 2	Demonstrate the concepts – Strings, Inheritance and Interfaces
CO 3	Build efficient and error-free codes using exception handling and demonstrate multi-threading
CO 4	Design GUI applications using Event Handling and Abstract Window Toolkit
CO 5	Develop real-time applications using Applets and Swings.
20AD3T04	**DATABASE MANAGEMENT SYSTEMS**
CO 1	Understand the concept of database, database models and familiarize with Entity Relationship models
CO 2	Demonstrate the use of constraints, relational algebra operations
CO 3	Apply SQL queries to interact with database and understand the basics of NOSQL
CO 4	Apply normalization in database design to eliminate anomalies
CO 5	Understand the basic concepts of transaction processing and concurrency control
20AD3T02	**INTRODUCTION TO ARTIFICIAL INTELLIGENCE**
CO 1	Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
CO 2	Apply the language/framework of different AI methods for a given problem.
CO 3	Implement basic AI algorithms- standard search algorithms or dynamic programming
CO 4	Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports

20AD3T05	**OPERATING SYSTEMS**
CO 1	Understand the importance, functions and structures of operating systems
CO 2	Analyze and compare the performance of various CPU scheduling algorithms
CO 3	Develop software or hardware-based solutions for process synchronization
CO 4	Apply deadlock handling techniques to avoid deadlocks.
CO 5	Compare various Memory Management Schemes and analyze various disk Scheduling Algorithms.
20AD3M10	**CONSTITUTION OF INDIA**
CO 1	Understand historical background of the constitution making, importance for building a democratic India, features and principles of Indian Constitution.
CO 2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO 3	Understand the roles and powers of State Government and its Administration and value of the fundamental rights and duties for becoming good citizen of India.
CO 4	Understand and analyze the decentralization of power between Union, State and Local self-Government and local administration.
CO 5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission, UPSC, Welfare commissions for sustaining democracy
20AD3L06	**Object Oriented Programming Lab**
CO 1	Implement java applications using OOP principles and proper program structuring
CO 2	Develop java programs using packages, inheritance and interfaces
CO 3	Implement error and exception handling techniques
CO 4	Design event driven GUI and real-time web related applications.
20AD3L07	**DATABASE MANAGEMENT SYSTEMS LAB**
CO 1	Design database schema for a given application and apply normalization
CO 2	Acquire skills in using SQL commands for data definition and data manipulation
CO 3	Develop solutions for database applications using procedures, cursors and triggers
CO 4	Develop solutions using PL/SQL procedures
20AD3L08	**UNIX AND SHELL PROGRAMMING LAB**
CO 1	Understand and usage of vi editor, file operations commands
CO 2	Apply UNIX commands for File handling mechanism and illustrate the changing of File permissions and ownership
CO 3	Analyze a given problem and apply requisite facets of Shell programming in order to devise a shell script to solve the problem
CO 4	Develop various tasks by using Shell Scripting
CO 5	Able to understand the various UNIX Commands

20AD3S09	DATA ANALYSIS AND VISUALIZATION WITH PYTHON
CO 1	Understand the workings of various numerical techniques, different descriptive measures of Statistics, correlation and regression to solve the engineering problems
CO 2	Understand how to apply some linear algebra operations to n-dimensional arrays
CO 3	Use Pandas to create and manipulate data structures like Series and Data Frames
CO 4	Work with visualization of data frames

AIDS II SEMESTER (II BTECH IV SEM)

20AD4T01	PROBABILITY AND STATISTICS
CO 1	Understand random variables and discrete probability distributions
CO 2	Determine probabilities based on practical situations using the normal distributions.
CO 3	Apply different distributions to compute confidence intervals.
CO 4	Test the hypothesis concerning means and proportions.
CO 5	Understand the concept of least square estimation linear regression
20AD4T02	DISCRETE MATHEMATICAL STRUCTURES
CO 1	Apply mathematical logic to design new programming languages.
CO 2	Illustratethepropertiesofsetsandfunctionstodesignamodelingsoftware system
CO 3	Explain a structure of an algebra which is useful to understand the theory of sequential machines, formal languages and coding theory.
CO 4	Apply the techniques of recursion for representing the data in the analysis ofAlgorithms
CO 5	Provide the knowledge of graphs such as trees which is useful in maintaining files and directories by Operating Systems
20AD4T03	DESIGN AND ANALYSIS OF ALGORITHMS
CO 1	Describe asymptotic notation used for denoting performance of algorithms
CO 2	Analyze the performance of a given algorithm and denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
CO 3	List and describe various algorithmic approaches
CO 4	Solve problems using divide and conquer, greedy, dynamic programming, backtracking and branch and bound algorithmic approaches.
CO 5	Apply graph search algorithms to real world problems
20AD4T04	FOUNDATIONS OF DATA SCIENCE
CO 1	Enumerate the Basic Concepts of Web & Markup Languages
CO 2	Develop web Applications using Scripting Languages & Frameworks
CO 3	Make use of Express JS and Node JS frameworks
CO 4	Illustrate the uses of web services concepts like restful, React JS
CO 5	Apply Deployment Techniques & Working with cloud platform

20AD4T05	**Managerial Economics and Financial Analysis**
CO 1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product
CO 2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
CO 3	The pupilis also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
CO 4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
CO 5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
20AD4L06	**R PROGRAMMING LAB**
CO 1	Understand the use of operators in R
CO 2	Use Data Structures to implement programs in R.
CO 3	Implement Mathematical functions in R
CO 4	Understand reading and writing files
CO 5	Analyze data from various sources
20AD4L07	**DATA SCIENCE LAB**
CO 1	Understand modern notions in predictive data analysis
CO 2	Select data, model selection, model complexity and identify the trends
CO 3	Understand a range of machine learning algorithms along with their strengths and weaknesses
CO 4	Build predictive models from data and analyze their performance
20AD4L08	**DESIGN AND ANALYSIS OF ALGORITHMS LAB**
CO 1	Design algorithms using appropriate design techniques (brute-force, greedy,
CO 2	Implement a variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language.
CO 3	Apply and implement learned algorithm design techniques and data structures to solve real world problems
CO 4	Analyze and compare the performance of algorithms using language feature
20AD4S09	**BASIC WEB PROGRAMMING**
CO 1	Understand and use various HTML Tags and apply CSS.
CO 2	Develop websites that include static pages
CO 3	Design Front end for Web Applications

AIDS I SEMESTER (III BTECH V SEM)

20AD5T01	**THEORY OF AUTOMATA**
CO 1	Understanding the basic concepts of autometa theory
CO 2	Ability to describe the language accepted by an autometa or generated by a regular expression on a conext free grammar

CO 3	Ability to pushdown autometa problem solving
CO 4	Design context free grammer to generate strings from a context free language and convert them into normal forms
CO 5	Ability to understand the functioning of finite state Autometa,non deterministic finite state autometa and push down autometa and turing machines
20AD5T02	**DATA WAREHOUSING & MINING**
CO 1	Understanding the fundamentals of datawarehousing
CO 2	Understanding the KDD and data preprocessing
CO 3	Discover the interesting Patterns from large volumes of data using supervised (classification) techniques
CO 4	characterize the kinds of patterns that can be discovered by association rule mining
CO 5	Demonstrate the unsupervised(clustering) learning techniques
20AD5T03	**MACHINE LEARNING**
CO 1	Differenciate between the supervised,unsupervised,semi supervised machine learning approaches
CO 2	Discuss the decision tree algorithm and identify and oversome the problem of over fitting
CO 3	Discuss and apply the back propogationalgorithm and genetical algorithms to various problems
CO 4	Apply the bayesign concepts to machine learning
CO 5	Analyse and suggest approiate machine learning approaches for various types of algorithms
20AD5T04	**ADVANCED DATA STRUCTURES**
CO 1	Illustrate the several sorting algorithms
CO 2	concept the priority queues such as min heap and max heap for the given data
CO 3	Apply the various operations on AVL and red black trees
CO 4	Built a multi way such trees and perform various operations
CO 5	Demonstrate the various operations of digital search structures and multiway trees
20AD5T05	**E-COMMERCE**
CO 1	Identidy,intepret and analyze the stake holder needs
CO 2	Identify and apply the relevant problem solving methodologies
CO 3	Design components, systems and/or processes to meet required specification
CO 4	Design components, systems and/or processes to meet required specification
CO 5	Demonstrate research skills
20AD5T06	**SOFTWARE ENGINEERING**
CO 1	Define and develop software project from requirement gathering to implementation

CO 2	Obtain knowledge about the principles and practices of software engineering
CO 3	Focus the fundamentals of modeling a software project
CO 4	obtain the basic knowledge of coding
CO5	obtain the knowledge about the estimation maintaince and reuse the software system
20AD5L08	MACHINE LEARNING LAB
CO 1	Understand the implementation procedures for the machine learning algorithms
CO 2	Design java/python programms for various learning algorithms
CO 3	Apply the appropriate data sets for machine learning algorithms
CO 4	Identify and apply machine learning algorithms to solve real world problems
20AD5L09	DATA WAREHOUSING & MINING LAB
CO 1	Understandfing data mining concepts and knoledge is covery process
CO 2	Explore on data insights and preprocessing techniques
CO 3	Extract the association Rules on frequent items in transaction data
CO 4	Built and analyse the classification model using various algorithms
CO 5	Perform clustering using Partition algorithm
20AD5L10	TESTING TOOLS(SKILL COURSE)
CO 1	Completely got idea about testing tools
CO2	Use the tools and their importance of testing tools
20AD5M11	DISASTER MANAGEMENT
CO 1	Differenciate the types disasters, causes and their impact on environment and society
CO 2	Access vulnerability and various mehods of risk reduction measures as well as mitigation
CO 3	Draw the hazard vulnerability profile of india scenarious in indian context
CO 4	Analyse the components in prepared ness,Risk Accessment,Response and Recovery Phases of disaster -disaster damage accessment
CO 5	Understand about the risk Accessment,Rersponse and recovery phases of disaster-disaster damage accessment
20AD5I12	Internship

AIDS II SEMESTER (III BTECH VI SEM)

20AD6T01	NOSQL DATABASES
CO 1	Identify what type of NoSQL data bse to implement based on business requirements(keyvalue,document,full text,graph etc)
CO 2	Apply the No SQL data modeling from application specific queries
CO 3	Use atomic Aggregates and denormalization as data modeing techniques to optimize query processing
CO 4	Understand storage Architechures

CO 5	Creation of indexes
20AD6T02	**COMPUTER NETWORKS**
CO 1	Independerntly ennumate the layers of the OSI model and TCP/IP model
CO 2	Identify the dfifferent types of network Topologies and Protocols
CO 3	Identify and Contract methods to identify errors and correct them
CO 4	Differenciate between various routing algorithms
CO 5	Understand the WWW and HTTP Architechures
20AD6T03	**BIG DATA ANALYTICS**
CO 1	Discuss the challenges and their solutions in Big Data
CO 2	Understand the work on Hadoop Framework and eco systems
CO 3	Expain and Analyse the big data using Map-Reduce programming in both hadoop and spark framework
CO 4	Demonstrate the spark Programming with different Programming Languages
CO 5	Demonstrate the graph algorithms and live streaming data in spark
20AD6T04	**MEAN STACK TECHNOLOGIES**
CO 1	Enumate the basic concepts of web & markup Languages
CO 2	Develop Web Applications using the scripting langugaes & Framework
CO 3	Make use of Express JS and Node JS Frame Works
CO 4	Illustrate the uses of web services concepts like restful and angular
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20AD6T05	**COMPILER DESIGN**
CO 1	An ability to understand the basic functioning of compiler and it's tools
CO 2	Demonstate about Scanning of Tokens and perform the syntax analysis by using parsing techniques
CO 3	Perdorm the semantic analysis using attribute grammar
CO 4	To implement the various parsing,conversion,optimization and generation algorithms for the design compiler
CO 5	Compar the different memory management techniques in run time environment
20AD6T06	**SOFTWARE ARCHITECHURE &DESIGN PATTERNS**
CO 1	Understand the Architechure,creating it and moving from one to any,different structural patterns
CO 2	Analyse the Architechure and build the systems from the requirements
CO 3	Design the creational and structural Patterns
CO 4	Learn about bahavioural Patterns
CO 5	Do a case sturdy in utilizing architechural structures
20AD6L08	**NoSQL LAB**
CO 1	Learn basic MongoDB Functions and it implementation
CO 2	implement various types of operations using MongoDB

CO 3	Implement concepts of limit records and sort records
CO 4	Implement indexing,Advanced Indexing and Hashing using MongoDB
CO 5	Analyse and apply aggregation and map reduction in MongoDB
20AD6L09	**COMPUTER NETWORKS LAB**
CO 1	Practical orientation of networking concepts
CO 2	To teach students various forms of IPC through UNIX and socket Porgramming
20AD6L10	**BDA LAB**
CO 1	Developing the various data models in big data
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CO 5	Data analytics with spark
20AD6S11	**SOFT SKILLS**
CO 1	Make presentation on various technical and non technical topics
CO 2	Learn various nuances of the interview process like building an effective resume, cracking JAM/GD/HR interviews
CO 3	Enhance Understanding of soft Skills and Life skills
20AD6M12	**ESSENCE OF INDIAN TRADICTIONAL KNOWLEDGE**
CO 1	Understand the significance of indian traditional Knowledge
CO 2	Classify the indian traditional Knowledge
CO 3	Compare the modern science with indian traditional Knowledge System
CO 4	Analyze the Role of government in protecting the traditional Knowledge
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DEPARTMENT OF ARTIFICIAL INTELLIGENCE	
COURESE OUTCOMES MIC - 20	
AIML I SEMESTER (I BTECH I SEM)	
20AM1T01	**LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS**
CO 1	Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations
CO 2	Illustrate the methods of computing eigen values and eigen vectors
CO 3	Able to analyze the real life situations, formulate the differential equations and then applying the methods
CO 4	Determine the solutions of linear differential equations
CO 5	Optimize functions of several variables and able to find extreme values of constrained functions
20AM1T02	**APPLIED CHEMISTRY**
CO 1	Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers
CO 2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.
CO 3	Synthesize nanomaterials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.
CO 4	Design models for energy by different natural sources. Analyze the principles of different analytical instruments and their applications.
CO 5	Obtain the knowledge of green chemistry and molecular machines
20AM1T03	**ENGLISH**
CO 1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information.
CO 2	ask and answer general questions on familiar topics
CO 3	employ suitable strategies to master the art of letter writing and email writing
CO 4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
CO 5	form sentences using proper grammatical structures and correct word forms
20AM1L04	**COMPUTER ENGIENERING WORKSHOP**
CO 1	Identify, assemble and update the components of a computer
CO 2	Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems
CO 3	Make use of tools for converting pdf to word and vice versa
CO 4	Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex
20AM1T05	**PROBLEM SOLVING THROUGH C**

CO 1	Understand the basic concepts of programming
CO 2	Understand and Apply loop construct for a given problem
CO 3	Demonstrate the use pointers
CO 4	Understand the use of functions and develop modular reusable code
CO 5	Understand File I/O operations
20AM1L06	ENGLISH COMMUNICATION SKILLS LAB
CO 1	Acquire basic proficiency in English by learning functional aspects of English language
CO 2	Learn the methods of enhancing vocabulary
CO 3	Acquaint himself/herself with nuances of Phonetics
20AM1L07	APPLIED CHEMISTRY LAB
CO 1	The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
20AM1L08	P ROBLEM SOLVING THROUGH C LAB
CO 1	Demonstrate Knowledge on various concepts of a C language.
CO 2	Able to draw flowcharts and write algorithms.
CO 3	Able design and development of C problem solving skills.
CO 4	Able to design and develop modular programming skills.
CO 5	Able to trace and debug a program
20AM1M09	ENVIRONMENTAL SCIENCE

AIML II SEMESTER (I BTECH II SEM)

20AM2T01	TRANSFORM TECHNIQUES
CO 1	Able to analyze a class of integrals in terms of beta and gamma functions
CO 2	Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing
CO 3	Analyze the general periodic functions in the form of an infinite convergent sine and cosine series
CO 4	Illustrate the methods to solve the boundary value problems
CO 5	Determine a solution of a discrete system using Z- transforms
20AM2T02	APPLIED PHYSICS
CO 1	Impart knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes
CO 2	Gain knowledge of applications of lasers and optical fibers in various fields
CO 3	Classify magnetic and dielectric materials and their Engineering applications.
CO 4	Understand basic quantum mechanics and free electron theories.
CO 5	Obtain the concept of concept of holes and electrons in semiconductors.
20AM2T03	COMPUTER ORGANIZATION
CO 1	Demonstrate an understanding of the design of the functional units of a digital computer system. Relate Postulates of Boolean algebra and minimize combinational functions.

CO 2	Design and analyze combinational and sequential circuits
CO 3	Implementation of computer arithmetic operations and to know the basic computer instruction formats
CO 4	Obtain how micro programmed control is used to interact with units of components of CPU
CO 5	Understanding of organization and architecture of input output and memory
20AM2T04	**DATA STRUCTURES**
CO 1	Understand the properties, interfaces, and behaviors of basic abstract types.
CO 2	Understand and apply linked lists
CO 3	Apply Stacks and Queue data structures.
CO 4	Demonstrate different methods for traversing trees.
CO 5	Demonstrate the application of Graphs
20AM2T05	**PYTHON PROGRAMMING**
CO 1	Understand the fundamentals of Python programming language.
CO 2	Understand Data Structures
CO 3	Understand the use of functions in Python
CO 4	Understand the Object-Oriented Programming concepts of Python
CO 5	Apply regular expressions for different situations
20AM2L06	**APPLIED PHYSICS LAB**
CO 1	The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
CO 2	Implement the basic principles of Mechanics to measure different physical parameters.
CO 3	Enhance the knowledge of Usage of electronic devices in various applications
20AM2L07	**DATA STRUCTURES LAB**
CO 1	Use basic data structures such as arrays and linked list.
CO 2	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
CO 3	Use various searching and sorting algorithms.
20AM2L08	**PYTHON PROGRAMMING LAB**
CO 1	Develop fundamental programs in python programming language
CO 2	Develop Python programs for numerical and text-based problems
CO 3	Develop Python programs on object-oriented programming and regular expressions.
CO 4	Develop python programs on data structures.

AIML III SEMESTER (II BTECH III SEM)

20AM3T01	**NUMERICAL METHODS & VECTOR CALCULUS**
CO 1	Determine the solution of transcendental equations by different numerical methods
CO 2	Provide the interpolation techniques which analyze the data of an unknown function.
CO 3	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries.
CO 4	Evaluate areas and volumes using double & triple integrals

CO 5	Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals.
20AM3T03	**Object Oriented Programming**
CO 1	Understand the concepts of Object-Oriented Programming and Java Programming constructs
CO 2	Demonstrate the concepts – Strings, Inheritance and Interfaces
CO 3	Build efficient and error-free codes using exception handling and demonstrate multi-threading
CO 4	Design GUI applications using Event Handling and Abstract Window Toolkit
CO 5	Develop real-time applications using Applets and Swings.
20AM3T04	**DATABASE MANAGEMENT SYSTEMS**
CO 1	Understand the concept of database, database models and familiarize with Entity Relationship models
CO 2	Demonstrate the use of constraints, relational algebra operations
CO 3	Apply SQL queries to interact with database and understand the basics of NOSQL
CO 4	Apply normalization in database design to eliminate anomalies
CO 5	Understand the basic concepts of transaction processing and concurrency control
20AM3T02	**INTRODUCTION TO ARTIFICIAL INTELLIGENCE**
CO 1	Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
CO 2	Apply the language/framework of different AI methods for a given problem.
CO 3	Implement basic AI algorithms- standard search algorithms or dynamic programming
CO 4	Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports
20AM3T05	**OPERATING SYSTEMS**
CO 1	Understand the importance, functions and structures of operating systems
CO 2	Analyze and compare the performance of various CPU scheduling algorithms
CO 3	Develop software or hardware-based solutions for process synchronization
CO 4	Apply deadlock handling techniques to avoid deadlocks.
CO 5	Compare various Memory Management Schemes and analyze various disk Scheduling Algorithms.
20AM3M10	**CONSTITUTION OF INDIA**
CO 1	Understand historical background of the constitution making, importance for building a democratic India, features and principles of Indian Constitution.
CO 2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO 3	Understand the roles and powers of State Government and its Administration and value of the fundamental rights and duties for becoming good citizen of India.
CO 4	Understand and analyze the decentralization of power between Union, State and Local self-Government and local administration.

CO 5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission, UPSC, Welfare commissions for sustaining democracy
20AM3L06	**Object Oriented Programming Lab**
CO 1	Implement java applications using OOP principles and proper program structuring
CO 2	Develop java programs using packages, inheritance and interfaces
CO 3	Implement error and exception handling techniques
CO 4	Design event driven GUI and real-time web related applications.
20AD3L07	**DATABASE MANAGEMENT SYSTEMS LAB**
CO 1	Design database schema for a given application and apply normalization
CO 2	Acquire skills in using SQL commands for data definition and data manipulation
CO 3	Develop solutions for database applications using procedures, cursors and triggers
CO 4	Develop solutions using PL/SQL procedures
20AM3L08	**UNIX AND SHELL PROGRAMMING LAB**
CO 1	Understand and usage of vi editor, file operations commands
CO 2	Apply UNIX commands for File handling mechanism and illustrate the changing of File permissions and ownership
CO 3	Analyze a given problem and apply requisite facets of Shell programming in order to devise a shell script to solve the problem
CO 4	Develop various tasks by using Shell Scripting
CO 5	Able to understand the various UNIX Commands
20AM3S09	**DATA ANALYSIS AND VISUALIZATION WITH PYTHON**
CO 1	Understand the workings of various numerical techniques, different descriptive measures of Statistics, correlation and regression to solve the engineering problems
CO 2	Understand how to apply some linear algebra operations to n-dimensional arrays
CO 3	Use Pandas to create and manipulate data structures like Series and Data Frames
CO 4	Work with visualization of data frames

AIML IV SEMESTER (II BTECH IV SEM)

20AM4T01	**PROBABILITY AND STATISTICS**
CO 1	Understand random variables and discrete probability distributions
CO 2	Determine probabilities based on practical situations using the normal distributions.
CO 3	Apply different distributions to compute confidence intervals.
CO 4	Test the hypothesis concerning means and proportions.
CO 5	Understand the concept of least square estimation linear regression
20AM4T02	**DISCRETE MATHEMATICAL STRUCTURES**
CO 1	Apply mathematical logic to design new programming languages.
CO 2	Illustratethepropertiesofsetsandfunctionstodesignamodelingsoftware system
CO 3	Explain a structure of an algebra which is useful to understand the theory of sequential machines, formal languages and coding theory.

CO 4	Apply the techniques of recursion for representing the data in the analysis ofAlgorithms
CO 5	Provide the knowledge of graphs such as trees which is useful in maintaining files and directories by Operating Systems
20AM4T03	**DESIGN AND ANALYSIS OF ALGORITHMS**
CO 1	Describe asymptotic notation used for denoting performance of algorithms
CO 2	Analyze the performance of a given algorithm and denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
CO 3	List and describe various algorithmic approaches
CO 4	Solve problems using divide and conquer, greedy, dynamic programming, backtracking and branch and bound algorithmic approaches.
CO 5	Apply graph search algorithms to real world problems
20AM4T04	**Machine Learning**
CO 1	Differentiate between supervised, unsupervised, semi-supervised machine learning approaches
CO 2	Discuss the decision tree algorithm and indentity and overcome the problem of over fitting
CO 3	Discuss and apply the back propagation algorithm and genetic algorithms to various problems
CO 4	Apply the Bayesian concepts to machine learning
CO 5	Analyze and suggest appropriate machine learning approaches for various types of problems
20AM4T05	**Managerial Economics and Financial Analysis**
CO 1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product
CO 2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
CO 3	The pupilis also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
CO 4	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
CO 5	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
20AM4L06	**R PROGRAMMING LAB**
CO 1	Understand the use of operators in R
CO 2	Use Data Structures to implement programs in R.
CO 3	Implement Mathematical functions in R
CO 4	Understand reading and writing files
CO 5	Analyze data from various sources
20AM4L07	**DATA SCIENCE LAB**
CO 1	Understand modern notions in predictive data analysis

CO 2	Select data, model selection, model complexity and identify the trends
CO 3	Understand a range of machine learning algorithms along with their strengths and weaknesses
CO 4	Build predictive models from data and analyze their performance
20AM4L08	**DESIGN AND ANALYSIS OF ALGORITHMS LAB**
CO 1	Design algorithms using appropriate design techniques (brute-force, greedy,
CO 2	Implement a variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language.
CO 3	Apply and implement learned algorithm design techniques and data structures to solve real world problems
CO 4	Analyze and compare the performance of algorithms using language feature
20AM4S09	**BASIC WEB PROGRAMMING**
CO 1	Understand and use various HTML Tags and apply CSS.
CO 2	Develop websites that include static pages
CO 3	Design Front end for Web Applications

AIML V SEMESTER (III BTECH V SEM)

20AM5T01	**THEORY OF AUTOMATA**
CO 1	Understand the basic concepts of Automata Theory
CO 2	Ability to describe the language accepted by an automata or generated by aregular expression or a context-free grammar
CO 3	Apply Pushdown Automata for problem solving.
CO 4	Design context free grammars to generate strings from a context free language and convert them into normal forms
CO 5	Ability to understand the functioning of Finite-State Machines, DeterministicFinite-State Automata, Nondeterministic Finite-State Automata andPushdown Automata and Turing Machines
20AM5T02	**DATA WAREHOUSING & MINING**
CO 1	Understand the fundamentals concepts of data warehousing
CO 2	Understand KDD Process and data preprocessing.
CO 3	Discover interesting patterns from large volumes of Data using supervised (classification) learning techniques
CO 4	Characterize the kinds of patterns that can be discovered by Association Rule Mining
CO 5	Demonstrate unsupervised (clustering) learning techniques
20AM5T03	**SOFTWARE ENGINEERING**
CO 1	Define and develop a software project from requirement gathering to implementation
CO 2	Obtain knowledge about principles and practices of software engineering.
CO 3	Focus on the fundamentals of modeling a software project.
CO 4	Obtain basic knowledge of coding

CO 5	Obtain knowledge about estimation maintenance and reuse of software systems
20AM5T04	COMPUTER GRAPHICS
CO 1	Illustrate the basics of computer graphics, different graphics systems and applications of computer graphics with various algorithms for line, circle and ellipse drawing objects for 2D transformations.
CO 2	Apply projections and visible surface detection techniques for display of 3Dscene on 2D screen
CO 3	Illustrate able to create the general software architecture of programs that use 3D object sets with computer graphics
CO 4	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).
CO 5	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.
20AM5T05	E-COMMERCE
CO 1	Identify, interpret and analyze stake holder needs
CO 2	Identify and apply relevant problem solving methodologies.
CO 3	Design components, systems and/or processes to meet required specifications
CO 4	:Design components, systems and/or processes to meet required specifications
CO 5	Demonstrate research skills.
20AM5T06	DATA SCIENCE AND VISUALIZATION
CO 1	Define Data Science and its fundamentals.
CO 2	Demonstrate the process in data science.
CO 3	Explain Machine learning Algorithms for data sciences
CO 4	Illustrate the process of future selection and analysis of data analysis
CO5	Explain the future selection algorithms for data science.
20AM5L08	CASE TOOLS LAB
CO 1	Ability to translate end-user requirements into system and software requirements.
CO 2	Ability to generate a high-level design of the system from the software requirements
CO 3	Will have experience and/or awareness of testing problems and will be able to develop a simple testing report
20AM5L09	DATA WAREHOUSING AND MINING LAB
CO 1	Understand Data Mining concepts and knowledge is covery process
CO 2	Explore on data insights and preprocessing techniques
CO 3	Extract association rules on frequent items in transaction data
CO 4	Build and analyze the classification model using various algorithms

CO 5	Perform clustering using partition algorithms
20AM5S10	TESTING TOOLS LAB
CO 1	Completely got an idea about testing tools
CO 2	Use the tools and their importance of testing tools
20AM5M11	DISASTER MANAGEMENT
CO 1	Differentiate the types of disasters, causes and their impact on environment and society.
CO 2	Assess vulnerability and various methods of risk reduction measures as well as mitigation
CO 3	Draw the hazard and vulnerability profile of India, Scenarios in the Indian context
CO 4	Analyze the Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster -- Disaster Damage Assessment
CO 5	Understand about Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment
20AM5I12	INTERNSHIP

AIML VI SEMESTER (III BTECH VI SEM)

20AM6T01	DEEP LEARNING
CO 1	Demonstrate the mathematical foundation of neural network
CO 2	Describe the machine learning basics
CO 3	Compare the different architectures of deep neural network
CO 4	Build a convolutional neural network
CO 5	Build and train RNN and LSTMs
20AM6T02	COMPUTER NETWORKS
CO 1	Independently enumerate the layers of the OSI model and TCP/IP
CO 2	Identify the different types of network topologies and protocols.
CO 3	Compare and contrast methods to identify Errors and correct them
CO 4	Differentiate between various network routing algorithms.
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CO 5	Compare different memory management techniques in runtime environment
20HS6T02	**QUANTITATIVE APTITUDE AND REASONING**
20AM6L08	**DEEP LEARNING LAB**
CO 1	Perform different pre-processing operations on structured or unstructured data.
CO 2	Design neural network layers for various learning problems
CO 3	Demonstrate binary as well as multi- class classification problems.
CO 4	Interpret the model results and analyse the performance of the model
CO 5	Apply statistical concepts and perform Exploratory Data Analysis.
CO 6	Implement, train, and validate their own neural network
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PRINCIPAL

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