Computer Science and Engineering (R19)	
CO-PO Mapping	
I YEAR I SEMESTER	
Course Outcomes	**ENGLISH**
CO1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
CO2	ask and answer general questions on familiar topics and introduce oneself/others
CO3	employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
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
Course Outcomes	**Mathematics - I**
CO1	Utilize mean value theorems to real life problems (L3)
CO2	Solve the differential equations related to various engineering fields (L3)
CO3	Familiarize with functions of several variables which is useful in optimization (L3)
CO4	Apply double integration techniques in evaluating areas bounded by region (L3)
CO5	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems (L5)
Course Outcomes	**Applied Chemistry**
CO1	Outline the properties of polymers and various additives added and different methods of forming plastic materials.
CO2	Explain the preparation, properties and applications of some plastic materials.
CO3	Explain the theory of construction of battery and fuel cells
CO4	Understand the importance of materials like nanomaterials and fullerenes and their uses.
CO5	Obtain the knowledge of computational chemistry
CO6	understand the principles of different analytical instruments.
Course Outcomes	**Fundamentals of Computer Science**
CO1	Illustrate the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming.
CO2	Recognize the Computer networks, types of networks and topologies.
CO3	Summarize the concepts of Operating Systems and Databases.
CO4	Recite the Advanced Computer Technologies like Distributed Computing & Wireless Networks
Course Outcomes	**Engineering Drawing**
CO1	The student will learn how to visualize 2D & 3D objects.
Course Outcomes	**APPLIED CHEMISTRY LAB**

CO1	The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
Course Outcomes	**IT WORKSHOP**
CO1	Assemble and disassemble components of a PC
CO2	Construct a fully functional virtual machine, Summarize various Linux operating system commands,
CO3	Secure a computer from cyber threats, Learn and practice programming skill in Github, Hackerrank, Codechef, HackerEarth etc.
CO4	Recognize characters & extract text from scanned images, Create audio files and podcasts
CO5	Create video tutorials and publishing, Use office tools for documentation, Build interactive presentations, Build websites, Create quizzes & analyze responses
I YEAR II SEMESTER	
Course Outcomes	**Mathematics – II**
CO1	develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
CO2	solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)
CO3	evaluate approximating the roots of polynomial and transcendental equations by different algorithms (L5)
CO4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)
CO5	apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations (L3)
Course Outcomes	**Mathematics – III**
CO1	Interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
CO2	Estimate the work done against a field, circulation and flux using vector calculus (L5)
CO3	Apply the Laplace transform for solving differential equations (L3)
CO4	Find or compute the Fourier series of periodic signals (L3)
CO5	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms (L3)
CO6	Identify solution methods for partial differential equations that model physical processes (L3)
Course Outcomes	**APPLIED PHYSICS**
CO1	explain the need of coherent sources and the conditions for sustained interference
CO2	explain the fundamental concepts of quantum mechanics.
CO3	explain the various electron theories
CO4	classify the energy bands of semiconductors.
CO5	explain the concept of polarization in dielectric materials

Course Outcomes	PROGRAMMING FOR PROBLEM SOLVING USING C
CO1	To write algorithms and to draw flowcharts for solving problems
CO2	To convert flowcharts/algorithms to C Programs, compile and debug programs
CO3	To use different operators, data types and write programs that use two-way/ multi-way selection
CO4	To select the best loop construct for a given problem
CO5	To design and implement programs to analyze the different pointer applications
CO6	To decompose a problem into functions and to develop modular reusable code
CO7	To apply File I/O operations
Course Outcomes	**DIGITAL LOGIC DESIGN**
CO1	An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
CO2	An ability to understand the different switching algebra theorems and apply them for logic functions
CO3	An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions
CO4	Students will be able to design various logic gates starting from simple ordinary gates to complex programmable logic devices & arrays
CO5	Students will be able to design various sequential circuits starting from flip-flop to registers and counters
Course Outcomes	**PROGRAMMING FOR PROBLEM SOLVING USING C LAB**
CO1	Gains 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
Course Outcomes	**CONSTITUTION OF INDIA**
CO1	Understand historical background of the constitution making and its importance for building a democratic India
CO2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO3	Understand the value of the fundamental rights and duties for becoming good citizen of India
CO4	Analyze the decentralization of power between central, state and local self-government.
CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democrac
II YEAR I SEMESTER	
Course Outcomes	**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**
CO1	Demonstrate skills in solving mathematical problems
CO2	Comprehend mathematical principles and logic
CO3	Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
CO4	Manipulate and analyze data numerically and/or graphically using appropriate Software
CO5	Communicate effectively mathematical ideas/results verbally or in writing

Course Outcomes	SOFTWARE ENGINEERING
CO1	Ability to transform an Object-Oriented Design into high quality, executable code
CO2	Skills to design, implement, and execute test cases at the Unit and Integration level
CO3	Compare conventional and agile software methods
Course Outcomes	**PYTHON PROGRAMMING**
CO1	Develop essential programming skills in computer programming concepts like data types, containers
CO2	Apply the basics of programming in the Python language
CO3	Solve coding tasks related conditional execution, loops
CO4	Solve coding tasks related to the fundamental notions and techniques used in objectoriented programming
Course Outcomes	**DATA STRUCTURES**
CO1	Summarize the properties, interfaces, and behaviors of basic abstract data types
CO2	Discuss the computational efficiency of the principal algorithms for sorting & searching
CO3	Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs
CO4	Demonstrate different methods for traversing trees
Course Outcomes	**OBJECT ORIENTED PROGRAMMING THROUGH C++**
CO1	Classify object oriented programming and procedural programming
CO2	Apply C++ features such as composition of objects, operator overloads, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling
CO3	Build C++ classes using appropriate encapsulation and design principles
CO4	Apply object oriented or non-object oriented techniques to solve bigger computing problems
Course Outcomes	**COMPUTER ORGANIZATION**
CO1	Develop a detailed understanding of computer systems
CO2	Cite different number systems, binary addition and subtraction, standard, floating-point, and micro operations
CO3	Develop a detailed understanding of architecture and functionality of central processing unit
CO4	Exemplify in a better way the I/O and memory organization
CO5	Illustrate concepts of parallel processing, pipelining and inter processor communication
Course Outcomes	**PYTHON PROGRAMMING LAB**
CO1	Write, Test and Debug Python Programs
CO2	Use Conditionals and Loops for Python Programs
CO3	Use functions and represent Compound data using Lists, Tuples and Dictionaries
CO4	Use various applications using python
Course Outcomes	**DATA STRUCTURES THROUGH C++ LAB**
CO1	Apply the various OOPs concepts with the help of programs.
CO2	Use basic data structures such as arrays and linked list.
CO3	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths
CO4	Use various searching and sorting algorithms.

Course Outcomes	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE
CO1	Understand the concept of Traditional knowledge and its importance
CO2	Know the need and importance of protecting traditional knowledge
CO3	Know the various enactments related to the protection of traditional knowledge
CO4	Understand the concepts of Intellectual property to protect the traditional knowledge
Course Outcomes	**EMPLOYABILITY SKILLS -I**
CO1	Establish effective communication with employers, supervisors, and co-workers
CO2	Identify to explore their values and career choices through individual skill assessments
CO3	Adapts positive attitude and appropriate body language
CO4	Interpret the core competencies to succeed in professional and personal life
II YEAR II SEMESTER	
Course Outcomes	**PROBABILITY AND STATISTICS**
CO1	Classify the concepts of data science and its importance (L4) or (L2)
CO2	Interpret the association of characteristics and through correlation and regression tools (L4)
CO3	Make use of the concepts of probability and their applications (L3)
CO4	Apply discrete and continuous probability distributions (L3)
CO5	Design the components of a classical hypothesis test (L6)
CO6	Infer the statistical inferential methods based on small and large sampling tests (L4)
Course Outcomes	**JAVA PROGRAMMING**
CO1	Able to realize the concept of Object Oriented Programming & Java Programming Constructs
CO2	Able to describe the basic concepts of Java such as operators, classes, objects, inheritance, packages, Enumeration and various keywords
CO3	Apply the concept of exception handling and Input/ Output operations
CO4	Able to design the applications of Java & Java applet
CO5	Able to Analyze & Design the concept of Event Handling and Abstract Window Toolkit
Course Outcomes	**OPERATING SYSTEMS**
CO1	Describe various generations of Operating System and functions of Operating System
CO2	Describe the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance
CO3	Solve Inter Process Communication problems using Mathematical Equations by various methods
CO4	Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques
CO5	Outline File Systems in Operating System like UNIX/Linux and Windows
Course Outcomes	**DATABASE MANAGEMENT SYSTEMS**
CO1	Describe a relational database and object-oriented database
CO2	Create, maintain and manipulate a relational database using SQL
CO3	Describe ER model and normalization for database design

CO4	Examine issues in data storage and query processing and can formulate appropriate solutions
CO5	Outline the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage
Course Outcomes	**FORMAL LANGUAGES AND AUTOMATA THEORY**
CO1	Classify machines by their power to recognize languages.
CO2	Summarize language classes & grammars relationship among them with the help of Chomsky hierarchy
CO3	Employ finite state machines to solve problems in computing
CO4	Illustrate deterministic and non-deterministic machines
CO5	Quote the hierarchy of problems arising in the computer science
Course Outcomes	**, JAVA PROGRAMMING LAB**
CO1	Evaluate default value of all primitive data type, Operations, Expressions, Control-flow, Strings
CO2	Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
CO3	Illustrating simple inheritance, multi-level inheritance, Exception handling mechanism
CO4	Construct Threads, Event Handling, implement packages, developing applets
Course Outcomes	**UNIX OPERATING SYSTEM LAB**
CO1	To use Unix utilities and perform basic shell control of the utilities
CO2	To use the Unix file system and file access control
CO3	To use of an operating system to develop software
CO4	Students will be able to use Linux environment efficiently
CO5	Solve problems using bash for shell scripting
Course Outcomes	**DATABASE MANAGEMENT SYSTEMS LAB**
CO1	Utilize SQL to execute queries for creating database and performing data manipulation operations
CO2	Examine integrity constraints to build efficient databases
CO3	Apply Queries using Advanced Concepts of SQL
CO4	Build PL/SQL programs including stored procedures, functions, cursors and triggers
Course Outcomes	**PROFESSIONAL ETHICS & HUMAN VALUES**
CO1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
CO2	Identify the multiple ethical interests at stake in a real-world situation or practice
CO3	Articulate what makes a particular course of action ethically defensible
CO4	Assess their own ethical values and the social context of problems
CO5	Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
Course Outcomes	**SOCIALLY RELEVANT PROJECT**
CO1	Use scientific reasoning to gather, evaluate, and interpret ideas
CO2	Analyze and design solutions to solve the ideas
CO3	Use one or more creative tools to complete the projects

III YEAR I SEMESTER	
Course Outcomes	**DATA WAREHOUSING AND DATA MINING**
CO1	Design a Data warehouse system and perform business analysis with OLAP tools
CO2	Apply suitable pre-processing and visualization techniques for data analysis
CO3	Apply frequent pattern and association rule mining techniques for data analysis
CO4	Apply appropriate classification techniques for data analysis
CO5	Apply appropriate clustering techniques for data analysis
Course Outcomes	**COMPUTER NETWORKS**
CO1	Illustrate the OSI and TCP/IP reference model
CO2	Analyze MAC layer protocols and LAN technologies
CO3	Design applications using internet protocols
CO4	Implement routing and congestion control algorithms
CO5	Develop application layer protocols
Course Outcomes	**COMPILER DESIGN**
CO1	Design, develop, and implement a compiler for any language
CO2	Use LEX and YACC tools for developing a scanner and a parser
CO3	Design and implement LL and LR parsers
CO4	Design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity
CO5	Apply algorithms to generate machine code
Course Outcomes	**ARTIFICIAL INTELLIGENCE**
CO1	Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
CO2	Apply the language/framework of different AI methods for a given problem
CO3	Implement basic AI algorithms- standard search algorithms or dynamic programming
CO4	Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports
Course Outcomes	**ADVANCED DATA STRUCTURES**
CO1	Illustrate several sub-quadratic sorting algorithms
CO2	Demonstrate recursive methods
CO3	Apply advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure
Course Outcomes	**COMPUTER NETWORKS LAB**
CO1	Apply the basics of Physical layer in real time applications
CO2	Apply data link layer concepts, design issues, and protocols
CO3	Apply Network layer routing protocols and IP addressing
CO4	Implement the functions of Application layer and Presentation layer paradigms and Protocols
Course Outcomes	**AI TOOLS & TECHNIQUES LAB**
CO1	Identify problems that are amenable to solution by AI methods
CO2	Identify appropriate AI methods to solve a given problem
CO3	Use language/framework of different AI methods for solving problems
CO4	Implement basic AI algorithms

CO5	Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports
Course Outcomes	**DATA MINING LAB**
CO1	Extend the functionality of R by using add-on packages
CO2	Examine data from files and other sources and perform various data manipulation tasks on them
CO3	Code statistical functions in R
CO4	Use R Graphics and Tables to visualize results of various statistical operations on data
CO5	Apply the knowledge of R gained to data Analytics for real life applications
Course Outcomes	**EMPLOYABILITY SKILLS -II**
CO1	Recite the corporate etiquette.
CO2	Make presentations effectively with appropriate body language
CO3	Be composed with positive attitude
CO4	Apply their core competencies to succeed in professional and personal life
III YEAR II SEMESTER	
Course Outcomes	**WEB TECHNOLOGIES**
CO1	Illustrate the basic concepts of HTML and CSS & apply those concepts to design static web pages
CO2	Identify and understand various concepts related to dynamic web pages and validate them using JavaScript
CO3	Outline the concepts of Extensible markup language & AJAX
CO4	Develop web Applications using Scripting Languages & Frameworks
CO5	Create and deploy secure, usable database driven web applications using PHP and RUBY
Course Outcomes	**DISTRIBUTED SYSTEMS**
CO1	Elucidate the foundations and issues of distributed systems
CO2	Illustrate the various synchronization issues and global state for distributed systems
CO3	Illustrate the Mutual Exclusion and Deadlock detection algorithms in distributed systems
CO4	Describe the agreement protocols and fault tolerance mechanisms in distributed systems
CO5	Describe the features of peer-to-peer and distributed shared memory systems
Course Outcomes	**DESIGN AND ANALYSIS OF ALGORITHMS**
CO1	Describe asymptotic notation used for denoting performance of algorithms
CO2	Analyze the performance of a given algorithm and denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
CO3	List and describe various algorithmic approaches
CO4	Solve problems using divide and conquer, greedy, dynamic programming, backtracking and branch and bound algorithmic approaches
CO5	Apply graph search algorithms to real world problems
CO6	Demonstrate an understanding of NP- Completeness theory and lower bound theory
Course Outcomes	**MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY**

CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities 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
Course Outcomes	**WEB TECHNOLOGIES LAB**
CO1	Analyze and apply the role of languages like HTML, CSS, XML
CO2	Review JavaScript, PHP and protocols in the workings of the web and web applications
CO3	Apply Web Application Terminologies, Internet Tools, E – Commerce and other web services
CO4	Develop and Analyze dynamic Web Applications using PHP & MySql
CO5	Install & Use Frameworks
IV YEAR I SEMESTER	
Course Outcomes	**CRYPTOGRAPHY AND NETWORK SECURITY**
CO1	Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory
CO2	Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication
CO3	Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
CO4	Apply different digital signature algorithms to achieve authentication and create secure applications
CO5	Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP
CO6	Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications
Course Outcomes	**UML & DESIGN PATTERNS**
CO1	Illustrate software design with UML diagrams
CO2	Design software applications using OO concepts
CO3	Identify various scenarios based on software requirements
CO4	Apply UML based software design into pattern based design using design patterns
CO5	Illustrate the various testing methodologies for OO software
Course Outcomes	**MACHINE LEARNING**
CO1	Identify machine learning techniques suitable for a given problem
CO2	Solve the problems using various machine learning techniques
CO3	Apply Dimensionality reduction techniques
CO4	Design application using machine learning techniques
Course Outcomes	**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.
Course Outcomes	**CLOUD COMPUTING**
CO1	Interpret the key dimensions of the challenge of Cloud Computing
CO2	Examine the economics, financial, and technological implications for selecting cloud computing for own organization
CO3	Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications
CO4	Evaluate own organizations' needs for capacity building and training in cloud computingrelated IT areas
CO5	Illustrate Virtualization for Data-Center Automation
Course Outcomes	**UML LAB**
CO1	Know the syntax of different UML diagrams
CO2	Create use case documents that capture requirements for a software system
CO3	Create class diagrams that model both the domain model and design model of a software system
CO4	Create interaction diagrams that model the dynamic aspects of a software system
CO5	Write code that builds a software system
CO6	Develop simple applications
Course Outcomes	**IPR & PATENTS**
CO1	IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents
CO2	Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements
IV YEAR II SEMESTER	
Course Outcomes	**MANAGEMENT AND ORGANIZATIONAL BEHAVIOR**
CO1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational structure
CO2	Will familiarize with the concepts of functional management that is HRM and Marketing of new product developments
CO3	The learner is able to think in strategically through contemporary management practices
CO4	The learner can develop positive attitude through personality development and can equip with motivational theories
CO5	The student can attain the group performance and grievance handling in managing the organizational culture
Course Outcomes	**DevOps**
CO1	Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility
CO2	Describe DevOps & DevSecOps methodologies and their key concepts

CO3	Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models
CO4	Set up complete private infrastructure using version control systems and CI/CD tools

Computer Science and Engineering (R16)	
CO-PO Mapping	
I Year I Semester	
Course Outcomes	**ENGLISH - I**
CO1	The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.
CO2	The lesson motivates the public to adopt road safety measures.
CO3	The lesson creates an awareness in the readers that mass production is ultimately detrimental to
CO4	The lesson helps to choose a source of energy suitable for rural India.
CO5	The lesson creates an awareness in the reader as to the usefulness of animals for the human society.
CO6	The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.
Course Outcomes	**MATHEMATICS-I**
CO1	Solve linear differential equations of first, second and higher order.
CO2	Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear
CO3	Calculate total derivative, Jocobian and minima of functions of two variables.
Course Outcomes	**MATHEMATICS-II (Mathematical Methods)**
CO1	Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
CO2	Compute interpolating polynomial for the given data.
CO3	Solve ordinary differential equations numerically using Euler's and RK method.
CO4	Find Fourier series and Fourier transforms for certain functions.
CO5	Identify/classify and solve the different types of partial differential equations.
Course Outcomes	**APPLIED PHYSICS**
CO1	Construction and working details of instruments, ie., Interferometer, Diffractometer
Course Outcomes	**COMPUTER PROGRAMMING**
CO1	Understand the basic terminology used in computer programming
CO2	Write, compile and debug programs in C language.
CO3	Use different data types in a computer program.
CO4	Design programs involving decision structures, loops and functions.
CO5	Explain the difference between call by value and call by reference
CO6	Understand the dynamics of memory by the use of pointers

CO7	Use different data structures and create/update basic data files.
Course Outcomes	**ENGLISH - COMMUNICATION SKILLS LAB - I**
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
Course Outcomes	**APPLIED/ENGINEERING PHYSICS LAB**
C01	Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements
Course Outcomes	**APPLIED/ENGINEERING PHYSICS - VIRTUAL LABS – ASSIGNMENTS**
CO1	Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental
Course Outcomes	**COMPUTER PROGRAMMING LAB**
CO1	Apply and practice logical ability to solve the problems.
CO2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
CO3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
CO4	Understand and apply the in-built functions and customized functions for solving the problems.
CO5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
CO6	Document and present the algorithms, flowcharts and programs in form of user-manuals
CO7	Identification of various computer components, Installation of software
I Year II Semester	
Course Outcomes	**ENGLISH -II**
CO1	The lesson underscores that the ultimate aim of Education is to enhance wisdom.
CO2	The lesson enables the students to promote peaceful co-existence and universal
CO3	The lesson imparts the students to manage different cultural shocks due to globalization.
CO4	The theme projects society's need to re examine its traditions when they are outdated.
CO5	The lesson offers several inputs to protect environment for the sustainability of the future generations.
CO6	Pupil get inspired by eminent personalities who toiled for the present day advancement of software development. 2. ' Srinivasa Ramanujan'
Course Outcomes	**MATHEMATICS-III**
CO1	Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations
CO2	. Solve simultaneous linear equations numerically using various matrix methods.
CO3	Determine double integral over a region and triple integral over a volume.
CO4	4. Calculate gradient of a scalar function, divergence and curl of a vector function.

Course Outcomes	APPLIED CHEMISTRY
CO1	The advantages and limitations of plastic materials and their use in design would be
Course Outcomes	**OBJECT-ORIENTED PROGRAMMING THROUGH C++**
CO1	Understand the basic terminology used in computer programming
CO2	Write, compile and debug programs in C language. Use different data types in a computer program.
CO3	Design programs involving decision structures, loops and functions.
CO4	Explain the difference between call by value and call by reference
Course Outcomes	**ENVIRONMENTAL STUDIES**
CO1	The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
CO2	The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
CO3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO4	Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO5	Social issues both rural and urban environment and the possible means to combat the challenges
CO6	The environmental legislations of India and the first global initiatives towards sustainable development.
CO7	About environmental assessment and the stages involved in EIA and the environmental audit
CO8	Self Sustaining Green Campus with Environment Friendly aspect of – Energy, Water and Wastewater reuse Plantation, Rain water Harvesting, Parking Curriculum.
Course Outcomes	**APPLIED / ENGINEERING CHEMISTRY LABORATORY**
CO1	The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox
Course Outcomes	**ENGLISH - COMMUNICATION SKILLS LAB- II**
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
Course Outcomes	**OBJECT-ORIENTED PROGRAMMING LAB**
CO1	Explain whatconstitutesanobject-oriented approachtoprogrammingandidentify potential benefits of object-oriented programming over other approaches.
CO2	Apply an object-oriented approach to developing applications of varying complexities
Course Outcomes	**STATISTICS WITH R PROGRAMMING**

CO1	List motivation for learning a programming language
CO2	Access online resources for R and import new function packages into the R workspace
CO3	Import, review, manipulate and summarize data-sets in R
CO4	Explore data-sets to create testable hypotheses and identify appropriate statistical tests
CO5	Perform appropriate statistical tests using R Create and edit visualizations
II Year I Semester	
Course Outcomes	**MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE**
CO1	Student will be able to demonstrate skills in solving mathematical problems
CO2	Student will be able to comprehend mathematical principles and logic
CO3	Student will be able to demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
CO4	Student will be able to manipulate and analyze data numerically and/or graphically using appropriate Software
CO5	Student will be able to communicate effectively mathematical ideas/results verbally or in writing
Course Outcomes	**DIGITAL LOGIC DESIGN**
CO1	An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
CO2	An ability to understand the different switching algebra theorems and apply them for logic functions.
CO3	An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
CO4	An ability to define the other minimization methods for any number of variables Variable Entered Mapping (VEM) and Quine-MeCluskey (QM) Techniques and perform an algorithmic reduction of logic functions.
Course Outcomes	**PYTHON PROGRAMMING**
CO1	Making Software easily right out of the box.
CO2	Experience with an interpreted Language.
CO3	To build software for real needs.
CO4	Prior Introduction to testing software
Course Outcomes	**DATA STRUCTURES THROUGH C++**
CO1	Distinguish between procedures and object oriented programming.
CO2	Apply advanced data structure strategies for exploring complex data structures.

CO3	Compare and contrast various data structures and design techniques in the area of Performance.
CO4	Implement data structure algorithms through C++. • Incorporate data structures into the applications such as binary search trees, AVL and B Trees
CO5	Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs
Course Outcomes	**COMPUTER GRAPHICS**
CO1	Know and be able to describe the general software architecture of programs that use 3D computer graphics.
CO2	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.
CO3	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).
Course Outcomes	**DATASTRUCTURES THROUGH C++ LAB**
CO1	Be able to design and analyze the time and space efficiency of the data structure
CO2	Be capable to identity the appropriate data structure for given problem
II Year II SEMESTER	
Course Outcomes	**SOFTWARE ENGINEERING**
CO1	Define and develop a software project from requirement gathering to implementation.
CO2	Obtain knowledge about principles and practices of software engineering.
CO3	Focus on the fundamentals of modeling a software project.
CO4	Obtain knowledge about estimation and maintenance of software systems
Course Outcomes	**JAVA PROGRAMMING**
CO1	Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
CO2	Write, compile, execute and troubleshoot Java programming for networking concepts.
CO3	Build Java Application for distributed environment.
CO4	Design and Develop multi-tier applications
CO5	Identify and Analyze Enterprise applications.
Course Outcomes	**ADVANCED DATA STRUCTURES**
CO1	Be able to understand and apply amortised analysis on data structures, including binary search trees, mergable heaps, and disjoint sets.

CO2	Have an idea of applications of algorithms in a variety of areas, including linear programming and duality, string matching, game-theory
CO3	Understand the implementation and complexity analysis of fundamental algorithms such as RSA, primality testing, max flow, discrete Fourier transform.
Course Outcomes	**COMPUTER ORGANIZATION**
CO1	Students can understand the architecture of modern computer.
CO2	They can analyze the Performance of a computer using performance equation
CO3	Understanding of different instruction types.
CO4	Students can calculate the effective address of an operand by addressing modes
CO5	They can understand how computer stores positive and negative numbers.
CO6	Understanding of how a computer performs arithmetic operation of positive and negative numbers.
Course Outcomes	**FORMAL LANGUAGE AND AUTOMATA THEORY**
CO1	Classify machines by their power to recognize languages.
CO2	Employ finite state machines to solve problems in computing.
CO3	Explain deterministic and non-deterministic machines.
CO4	Comprehend the hierarchy of problems arising in the computer science.
Course Outcomes	**PRINCIPLES OF PROGRAMMING LANGUAGES**
CO1	Describe syntax and semantics of programming languages
CO2	Explain data, data types, and basic statements of programming languages
CO3	Design and implement subprogram constructs, Apply object - oriented, concurrency, and event handling programming constructs
CO4	Develop programs in Scheme, ML, and Prolog
CO5	Understand and adopt new programming languages
Course Outcomes	**ADVANCED DATA STRUCTURES LAB**
CO1	Implement heap and various tree structure like AVL, Red-black, B and Segment trees
CO2	Solve the problems such as line segment intersection, convex shell and Voronoi diagram
III Year I Semester	
Course Outcomes	**COMPILER DESIGN**
CO1	Acquire knowledge in different phases and passes of Compiler, and specifying different
CO2	Parser and its types i.e. Top-down and Bottom-up parsers.
CO3	Construction of LL, SLR, CLR and LALR parse table.

CO4	Syntax directed translation, synthesized and inherited attributes.
CO5	Techniques for code optimization.
Course Outcomes	**UNIX PROGRAMMING**
CO1	Documentation will demonstrate good organization and readability.
CO2	File processing projects will require data organization, problem solving and research.
CO3	Scripts and programs will demonstrate simple effective user interfaces.
CO4	Scripts and programs will demonstrate effective use of structured programming.
CO5	Testing will demonstrate both black and glass box testing strategies.
CO6	Project work will involve group participation.
Course Outcomes	**DATA BASE MANAGEMENT SYSTEMS**
CO1	Describe a relational database and object-oriented database
CO2	Create, maintain and manipulate a relational database using SQL
CO3	Examine issues in data storage and query processing and can formulate appropriate solutions.
CO4	Describe ER model and normalization for database design.
CO5	Design and build database system for a given real world problem
Course Outcomes	**OPERATING SYSTEMS**
CO1	Design various Scheduling algorithms.
CO2	Apply the principles of concurrency.
CO3	Design deadlock, prevention and avoidance algorithms.
CO4	Compare and contrast various memory management schemes.
CO5	Design and Implement a prototype file systems.
CO6	Perform administrative tasks on Linux Servers
CO7	Introduction to Android Operating System Internals
Course Outcomes	**UNIFIED MODELING LAB**
CO1	Understand the Case studies and design the Model.
CO2	Understand how design patterns solve design problems.
CO3	Develop design solutions using creational patterns.
Course Outcomes	**OPERATING SYSEMS AND LINUX PROGRAMMING LAB**
CO1	To use Unix utilities and perform basic shell control of the utilities

CO2	To use the Unix file system and file access control.
CO3	To use of an operating system to develop software
CO4	Students will be able to use Linux environment efficiently
CO5	Solve problems using bash for shell scripting
CO6	Will be able to implement algorithms to solve data mining problems using weka tool
Course Outcomes	**DATA BASE MANAGEMENT SYSTEM LAB**
CO1	Understand, appreciate and effectively explain the underlying concepts of database technologies
CO2	Design and implement a database schema for a given problem-domain
CO3	Normalize a database
CO4	Populate and query a database using SQL DML/DDL commands.
CO5	Declare and enforce integrity constraints on a database using a state-of-the-artRDBMS
CO6	Design and build a GUI application using a 4GL
Course Outcomes	**PROFESSIONAL ETHICSAND HUMAN VALUES**
CO1	It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties
CO2	It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.
III Year II Semester	
Course Outcomes	**COMPUTER NETWORKS**
CO1	Understand OSI and TCP/IP models
CO2	Analyze MAC layer protocols and LAN technologies
CO3	Design applications using internet protocols
CO4	Understand routing and congestion control algorithms
CO5	Understand how internet works
Course Outcomes	**DATA WARE HOUSING AND DATA MINING**
CO1	Understand stages in building a Data Warehouse
CO2	Understand the need and importance of preprocessing techniques
CO3	Understand the need and importance of Similarity and dissimilarity techniques
CO4	Analyze and evaluate performance of algorithms for Association Rules

CO5	Analyze Classification and Clustering algorithms
Course Outcomes	**DESIGN AND ANALYSIS OF ALGORITHMS**
CO1	Argue the correctness of algorithms using inductive proofs and invariants.
CO2	Analyze worst-case running times of algorithms using asymptotic analysis.
CO3	Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamicprogramming algorithms, and analyze them.
CO4	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
Course Outcomes	**SOFTWARE TESTING METHODOLOGIES**
CO1	Understand the basic testing procedures.
CO2	Able to support in generating test cases and test suites.
CO3	Able to test the applications manually by applying different testing methods and
CO4	Apply tools to resolve the problems in Real time environment.
Course Outcomes	**ARTIFICIAL INTELLIGENCE**
CO1	Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
CO2	Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a
CO3	Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
CO4	•Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.
Course Outcomes	**INTERNET OF THINGS**
CO1	Demonstrate knowledge and understanding of the security and ethical issues of the Internet of Things
CO2	Conceptually identify vulnerabilities, including recent attacks, involving the Internet of Things
CO3	Develop critical thinking skills
CO4	Compare and contrast the threat environment based on industry and/or device type
Course Outcomes	**CYBER SECURITY**
CO1	Cyber Security architecture principles
CO2	Identifying System and application security threats and vulnerabilities
CO3	Identifying different classes of attacks
CO4	Cyber Security incidents to apply appropriate response
CO5	Describing risk management processes and practices

CO6	Evaluation of decision making outcomes of Cyber Security scenarios
Course Outcomes	**DIGITAL SIGNAL PROCESSING**
CO1	An ability to apply knowledge of Mathematics, science, and engineering
CO2	An ability to design and conduct experiments and interpret data
CO3	An ability to design a system, component or process to meet desired needs within realistic
CO4	An ability to function as part of a multi-disciplinary team
Course Outcomes	**EMBEDDED SYSTEMS**
CO1	Program an embedded system
CO2	Design, implement and test an embedded system.
CO3	Explain the general structure of a real-time system
CO4	Define the unique design problems and challenges of real-time systems
Course Outcomes	**NETWORK PROGRAMMING LAB**
CO1	Understand and explain the basic concepts of Grid Computing;
CO2	Explain the advantages of using Grid Computing within a given environment;
CO3	Prepare for any upcoming Grid deployments and be able to get started with a potentially available Grid setup
CO4	Discuss some of the enabling technologies e.g. high-speed links and storage area networks
CO5	Build computer grids.
Course Outcomes	**SOFTWARE TESTING LAB**
CO1	Find practical solutions to the problems
CO2	Solve specific problems alone or in teams
CO3	Manage a project from beginning to end
CO4	Work independently as well as in teams
Course Outcomes	**DATA WARE HOUSING AND DATA MINING LAB**
CO1	The data mining process and important issues around data cleaning, pre-processing and integration.
CO2	The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.
Course Outcomes	**INTELLECTUAL PROPERTY RIGHTS AND PATENTS**
CO1	IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents

CO2	Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.
IV Year I Semester	
Course Outcomes	**CRYPTOGRAPHY AND NETWORK SECURITY**
CO1	To be familiarity with information security awareness and a clear understanding of its importance.
CO2	To master fundamentals of secret and public cryptography
CO3	To master protocols for security services
CO4	To be familiar with network security threats and countermeasures
CO5	To be familiar with network security designs using available secure solutions (such asPGP, SSL, IPSec, etc)
Course Outcomes	**WEB TECHNOLOGIES**
CO1	Analyze a web page and identify its elements and attributes.
CO2	Create web pages using XHTML and Cascading Styles sheets.
CO3	Build dynamic web pages.
CO4	Build web applications using PHP.
CO5	Programming through PERL and Ruby
CO6	Write simple client-side scripts using AJAX
Course Outcomes	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
CO2	One 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.
CO3	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
Course Outcomes	**BIG DATA ANALYTICS**
CO1	Preparing for data summarization, query, and analysis.
CO2	Applying data modeling techniques to large data sets
CO3	Creating applications for Big Data analytics
CO4	Building a complete business data analytic solution
Course Outcomes	**INFORMATION RETRIEVAL SYSTEMS**

CO1	Identify basic theories in information retrieval systems
CO2	Identify the analysis tools as they apply to information retrieval systems
CO3	Understands the problems solved in current IR systems
CO4	Describes the advantages of current IR systems
CO5	Understand the difficulty of representing and retrieving documents
CO6	Understand the latest technologies for linking, describing and searching the web.
Course Outcomes	**MOBILE COMPUTING**
CO1	Able to think and develop new mobile application.
CO2	Able to take any new technical issue related to this new paradigm and come up with a
CO3	Able to develop new ad hoc network applications and/or algorithms/protocols
CO4	Able to understand & develop any existing or new protocol related to mobile environment
Course Outcomes	**CLOUD COMPUTING**
CO1	Understanding the key dimensions of the challenge of Cloud Computing
CO2	Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization
CO3	Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
CO4	Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas
Course Outcomes	**SOFTWARE PROJECT MANAGEMENT**
CO1	To match organizational needs to the most effective software development model
CO2	To understand the basic concepts and issues of software project management
CO3	To effectively Planning the software projects
CO4	To implement the project plans through managing people, communications and change
CO5	To select and employ mechanisms for tracking the software projects
CO6	To conduct activities necessary to successfully complete and close the Software projects
CO7	To develop the skills for tracking and controlling software deliverables
CO8	To create project plans that address real-world management challenges
Course Outcomes	**WEB TECHNOLOGIES LAB**

CO1	To acquire knowledge of XHTML, Java Script and XML to develop web applications
CO2	Ability to develop dynamic web content using Java Servlets and JSP
CO3	To understand JDBC connections and Java Mail API
CO4	To understand the design and development process of a complete web application

IV Year – II Semester

Course Outcomes	**DISTRIBUTED SYSTEMS**
CO1	Develop a familiarity with distributed file systems.
CO2	Describe important characteristics of distributed systems and the salient architectural features of such systems.
CO3	Describe the features and applications of important standard protocols which are used in distributed systems.
CO4	Gaining practical experience of inter-process communication in a distributed environment
Course Outcomes	**MANAGEMENT SCIENCE**
CO1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
CO2	Will familiarize with the concepts of functional management project management and strategic management.
Course Outcomes	**MACHINE LEARNING**
CO1	Recognize the characteristics of machine learning that make it useful to real-world problems
CO2	Characterize machine learning algorithms as supervised, semi-supervised, and Unsupervised.
CO3	Have heard of a few machine learning toolboxes.
CO4	Be able to use support vector machines.
CO5	Be able to use regularized regression algorithms.
CO6	Understand the concept behind neural networks for learning non-linear functions.
Course Outcomes	**CONCURRENT AND PARALLEL PROGRAMMING**
CO1	Understanding improvement of CPP concepts presented
CO2	The number of reinforcement–exercises assigned

CO3	The time required for the resolution of exercises
CO4	Compliance level with the new model of theoretical teaching
Course Outcomes	**ARTIFICIAL NEURAL NETWORKS**
CO1	This course has been designed to offer as a graduate-level/ final year undergraduate level elective subject to the students of any branch of engineering/ science, having basic foundations of matrix algebra, calculus and preferably (not essential) with a basic knowledge of optimization.
CO2	Students and researchers desirous of working on pattern recognition and classification, regression and interpolation from sparse observations; control and optimization are expected to find this course useful. The course covers theories and usage of artificial neural networks (ANN) for problems pertaining to classification (supervised/unsupervised) and regression
CO3	The course starts with some mathematical foundations and the structures of artificial neurons, which mimics biological neurons in a grossly scaled down version. It offers mathematical basis of learning mechanisms through ANN. The course introduces perceptrons, discusses its capabilities and limitations as a pattern classifier and later develops concepts of multilayer perceptrons with back propagation learning
Course Outcomes	**OPERATION RESEARCH**
CO1	Methodology of Operations Research
CO2	Linear programming: solving methods, duality, and sensitivity analysis.
CO3	Integer Programming.
CO4	Network flows.
CO5	Multi-criteria decision techniques.
CO6	Decision making under uncertainty and risk.
CO7	Game theory. Dynamic programming.

ELECTRONICS AND COMMUNICATION ENGINEERING (R19)	
	1-YEAR-1 SEMESTER
COURSE OUTCOMES	**ENGLISH**
CO1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specificinformation
CO2	ask and answer general questions on familiar topics and introduceoneself/others
CO3	employ suitable strategies for skimming and scanning to get the general idea of a text and locate specificinformation
CO4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
CO5	form sentences using proper grammatical structures and correct wordforms
CORSE OUTCOMES	**MATHEMATICS-1**
CO1	utilize mean value theorems to real life problems (L3)
CO2	solve the differential equations related to various engineering fields(L3)
CO3	familiarize with functions of several variables which is useful in optimization(L3)
CO4	Apply double integration techniques in evaluating areas bounded by region(L3)
CO5	students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems (L5)
COURSE OUTCOMES	**APPLIED CHEMISTRY**
CO1	Outline the properties of polymers and various additives added and different methods of forming plasticmaterials
CO2	Explain the preparation, properties and applications of some plasticmaterials.
CO3	Explain the theory of construction of battery and fuelcells.
CO4	Understand the importance of materials like nanomaterials and fullerenes and theiruses.
CO5	Obtain the knowledge of computationalchemistry
CO6	explain the different applications of analyticalinstruments.
COURSE OUTCOMES	**PROGRAMMING FOR PROBLEM SOLVING USING C**
CO1	To write algorithms and to draw flowcharts for solvingproblems
CO2	To convert flowcharts/algorithms to C Programs, compile and debugprograms
CO3	To use different operators, data types and write programs that use two-way/ multi-way selection
CO4	To select the best loop construct for a givenproblem
CO5	To design and implement programs to analyze the different pointerapplications
CO6	To decompose a problem into functions and to develop modular reusablecode

CO7	To apply File I/Ooperation
CORSE OUTCOMES	ENGINEERING DRAWING
CO1	The student will learn how to visualize 2D & 3D objects.
COUSE OUTCOMES	**APPLIED CHEMISTRY LAB**
CO1	The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills
COURSE OUTCOMES	**PROGRAMMING FOR PROBLEM SOLVING USING C**
CO1	Gains Knowledge on various concepts of a Clanguage.
CO2	Able to draw flowcharts and writealgorithms.
CO3	Able design and development of C problem solvingskills.
CO4	Able to design and develop modular programmingskills.
CO5	Able to trace and debug aprogram
	1-YEAR-II SEMESTER
COURSE OUTCOMES	**MATHEMATICS-2**
CO1	develop the use of matrix algebra techniques that is needed by engineers for practical applications(L6)
CO2	solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel(L3)
CO3	evaluate approximating the roots of polynomial and transcendental equations by different algorithms(L5
CO4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals(L3)
CO5	apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations(L3)
COURSE OUTCOMES	**MATHEMATICS-III**
CO1	interpret the physical meaning of different operators such as gradient, curl anddivergence (L5)
CO2	estimate the work done against a field, circulation and flux using vector calculus(L5)
CO3	apply the Laplace transform for solving differential equations(L3)
CO4	find or compute the Fourier series of periodic signals(L3)
CO5	know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms(L3)
CO6	identify solution methods for partial differential equations that model physical processes (L3)
COURSE OUTCOMES	**APPLED PHYSICS**

CO1	explainthe need of coherent sources and the conditions for sustainedinterference.
CO2	analyzethe physical significance of wavefunction
CO3	classifythe magnetic materials based on susceptibility and their temperaturedependence.
CO4	interpretthe effects of temperature on Fermi Dirac distributionfunction
CO5	Apply the concept of magnetism to magneticdevices.
COURSE OUTCOMES	**NETWORK ANALYSIS**
CO1	gain the knowledge on basic networkelements
CO2	will analyze the RLC circuits behavior indetailed.
CO3	analyze the performance of periodicwaveforms.
CO4	gain the knowledge in characteristics of two port network parameters (Z,Y,ABCD,h &g).
CO5	analyze the filter design concepts in real worldapplications.
COURSE OUTCOMES	**BASIC ELECTRIC ENGINEERING**
CO1	Able to explain the operation of DC generator and analyze the characteristics of DC generator.
CO2	Able to explain the principle of operation of DC motor and analyze their characteristics. Acquire the skills to analyze the starting and speed control methods of DCmotors.
CO3	Ability to analyze the performance and speed – torque characteristics of a 3-phase induction motor and understand starting methods of 3-phase inductionmotor.
CO4	Able to explain the operation of SynchronousMachines
CO5	Capability to understand the operation of various specialmachines.
COURSE OUTCOMES	**BASIC ELECTRIC ENGINEERING LAB**
CO1	Determine and predetermine the performance of DC machines andtransformers
CO2	Control the DC shunt machines.
CO3	Compute the performance of 1-phasetransformer
CO4	Perform tests on 3-phase induction motor and alternator to determine theirperformance characteristics.
	II YEAR 1-SEMESTER
COURSE OUTCOMES	**ELECTRONIC DEVICES AND CIRCUITS**
CO1	Apply the basic concepts of semiconductor physics.
CO2	Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
CO3	Understand the construction, principle of operation of transistors, BJT and FET withtheir V-I characteristics in different configurations
CO4	Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions.
CO5	Perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.

COURSE OUTCOMES	**SWITCHING THEORY AND LODICAL DESIGN**
CO1	Design different types of combinational logiccircuits.
CO2	The operation and design methodology for synchronous sequential circuits and algorithmic statemachines
CO3	Produce innovative designs by modifying the traditional designtechniques
CO4	Classify different number systems and apply to generate variouscodes
CO5	Use the concept of Boolean algebra in minimization of switchingfunctions
COURSE OUTCOMES	**SIGNALS and SYSTEMS**
CO1	Analyze the frequency domain representation of signals using Fourierconcepts
CO2	Classify the systems based on their properties and determine the response ofLTI Systems.
CO3	Know the sampling process and various types of samplingtechniques
CO4	Apply Laplace and z-transforms to analyze signals and Systems (continuous &discrete).
CO5	Differentiate the various classifications of signals andsystems
COURSE OUTCOMES	**RANDOM VARIABLES and STOCHASTIC PROCESSES**
CO1	Mathematically model the random phenomena and solve simple probabilisticproblems
CO2	Identify different types of random variables and compute statistical averages ofthese randomvariables.
CO3	Characterize the random processes in the time and frequencydomains.
CO4	Analyze the LTI systems with randominputs
COURSE OUTCOMES	**OBJECT ORIENTED PROGRAMMING THROUGH JAVA**
CO1	Show competence in the use of the Java programming language in the development of small to mediumsized application programs that demonstrate professionally acceptable coding and performance standard
CO2	Illustrate the basic principles of the object-oriented programming
CO3	Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming.
COURSE OUTCOMES	**MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS**
CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for aproduct.
CO2	The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination ofinputs.
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 BusinessUnits.
CO4	The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decisionmaking.
CO5	The Learner is able to prepare Financial Statements and the usage of various Accounting tools forAnalysis

COURSE OUTCOMES	**CONSTITUTION OF INDIA**
CO1	Understand the concept of Indianconstitution
CO2	Differentiate between the state and centralgovernment
CO3	Differentiate between structure and functions of statesecretariat
CO4	Evaluate Zillapanchayat block levelorganisation
CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustainingdemocracy. 1. Know the sources, features and principles of IndianConstitution. 2. Learn about Union Government, State government and itsadministration. 3. Get acquainted with Local administration and PachayatiRaj. 4. Be aware of basic concepts and developments of HumanRights. 5. Gain knowledge on roles and functioning of ElectionCommission
	II YEAR II-SEMESTER
COURSE OUTCOMES	**ELECTRONIC CIRCUIT ANALYSIS**
CO1	Design and analysis ofsmall signal high frequency transistor amplifier using BJT and FET
CO2	Designandanalysisofmultistageamplifiersusing BJTandFETandDifferential amplifier usingBJT.
CO3	Derive the expressions for frequency ofoscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stabilityconcept.
CO4	Know the classification of the power and tuned amplifiers and their analysiswith performance comparison.
COURSE OUTCOMES	**LINEAR CONTROL SYSTEMS**
CO1	This course introduces the concepts of feedback and its advantages to various controlsystems
CO2	The performance metrics to design the control system in time-domain and frequency domain areintroduced
CO3	Control systems for various applications can be designed using time-domain and frequency domainanalysis
CO4	In addition to the conventional approach, the state space approach for the analysis of control systems isalsointroduced.
COURSE OUTCOMES	**ELECTROMAGNETIC WAVES and TRANSMISSION LINES**
CO1	Determine E and H using various laws and applications of electric & magneticfields
CO2	Apply the Maxwell equations to analyze the time varying behavior of EMwaves
CO3	Gain the knowledge in uniform plane wave concept and characteristics of uniformplane wave invariousmedia
CO4	Calculate Brewster angle, critical angle and total internalreflection
CO5	Derive andCalculate the expressions for input impedance of transmission lines,reflection coefficient, VSWR etc. using smithchart

COURSE OUTCOMES	**ANALOG COMMUNICATIONS**
CO1	Differentiate various Analog modulation and demodulationschemes and their spectralcharacteristics
CO2	Analyze noise characteristics of various analog modulationmethods
CO3	Analyze various functional blocks of radio transmitters andreceivers
CO4	Design simple analog systems for various modulationtechniques.
COURSE OUTCOMES	**COMPUTER ARCHITECTURE and ORGANIZATION**
CO1	Students can understand the architecture ofmoderncomputer
CO2	They can analyze the Performance of a computer usingperformanceequation
CO3	Understanding of differentinstructiontypes.
CO4	They can understand how computer stores positive andnegativenumbers.
CO5	Understand the concepts of I/O Organization and Memorysystems
COURSE OUTCOMES	**MANAGEMENT and ORGANISATIONAL BEHAVIOUR**
CO1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizationalstructure
CO2	Will familiarize with the concepts of functional management that is HRM and Marketing of new productdevelopments
CO3	The learner is able to think in strategically through contemporary managementpractices
CO4	The learner can develop positive attitude through personality development and can equip with motivationaltheories
CO5	The student can attain the group performance and grievance handling in managing the organizationalculture
	III YEAR I-SEMESTER
COURSE OUTCOMES	**LINEAR INTEGRATED CIRCUITS and APPLICATIONS**
CO1	Design circuits using operational amplifiers for variousapplications
CO2	Analyze and design amplifiers and active filters usingOp-amp.
CO3	Understand the gain-bandwidth concept and frequency response of the amplifier configurations
CO4	Diagnose and trouble-shoot linear electroniccircuits
CO5	Understand thoroughly the operational amplifiers with linear integratedcircuits.
COURSE OUTCOMES	**MICROPROCESSOR AND MICROCONTROLLERS**
CO1	Understand the architecture of microprocessor/ microcontroller and theiroperation
CO2	Demonstrate programming skills in assembly language for processors andControllers.
CO3	Analyze various interfacing techniques and apply them for the design of processor/Controller basedsystems.
COURSE OUTCOMES	**DIGITAL COMMUNICATIONS**

CO1	Analyze the performance of a Digital Communication System for probability of error and are able to design a digital communicationsystem.
CO2	Analyze various source codingtechniques.
CO3	Design a coded communicationsystem.
COURSE OUTCOMES	**ELECTRONIC MEASUREMENTS & INSTRUMENTATION**
CO1	Select the instrument to be used based on therequirements.
CO2	Understand and analyze different signal generators andanalyzers.
CO3	Understand the design of oscilloscopes for differentapplications.
CO4	Design different transducers for measurement of differentparameters
COURSE OUTCOMES	**DATASTRUCTURES and ALGORITHMS**
CO1	Demonstrate analytical comprehension of concepts such as abstract datatypes
CO2	Demonstrate the ability to analyze, design, apply and use data structures and algorithms to solve engineering problems and evaluate theirsolutions.
CO3	Demonstrate the ability of using generic principles for data representation & manipulation with a view for efficiency, maintainability, andcode-reuse.
COURSE OUTCOMES	**ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**
CO1	Understand the concept of Traditional knowledge and itsimportance
CO2	Know the need and importance of protecting traditionalknowledge
CO3	Know the various enactments related to the protection of traditionalknowledge
CO4	Understand the concepts of Intellectual property to protect the traditionalknowledge
	III YEAR II-SEMESTER
COURSE OUTCOMES	**WIRED and WIRELESS TRANSMISSION DEVICES**
CO1	Identify basic antennaparameters.
CO2	Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and micro stripantennas
CO3	Quantify the fields radiated by various types ofantennas
CO4	Identify the characteristics of radio wavepropagation
CO5	Analyze antenna measurements to assess antenna'sperformance
COURSE OUTCOMES	**VLSI DESIGN**
CO1	Demonstrate a clear understanding of CMOS fabrication flow and technology scaling.
CO2	Apply the design Rulesand draw layout of a given logic circuit.
CO3	Design basic building blocks in Analog IC design.
CO4	Analyze the behaviour of static and dynamic logic circuits.
CO5	Design amplifier circuits using MOS transistors.
COURSE OUTCOMES	**DIGITAL SIGNAL PROCESSING**
CO1	Formulate engineering problems in terms of DSPoperations

CO2	Analyze digital signals andsystems
CO3	Analyze discrete time signals in frequencydomain
CO4	Design digital filters and implement with differentstructures
CO5	Understand the keyarchitectural
COURSE OUTCOMES	**CELLULAR & MOBILE COMMUNICATION**
CO1	Identify the limitations of conventional mobile telephone systems; understandthe concepts of cellularsystems
CO2	Understand the frequency management, channel assignment strategies and antennasin cellularsystems.
CO3	Understand the concepts of handoff and architectures of various cellularsystems
COURSE OUTCOMES	**Data Mining**
CO1	Understand Data MiningPrinciples
CO2	Identify appropriate data mining algorithms to solve real world problems
CO3	Compare and evaluate different data mining techniques like classification, prediction, clustering and association rulemining
COURSE OUTCOMES	**INTERNET OF THINGS**
CO1	Understand internet of Things and its hardware and softwarecomponents.
CO2	Interface I/O devices, sensors &communicationmodules.
CO3	Remotely monitor data and controldevices.
CO4	Design real time IoT basedapplications
COURSE OUTCOMES	**Intellectual Property Rights (IPR) & Patents**
CO1	IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seekPatents
CO2	Student get an insight on Copyrights, Patents and Software patents which are instrumental for furtheradvancements
CO3	advanced Technical and Scientific disciplines
CO4	Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latestdevelopments
	IV YEAR I-SEMESTER
COURSE OUTCOMES	**MICROWAVE and OPTICAL COMMUNICATION ENGINEERING**
CO1	Design different modes in waveguidestructures
CO2	Calculate S-matrix for various waveguide components and splitting the microwave energy in a desireddirection
CO3	Distinguish between Microwave tubes and Solid State Devices, calculation of efficiency devices
CO4	Measure various microwave parameters using a Microwave testbench
COURSE OUTCOMES	**DATA COMMUNICATIONS & COMPUTER NETWORKS**
CO1	Know the Categories and functions of various Data communication Networks
CO2	Design and analyze various error detectiontechniques.

CO3	Demonstrate the mechanism of routing the data in networklayer
CO4	Know the significance of various Flow control and Congestion controlMechanisms
CO5	Know the Functioning of various Application layerProtocols.
COURSE OUTCOMES	**DIGITAL IMAGE and VIDEO PROCESSING**
CO1	Defining the digital image, representation of digital image, importance of image resolution, applications in imageprocessing
CO2	Understand image degradation, image restoration techniques using spatial filtersand frequencydomain
CO3	Understand the redundancy in images, various image compressiontechniques.
CO4	Know the video technology from analog color TV systems to digital video systems,how video signal is sampled and filtering operations in videoprocessing
CO5	Know the general methodologies for 2D motion estimation, various coding used invideo processing
COURSE OUTCOMES	**ANALOG IC DESIGN**
CO1	Model and simulate different MOS Devices using small signalModel.
CO2	Design and analyze any Analog Circuits in real timeapplications.
CO3	Apply the concepts Analog Circuit Design to develop various Applications in RealTime.
CO4	Analyze and comparedifferentOpen-Loop Comparators andOscillators
	IV YEAR II-SEMESTER
COURSE OUTCOMES	**WIRELESS COMMUNICATION**
CO1	Know about the Wireless systems and Standards (1G/2G/3Gsystems).
CO2	Concept and analysis of CDMA-based wirelessnetworks.
CO3	Understand the concepts of Multiple-Input Multiple-Output(MIMO).
CO4	Understand the modern wireless systems usingOFDM.
CO5	Analysis of Satellite-Based Wirelesssystems.
COURSE OUTCOMES	**INDUSTRIAL INTERNET OF THINGS**
CO1	Understand the elements of IoT to build a total control plane in an Industrialapplication
CO2	Apply M2M protocols for development of IoT Applications.
CO3	Learn and understand the concept of digitalization and dataacquisition.
CO4	Build smart factory based on the IoTconcepts
CO5	Build Industrial DigitalTwins.
COURSE OUTCOMES	**BLOCKCHAIN TECHNLOGY**
CO1	Demonstrate the foundation of the Block chain technology and understand the processes in payment andfunding
CO2	Identify the risks involved in building Block chainapplications.
CO3	Review of legal implications using smartcontracts.

CO4	Choose the present landscape of Blockchain implementations and Understand Crypto currencymarkets
CO5	Examine how to profit from trading cryptocurrencies

	ELECTRONICS AND COMMUNICATION ENGINEERING (R16)
	I YEAR - I SEMESTER
COURSE OUTCOMES	**ENGLISH – I**
CO1	Using English languages, both written and spoken, competently and correctly
CO2	Improving comprehension and fluency of speech
CO3	Gaining confidence in using English in verbal situations
COURSE OUTCOMES	**MATHEMATICS - I**
CO1	Solve linear differential equations of first, second and higher order
CO2	Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE
CO3	Calculate total derivative, Jocobian and minima of functions of two variables
COURSE OUTCOMES	**APPLIED PHYSICS**
CO1	Construction and working details of instruments, ie, Interferometer, Diffractometer and Polarimeter are learnt
CO2	Study EM-fields and semiconductors under the concepts of Quantum mechanics paves way for their optimal
COURSE OUTCOMES	**COMPUTER PROGRAMMING**
CO1	Understand the basic terminology used in computer programming
CO2	Write, compile and debug programs in C language
CO3	Use different data types in a computer program
CO4	Design programs involving decision structures, loops and functions
CO5	Explain the difference between call by value and call by reference
CO6	Understand the dynamics of memory by the use of pointers
CO7	Use different data structures and create/update basic data files
COURSE OUTCOMES	**ENGLISH - COMMUNICATION SKILLS LAB- 1**
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world
CO2	The course content along with the study material is divided into six units
COURSE OUTCOMES	**APPLIED / ENGINEERING PHYSICS LAB**
CO1	Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements
COURSE OUTCOMES	**APPLIED / ENGINEERING PHYSICS VIRTUAL LABS - ASSIGNMENTS**
CO1	Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper
COURSE OUTCOMES	**ENGINEERING WORKSHOP & IT WORKSHOP**
CO1	Common understanding of concepts, patterns of decentralization implementation in Africa †
CO2	Identified opportunities for coordinated policy responses, capacity building and implementation of best practices

CO3	Identified instruments for improved decentralization to the local level †
CO4	Identified strategies for overcoming constraints to effective decentralization and sustainable management at different levels
	I YEAR - II SEMESTER
COURSE OUTCOMES	**ENGLISH - II**
CO1	Underscores that the ultimate aim of Education is to enhance wisdom
CO2	Enables the students to promote peaceful co-existence and universal harmony among people and society
CO3	Imparts the students to manage different cultural shocks due to globalization
CO4	The theme projects society's need to re examine its traditions when they are outdated
CO5	Offers several inputs to protect environment for the sustainability of the future generations
CO6	Pupil get inspired by eminent personalities who toiled for the present day advancement of software development
COURSE OUTCOMES	**MATHEMATICS - III**
CO1	Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations
CO2	Solve simultaneous linear equations numerically using various matrix methods
CO3	Determine double integral over a region and triple integral over a volume
CO4	Calculate gradient of a scalar function, divergence and curl of a vector function Determine line, surface and volume integrals Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals
COURSE OUTCOMES	**APPLIED CHEMISTRY**
CO1	The advantages and limitations of plastic materials and their use in design would be understood
CO2	Fuels which are used commonly and their economics, advantages and limitations are discussed
CO3	Reasons for corrosion and some methods of corrosion control would be understood
CO4	The students would be now aware of materials like nanomaterials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood
CO5	The importance of green synthesis is well understood and how they are different from conventional methods is also explained.
CO6	Conductance phenomenon is better understood. The students are exposed to some of the alternative fuels and their advantages and limitations.
COURSE OUTCOMES	**ELECTRICAL & MECHANICAL TECHNOLOGY**
CO1	Working of I.C. Engines
CO2	Modes of Heat transfer
CO3	Power transmission by drives and different manufacturing methods
COURSE OUTCOMES	**ENVIRONMENTAL STUDIES**

CO1	The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
CO2	The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
CO3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO4	Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO5	Social issues both rural and urban environment and the possible means to combat the challenges
CO6	The environmental legislations of India and the first global initiatives towards sustainable development
CO7	About environmental assessment and the stages involved in EIA and the environmental audit
CO8	Self Sustaining Green Campus with Environment Friendly aspect of – Energy, Water and Wastewater reuse Plantation, Rain water Harvesting, Parking Curriculum
COURSE OUTCOMES	**DATA STRUCTURES**
CO1	Apply advanced data structure strategies for exploring complex data structures
CO2	Compare and contrast various data structures and design techniques in the area Of Performance
CO3	Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs
COURSE OUTCOMES	**APPLIED/ENGINEERING CHEMISTRY LABORATORY**
CO1	The students entering into the professional course have practically very little exposure to lab classes
CO2	The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis
CO3	Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments They thus acquire some experimental skills
COURSE OUTCOMES	**ENGLISH - COMMUNICATION SKILLS LAB - 2**
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world
CO2	The course content along with the study material is divided into six units
COURSE OUTCOMES	**COMPUTER PROGRAMMING LAB**
CO1	Apply and practice logical ability to solve the problems
CO2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment

CO3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
CO4	Understand and apply the in-built functions and customized functions for solving the problems
CO5	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems
CO6	Document and present the algorithms, flowcharts and programs in form of user-manuals
CO7	Identification of various computer components, Installation of software
	II YEAR - I SEMESTER
COURSE OUTCOMES	**ELECTRONIC DEVICES AND CIRCUITS**
CO1	Understand the basic concepts of semiconductor physics
CO2	Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation
CO3	Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons
CO4	Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations
CO5	Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions
CO6	Perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations
COURSE OUTCOMES	**SIGNALS & SYSTEMS**
CO1	Characterize the signals and systems and principles of vector spaces, Concept of orthogonality
CO2	Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform
CO3	Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back
CO4	Understand the relationships among the various representations of LTI systems
CO5	Understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships
CO6	Apply z-transform to analyze discrete-time signals and systems
COURSE OUTCOMES	**NETWORK ANALYSIS**
CO1	Gain the knowledge on basic network elements
CO2	Will analyze the RLC circuits behaviour in detailed
CO3	Analyze the performance of periodic waveforms
CO4	Gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h & g)
CO5	Analyze the filter design concepts in real world applications
COURSE OUTCOMES	**RANDOM VARIABLES & STOCHASTIC PROCESSES**
CO1	Mathematically model the random phenomena and solve simple probabilistic problems
CO2	Identify different types of random variables and compute statistical averages of these random variables

CO3	Characterize the random processes in the time and frequency domains
CO4	Analyze the LTI systems with random inputs
CO5	Apply these techniques to analyze the systems in the presence of different types of noise
COURSE OUTCOMES	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs
CO2	One 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
CO3	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making
COURSE OUTCOMES	**NETWORKS & ELECTRICAL TECHNOLOGY LAB**
CO1	Able to analyse RLC circuits and understand resonant frequency and Q-factor
CO2	Able to determine first order RC/RL networks of periodic non- sinusoidal waveforms
CO3	Able to apply network theorems to analyze the electrical network
CO4	Able to describe the performance of dc shunt machine
CO5	Able to investigate the performance of 1-phase transformer
CO6	Able to perform tests on 3-phase induction motor and alternator to determine their performance characteristic
	II YEAR - II SEMESTER
COURSE OUTCOMES	**ELECTRONIC CIRCUIT ANALYSIS**
CO1	Design and analysis of small signal high frequency transistor amplifier using BJT and FET
CO2	Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT
CO3	Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept
CO4	Know the classification of the power and tuned amplifiers and their analysis with performance comparison
COURSE OUTCOMES	**CONTROL SYSTEMS**
CO1	This course introduces the concepts of feedback and its advantages to various control systems
CO2	The performance metrics to design the control system in time-domain and frequency domain are introduced
CO3	Control systems for various applications can be designed using time-domain and frequency domain analysis
CO4	In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced

COURSE OUTCOMES	EM WAVES AND TRANSMISSION LINES
CO1	Determine E and H using various laws and applications of electric & magnetic fields
CO2	Apply the Maxwell equations to analyze the time varying behavior of EM waves
CO3	Gain the knowledge in uniform plane wave concept and characteristics of uniform plane wave in various media
CO4	Calculate Brewster angle, critical angle and total internal reflection
CO5	Derive the expressions for input impedance of transmission lines
CO6	Calculate reflection coefficient, VSWR etc. using smith chart
COURSE OUTCOMES	**ANALOG COMMUNICATIONS**
CO1	Differentiate various Analog modulation and demodulation schemes and their spectral characteristics
CO2	Analyze noise characteristics of various analog modulation methods
CO3	Analyze various functional blocks of radio transmitters and receivers
CO4	Design simple analog systems for various modulation techniques
COURSE OUTCOMES	**PULSE AND DIGITAL CIRCUITS**
CO1	Design linear and non-linear wave shaping circuits
CO2	Apply the fundamental concepts of wave shaping for various switching and signal generating circuits
CO3	Design different multivibrators and time base generators
CO4	Utilize the non sinusoidal signals in many experimental research areas
COURSE OUTCOMES	**MANAGEMENT SCIENCE**
CO1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior
CO2	Will familiarize with the concepts of functional management project management and strategic management
	III YEAR - I SEMESTER
COURSE OUTCOMES	**COMPUTER ARCHITECTURE AND ORGANIZATION**
CO1	Students can understand the architecture of modern computer
CO2	They can analyze the Performance of a computer using performance equation
CO3	Understanding of different instruction types
CO4	Students can calculate the effective address of an operand by addressing modes
CO5	They can understand how computer stores positive and negative numbers
CO6	Understanding of how a computer performs arithmetic operation of positive and negative numbers
COURSE OUTCOMES	**LINEAR IC APPLICATIONS**
CO1	Design circuits using operational amplifiers for various applications
CO2	Analyze and design amplifiers and active filters using Op-amp
CO3	Diagnose and trouble-shoot linear electronic circuits
CO4	Understand the gain-bandwidth concept and frequency response of the amplifier configurations

CO5	Understand thoroughly the operational amplifiers with linear integrated circuits
COURSE OUTCOMES	**DIGITAL IC APPLICATIONS**
CO1	Understand the structure of commercially available digital integrated circuit families
CO2	Learn the IEEE Standard 1076 Hardware Description Language (VHDL)
CO3	Model complex digital systems at several levels of abstractions, behavioral, structural, simulation, synthesis and rapid system prototyping
CO4	Analyze and design basic digital circuits with combinatorial and sequential logic circuits using VHDL
COURSE OUTCOMES	**DIGITAL COMMUNICATIONS**
CO1	Determine the performance of different waveform coding techniques for the generation and digital representation of the signals
CO2	Determine the probability of error for various digital modulation schemes
CO3	Analyze different source coding techniques
CO4	Compute and analyze different error control coding schemes for the reliable transmission of digital information over the channel
COURSE OUTCOMES	**ANTENNA AND WAVE PROPAGATION**
CO1	Identify basic antenna parameters
CO2	Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and microstrip antennas
CO3	Quantify the fields radiated by various types of antennas
CO4	Design and analyze antenna arrays
CO5	Analyze antenna measurements to assess antenna's performance
CO6	Identify the characteristics of radio wave propagation
COURSE OUTCOMES	**PROFESSIONAL ETHICSAND HUMAN VALUES**
CO1	It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties
CO2	It provides the student the sensitivity and global outlook in the contemporary world to fulfil the professional obligations effectively
	III YEAR - II SEMESTER
COURSE OUTCOMES	**MICROWAVE ENGINEERING**
CO1	Design different modes in waveguide structures
CO2	Calculate S-matrix for various waveguide components and splitting the microwave energy in a desired direction
CO3	Distinguish between Microwave tubes and Solid State Devices, calculation of efficiency of devices
CO4	Measure various microwave parameters using a Microwave test bench
COURSE OUTCOMES	**VLSI DESIGN**
CO1	Understand the properties of MOS active devices and simple circuits configured when using them and the reason for such encumbrances as ratio rules by which circuits can be interconnected in silicon
CO2	Know three sets of design rules with which nMOS and CMOS designs may be fabricated

CO3	Understand the scaling factors determining the characteristics and performance of MOS circuits in silicon
COURSE OUTCOMES	**DIGITAL SIGNAL PROCESSING**
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
CO5	Use the Multirate Processing concepts in various applications(eg: Design of phase shifters, Interfacing of digital systems…)
CO6	Apply the signal processing concepts on DSP Processor
COURSE OUTCOMES	**OOPS THROUGH JAVA (OPEN ELECTIVE)**
CO1	Understand Java programming concepts and utilize Java Graphical User Interface in Program writing
CO2	Write, compile, execute and troubleshoot Java programming for networking concepts
CO3	Build Java Application for distributed environment
CO4	Design and Develop multi-tier applications
CO5	Identify and Analyze Enterprise applications
COURSE OUTCOMES	**DATA MINING (OPEN ELECTIVE)**
CO1	Understand stages in building a Data Warehouse
CO2	Understand the need and importance of preprocessing techniques
CO3	Understand the need and importance of Similarity and dissimilarity techniques
CO4	Analyze and evaluate performance of algorithms for Association Rules
CO5	Analyze Classification and Clustering algorithms
	IV YEAR - I SEMESTER
COURSE OUTCOMES	**RADAR SYSTEMS**
CO1	Derive the radar range equation and to solve some analytical problems
CO2	Understand the different types of radars and its applications
CO3	Understand the concept of tracking and different tracking techniques
CO4	Understand the various components of radar receiver and its performance
COURSE OUTCOMES	**DIGITAL IMAGE PROCESSING**
CO1	Perform image manipulations and different digital image processing techniques
CO2	Perform basic operations like – Enhancement, segmentation, compression, Image transforms and restoration techniques on image
CO3	Analyze pseudo and fullcolor image processing techniques
CO4	Apply various morphological operators on images
COURSE OUTCOMES	**COMPUTER NETWORKS**
CO1	Understand OSI and TCP/IP models
CO2	Analyze MAC layer protocols and LAN technologies
CO3	Design applications using internet protocols
CO4	Understand routing and congestion control algorithms
CO5	Understand how internet works

COURSE OUTCOMES	OPTICAL COMMUNICATIONS
CO1	Choose necessary components required in modern optical communications systems
CO2	Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers
CO3	Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems
CO4	Choose the optical cables for better communication with minimum losses Design, build, and demonstrate optical fiber experiments in the laboratory
COURSE OUTCOMES	**ELECTRONIC SWITCHING SYSTEMS (Elective- I)**
CO1	Evaluate the time and space parameters of a switched signal
CO2	Establish the digital signal path in time and space, between two terminals
CO3	Evaluate the inherent facilities within the system to test some of the SLIC, CODEC and digital switch functions
CO4	Investigate the traffic capacity of the system
CO5	Evaluate methods of collecting traffic data
CO6	Evaluate the method of interconnecting two separate digital switches
COURSE OUTCOMES	**EMBEDDED SYSTEMS (ELECTIVE - II)**
CO1	Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function
CO2	The hardware components required for an embedded system and the design approach of an embedded hardware
CO3	The various embedded firmware design approaches on embedded environment
CO4	Understand how to integrate hardware and firmware of an embedded system using real time operating system
COURSE OUTCOMES	**ANALOG IC DESIGN (ELECTIVE - II)**
CO1	Understand the concepts of MOS Devices and Modeling
CO2	Design and analyze any Analog Circuits in real time applications
CO3	Extend the Analog Circuit Design to Different Applications in Real Time
CO4	Understand of Open-Loop Comparators and Different Types of Oscillators
	IV YEAR - II SEMESTER
COURSE OUTCOMES	**CELLULAR AND MOBILE COMMUNICATIONS**
CO1	Identify the limitations of conventional mobile telephone systems; understand the concepts of cellular systems
CO2	Understand the frequency management, channel assignment strategies and antennas in cellular systems
CO3	Understand the concepts of handoff and architectures of various cellular systems
COURSE OUTCOMES	**ELECTRONIC MEASUREMENTS AND INSTRUMENTATION**
CO1	Select the instrument to be used based on the requirements
CO2	Understand and analyze different signal generators and analyzers
CO3	Understand the design of oscilloscopes for different applications
CO4	Design different transducers for measurement of different parameters

COURSE OUTCOMES	SATELLITE COMMUNICATIONS
CO1	Understand the concepts, applications and subsystems of Satellite communications
CO2	Derive the expression for G/T ratio and to solve some analytical problems on satellite link design
CO3	Understand the various types of multiple access techniques and architecture of earth station design
CO4	Understand the concepts of GPS and its architecture
COURSE OUTCOMES	**DIGITAL IC DESIGN (ELECTIVE-III)**
CO1	Understand the concepts of MOS Design
CO2	Design and analysis of Combinational and Sequential MOS Circuits
CO3	Extend the Digital IC Design to Different Applications
CO4	Understand the Concepts of Semiconductor Memories, Flash Memory, RAM array organization
COURSE OUTCOMES	**OPERATING SYSTEMS (ELECTIVE-III)**
CO1	Design various Scheduling algorithms
CO2	Apply the principles of concurrency
CO3	Design deadlock, prevention and avoidance algorithms
CO4	Compare and contrast various memory management schemes
CO5	Design and Implement a prototype file systems
CO6	Perform administrative tasks on Linux Servers
CO7	Introduction to Android Operating System Internals

MECHANICAL ENGINEERING (R19)	
	1-YEAR 1-SEMISTER
COURSE OUTCOMES	**Mathematics-I (BS1101)**
C01	utilize mean value theorems to real life problems (L3)
CO2	solve the differential equations related to various engineering fields (L3)
CO3	familiarize with functions of several variables which is useful in optimization
CO4	Apply double integration techniques in evaluating areas bounded by region (L3)
C05	students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems (L5)
COURSE OUTCOMES	**MATHEMATICS - II (BS1102)**
CO1	develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
CO2	solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel (L3)
CO3	evaluate approximating the roots of polynomial and transcendental equations by different algorithms (L5)
CO4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)
CO5	apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations (L3)
COURSE OUTCOMES	**ENGINEERING PHYSICS (BS1108)**
CO1	explain the concept of dielectric constant and polarization in dielectric materials
CO2	summarize various types of polarization of dielectrics
CO3	interpret Lorentz field and Claussius_Mosotti relation in dielectrics
CO4	classify the magnetic materials based on susceptibility and their temperature dependence
CO5	explain the applications of dielectric and magnetic materials
COURSE OUTCOMES	**PROGRAMMING FOR PROBLEM SOLVING USING C (ES1101**
CO1	To write algorithms and to draw flowcharts for solving problems
CO2	To convert flowcharts/algorithms to C Programs, compile and debug programs
CO3	To select the best loop construct for a given problem
CO4	To design and implement programs to analyze the different pointer applications
CO5	To apply File I/O operations
COURSE OUTCOMES	**ENGINEERING DRAWING (ES1103)**
CO1	The student will learn how to visualize 2D & 3D objects.
COURSE OUTCOMES	**PROGRAMMING FOR PROBLEM SOLVING USING C LAB (ES1102)**
CO1	Gains 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
COURSE OUTCOMES	**CONSTITUTION OF INDIA (MC1104**
CO1	Understand historical background of the constitution making and its importance for building a democratic India.
CO2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO3	Understand the value of the fundamental rights and duties for becoming good citizen of India.
CO4	Analyze the decentralization of power between central, state and local self-government.
CO5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy. 1
	1-YEAR 2-SEMISTER
COURSE OUTCOMES	**ENGINEERING CHEMISTRY (BS1210**
CO1	Outline the awareness of materials like nanomaterials and fullerenes and their uses.
CO2	Explain the techniques that detect and measure changes of state of reaction.
CO3	Illustrate the commonly used industrial materials.
CO4	Study alternate fuels.
CO5	Analyse flue gases.
COURSE OUTCOMES	**ENIGINEERING MECHANICS (BS1204)**
CO1	The student should be able to draw free body diagrams for FBDs for particles and rigid bodies in plane and space and problems to solve the unknown forces, orientations and geometric parameters.
CO2	He should be able to determine centroid for lines, areas and center of gravity for volumes and their composites
CO3	He should be able to determine area and mass movement of inertia for composite sections
CO4	He should be able to analyze motion of particles and rigid bodies and apply the principles of motion, work energy and impulse – momentum.
COURSE OUTCOMES	**BASIC ELECTRICAL & ELECTRONICS ENGINEERING (ES1206)**
CO1	Analyse various electrical networks.
CO2	Understand operation of DC generators,3-point starter and DC machine testing by Swinburne's Test and Brake test.
CO3	Analyse performance of single-phase transformer and acquire proper knowledge and working of 3-phase alternator and 3-phase induction motors.
CO4	Analyse operation of half wave, full wave bridge rectifiers and OP-AMPs.
CO5	Understanding operations of CE amplifier and basic concept of feedback amplifier.
COURSE OUTCOMES	**ENGINEERING CHEMISTRY LAB (BS1211)**

CO1	The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
COURSE OUTCOMES	**BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB (ES1208)**
CO1	Compute the efficiency of DC shunt machine without actual loading of the machine.
CO2	Estimate the efficiency and regulation at different load conditions and power factors for single phase transformer with OC and SC tests.
CO3	Analyse the performance characteristics and to determine efficiency of DC shunt motor &3-Phase induction motor.
CO4	Pre-determine the regulation of an alternator by synchronous impedance method.
CO5	Control the speed of dc shunt motor using Armature voltage and Field flux control methods.
CO6	Draw the characteristics of PN junction diode & transistor
CO7	Determine the ripple factor of half wave & full wave rectifiers
	II Year - I Semester
COURSE OUTCOMES	**VECTOR CALCULAUS & FOURIER TRANSFORMS**
CO1	Interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
CO2	Estimate the work done against a field, circulation and flux using vector calculus (L5)
CO3	Apply the Laplace transform for solving differential equations (L3).
CO4	Find or compute the Fourier series of periodic signals (L3)
CO5	Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms (L3)
CO6	Identify solution methods for partial differential equations that model physical processes (L3)
COURSE OUTCOMES	**MECHANICS OF SOLIDS**
CO1	Model & Analyze the behavior of basic structural members subjected to various loading and support conditions based on principles of equilibrium.
CO2	Understand the apply the concept of stress and strain to analyze and design structural members and machine parts under axial, shear and bending loads, moment and torsional moment.
CO3	Students will learn all the methods to analyze beams, columns, frames for normal, shear, and torsion stresses and to solve deflection problems in preparation for the design of such structural components. Students are able to analyse beams and draw correct and complete shear and bending moment diagrams for beams.
CO4	Students attain a deeper understanding of the loads, stresses, and strains acting on a structure and their relations in the elastic behavior
CO5	Design and analysis of Industrial components like pressure vessels.
COURSE OUTCOMES	**MATERIALS SCIENCE & METALLURGY**

CO1	Understand the crystalline structure of different metals and study the stability of phases in different alloy systems.
CO2	Study the behavior of ferrous and non ferrous metals and alloys and their application in different domains
CO3	Able to understand the effect of heat treatment, addition of alloying elements on properties of ferrous metals.
CO4	Grasp the methods of making of metal powders and applications of powder metallurgy
CO5	Comprehend the properties and applications of ceramic, composites and other advanced methods.
COURSE OUTCOMES	**PRODUCTION TECHNOLOGY**
CO1	Able to design the patterns and core boxes for metal casting processes
CO2	Able to design the gating system for different metallic components
CO3	Know the different types of manufacturing processes
CO4	Be able to use forging, extrusion processes
CO5	Learn about the different types of welding processes used for special fabrication
COURSE OUTCOMES	**THERMODYNAMICS**
CO1	After undergoing the course the student is expected to learn
CO2	Basic concepts of thermodynamics
CO3	Laws of thermodynamics
CO4	Concept of entropy
CO5	Property evaluation of vapors and their depiction in tables and charts
CO6	Evaluation of properties of perfect gas mixtures.
COURSE OUTCOMES	**MACHINE DRAWING**
CO1	CODraw and represent standard dimensions of different mechanical fasteners and joints and Couplings.
CO2	CODraw different types of bearings showing different components.
CO3	COAssemble components of a machine part and draw the sectional assembly drawing showing the dimensions of all the components of the assembly as per bill of materials
CO4	COSelect and represent fits and geometrical form of different mating parts in assembly drawings.
CO5	To prepare manufacturing drawings indicating fits, tolerances, surface finish and surface treatment requirements.
	II Year - II Semester
COURSE OUTCOMES	**COMPLEX VARIABLES & STATISTICAL METHODS**
CO1	apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic (L3)
CO2	find the differentiation and integration of complex functions used in engineering problems (L5)
CO3	make use of the Cauchy residue theorem to evaluate certain integrals (L3)
CO4	apply discrete and continuous probability distributions (L3)
CO5	design the components of a classical hypothesis test (L6)
CO6	infer the statistical inferential methods based on small and large sampling tests (L4)

COURSE OUTCOMES	**KINEMATICS OF MACHINERY**
CO1	Contrive a mechanism for a given plane motion with single degree of freedom.
CO2	Suggest and analyze a mechanism for a given straight line motion and automobile steering motion.
CO3	Analyze the motion (velocity and acceleration) of a plane mechanism.
CO4	Suggest and analyze mechanisms for a prescribed intermittent motion like opening and closing of IC engine valves etc.
CO5	Select a power transmission system for a given application and analyze motion of different transmission systems
COURSE OUTCOMES	**APPLIED THERMODYNAMICS**
CO1	Expected to learn the working of steam power cycles and also should be able to analyze and evaluate the performance of individual components
CO2	Student is able to learn the principles of combustion , stochiometry and flue gas analysis
CO3	Students will be able to design the components and calculate the losses and efficiency of the boilers, nozzles and impulse turbines.
CO4	Students will be able to design the components and calculate the losses and efficiency of reactions turbines and condensers.
CO5	Student is able to learn various types of compressors, principles of working and their performance evaluation.
COURSE OUTCOMES	**FLUID MECHANICS & HYDRAULIC MACHINES**
CO1	The basic concepts of fluid properties.
CO2	The mechanics of fluids in static and dynamic conditions.
CO3	Boundary layer theory, flow separation and dimensional analysis.
CO4	Hydrodynamic forces of jet on vanes in different positions.
CO5	Working Principles and performance evaluation of hydraulic pump and turbines.
COURSE OUTCOMES	**METAL CUTTING & MACHINE TOOLS**
CO1	Learned the fundamental knowledge and principals in material removal process.
CO2	Acquire the knowledge on operations in conventional, automatic, Capstan and turret lathes
CO3	capable of understanding the working principles and operations of shaping, slotting, planning , drilling and boring machines.
CO4	able to make gear and keyway in milling machines and understand the indexing mechanisms
CO5	Understand the different types of unconventional machining methods and principles of finishing processes.
COURSE OUTCOMES	**DESIGN OF MACHINE MEMBERS – I**
CO1	Calculate different stresses in the machine components subjected to various static loads, failures and suitability of a material for an engineering application.
CO2	Calculate dynamic stresses in the machine components subjected to variable loads.
CO3	Design riveted, welded, bolted joints, keys, cotters and knuckle joints subjected to static loads and their failure modes

CO4	Design the machine shafts and suggest suitable coupling for a given application.
CO5	Calculate stresses in different types of springs subjected to static loads and dynamic loads.
COURSE OUTCOMES	**ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**
CO1	Understand the concept of Traditional knowledge and its importance
CO2	Know the need and importance of protecting traditional knowledge
CO3	Know the various enactments related to the protection of traditional knowledge
CO4	Understand the concepts of Intellectual property to protect the traditional knowledge
	III Year - I Semester
COURSE OUTCOMES	**DYNAMICS OF MACHINERY**
CO1	To compute the frictional losses and transmission in clutches, brakes and dynamometers
CO2	To determine the effect of gyroscopic couple in motor vehicles, ships and aeroplanes
CO3	To analyze the forces in four bar and slider crank mechanisms and design a flywheel
CO4	To determine the rotary unbalanced mass in reciprocating equipment
CO5	To determine the unbalanced forces and couples in reciprocating and radial engines
CO6	To determine the natural frequencies of discrete systems undergoing longitudinal, torsional and transverse vibrations.
COURSE OUTCOMES	**DESIGN OF MACHINE MEMBERS-II**
CO1	Select the suitable bearing based on the application of the loads and predict the life of the bearing
CO2	Design of IC Engines parts
CO3	Design of power transmission elements such as gears, belts, chains, pulleys, ropes, levers and power screws.
CO4	Select the suitable bearing based on the application of the loads and predict the life of the bearing
COURSE OUTCOMES	**MECHANICAL MEASUREMENTS & METROLOGY**
CO1	Describe the construction and working principles of measuring instruments for measurement of displacement and speed and select appropriate instrument for a given application.
CO2	Describe the construction and working principles of measuring instruments for strain, force, Torque, power, acceleration and Vibration and select appropriate instrument for a given application.
CO3	Explain shaft basis system and hole basis systems for fits and represent tolerances for a given fit as per the shaft basis system and hole basis system and design limit gauges based on the tolerances for quality check in mass production
CO4	Explain methods for linear, angle and flatness measurements and select a suitable method and its relevant instrument for a given application.
CO5	To measure the threads, gear tooth profiles, surface roughness and flatness using appropriate instruments and analyze the data

COURSE OUTCOMES	**MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY**
CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities 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
COURSE OUTCOMES	**IC ENGINES & GAS TURBINES**
CO1	Derive the actual cycle from fuel-air cycle and air- standard cycle for all practical applications.
CO2	Explain working principle and various components of IC engine
CO3	Explain combustion phenomenon of CI and SI engines and their impact on engine variables.
CO4	Analyze the performance of an IC engine based on the performance parameters.
CO5	Explain the cycles and systems of a gas turbine and determine the efficiency of gas turbine.
CO6	CO6: Explain the applications and working principle of rockets and jet propulsion.
COURSE OUTCOMES	**MECHANICAL MEASUREMENTS & METROLOGY LAB**
CO1	Student will become familiar with the different instruments that are available for linear, angular, roundness and roughness measurements they will be able to select and use the appropriate measuring instrument according to a specific requirement (in terms of accuracy, etc)
CO2	Students will be able to select proper measuring instrument and know requirement of calibration, errors in measurement etc. They can perform accurate measurements.
	III Year - II Semester
COURSE OUTCOMES	**OPERATIONS RESEARCH**
CO1	Formulate the resource management problems and identify appropriate methods to solve them
CO2	Apply LPP, transportation and assignment models to optimize the industrial resources
CO3	Solve decision theory problems through the application of game theory
CO4	Apply the replacement and queuing models to increase the efficiency of the system
CO5	Model the project management problems through CPM and PERT
COURSE OUTCOMES	**HEAT TRANSFER**
CO1	Compute rate of heat transfer for 1D, steady state composite systems without heat generation.

CO2	Analyze the system with heat generation, variable thermal conductivity, fins and 1D transient conduction heat transfer problems.
CO3	Develop the empirical equations for forced convection problems by using Buckingham's pi theorem.
CO4	Compute the rate of heat transfer for natural convection systems and design and analysis of heat exchangers.
CO5	Solve the heat transfer systems with phase change and radiation.
COURSE OUTCOMES	**CAD/CAM**
CO1	Describe the mathematical basis in the technique of representation of geometric entities including points, lines, and parametric curves, surfaces and solid, and the technique of transformation of geometric entities using transformation matrix
CO2	Describe the use of GT and CAPP for the product development
CO3	Identify the various elements and their activities in the Computer Integrated Manufacturing Systems.
COURSE OUTCOMES	**COMPOSITE MATERIALS**
CO1	Explain various composite materials with their constituents, advantages, limitations and applications
CO2	Enumerate different reinforcements with their application
CO3	Describe various manufacturing methods of polymer and metal matrix composites materials.
CO4	Describe various manufacturing methods of metal matrix composites materials and their applications.
CO5	Explain the synthesis and characterization procedures of nanocomposites
COURSE OUTCOMES	**REFRIGERATION AND AIR CONDITIONING**
CO1	Differentiate between different types of refrigeration systems with respect to engineering applications
CO2	Thermodynamically analyse refrigeration and air conditioning systems and evaluate performance parameters
CO3	Apply the principles of Psychrometrics to design the air conditioning loads for the industrial applications
CO4	perform cooling load calculations and select the appropriate process and equipment for the required comfort and industrial air-conditioning.
COURSE OUTCOMES	**UNCONVENTIONAL MACHINING PROCESSES**
CO1	Understand the characteristics and importance of different types of unconventional machining processes
CO2	Identify the appropriate unconventional machining process for the implementation in a typical industrial scenario based on the applications
CO3	Understand the significance of tools and resources used for machining the components in unconventional machining
CO4	Machine the components through ECM / EDM and other machining processes
CO5	Perform experiments in the advanced unconventional machining processes such as laser beam machining and electron beam machining
COURSE OUTCOMES	**ADVANCED MECHANICS OF SOLIDS**

CO1	Able to identify the failure modes of different structural members and apply various energy methods for statically determinant and in determinant structures.
CO2	Gets acquainted with solving problems of curved beams and beams with un-symmetrical loading
CO3	Able to apply the Soap-film analogy concept for torsional problems with non-circular cross section
COURSE OUTCOMES	**MATERIAL CHARACTERIZATION**
CO1	choose and appropriate electron microscopy techniques to investigate microstructure of materials at high resolution
CO2	Determine crystal structure of specimen and estimate its crystallite size
CO3	Use appropriate spectroscopic technique to measure vibrational / electronic transitions to estimate parameters like energy band gap, elemental concentration, etc.
CO4	Apply thermal analysis techniques to determine thermal stability of and thermodynamic transitions of the specimen.
COURSE OUTCOMES	**TRIBOLOGY**
CO1	Students will demonstrate basic understanding of friction, lubrication and wear rocesses.
CO2	Students will become familiar with mathematical tools used to analyze tribological processes.
CO3	To enhance students' awareness of tribological issues in the design of machine components, such as rolling element bearings, journal bearings, thrust bearings, seals and braking systems.
CO4	Students will become familiar with common anti-friction and anti-wear components and the lubricants used therein.
CO5	Students will be able to describe the detailed operation of selected anti-friction or anti-wear components.
CO6	Students will be exposed to design a tribological system for optimal performance. Students will be able to develop technical project reports and technical presentations
COURSE OUTCOMES	**AUTOMOBILE ENGINEERING**
CO1	Describe the basic lay-out of an automobile and its components and enlist the emission standards of an automobile.
CO2	Describe different engine cooling, lubrication, ignition, electrical and air conditioning systems and suggest suitable systems for a given application.
CO3	Explain the principles of transmission, suspension, steering and braking systems.
CO4	Describe various fuel supply systems in SI and CI engines
COURSE OUTCOMES	**MECHATRONICS**
CO1	Explain mechatronics design process and outline appropriate sensors and actuators for engineering applications
CO2	Develop a simulation model for simple physical systems
CO3	Write simple microcontroller programs
CO4	Explain linearization of nonlinear systems and elements of data acquisition
CO5	Explain various applications of design of mechatronic systems

CO6	CO6. Shall be able to use the various mechatronics systems devices and components in the design of electro mechanical systems.
COURSE OUTCOMES	**HEAT TRANSFER LAB**
CO1	The student should be able to evaluate the amount of heat exchange for plane, cylindrical & spherical geometries and should be able to compare the performance of extended surfaces and heat exchangers
COURSE OUTCOMES	**CAD/CAM LAB**
CO1	The student will be able to appreciate the utility of the modeling tools in creating 2D and 3D drawings.
CO2	Use of these tools for any engineering and real time applications
CO3	Acquire knowledge on utilizing these tools for a better project in their curriculum as well as they will be prepared to handle industry problems with confidence when it matters to use these tools in their Employment
	IV Year - I Semester
COURSE OUTCOMES	**INDUSTRIAL MANAGEMENT**
CO1	Design and conduct experiments, analyse, interpret data and synthesize valid conclusions
CO2	Design a system, component, or process, and synthesize solutions to achieve desired needs
CO3	Use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal, and environmental constraints
CO4	Function effectively within multi-disciplinary teams and understand the fundamental precepts of effective project management
COURSE OUTCOMES	**FINITE ELEMENT METHODS**
CO1	Understand the concepts behind variational methods and weighted residual methods in FEM
CO2	Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements, and 3-D element .
CO3	Develop element characteristic equation procedure and generate global equations.
CO4	Able to apply Suitable boundary conditions to global equations, and reduce it to a solvable form. Able to apply the FE procedure to field problems like heat transfer.
COURSE OUTCOMES	**MECHANICAL VIBRATIONS**
CO1	□ To Analyze the various 1-D periodic and periodic responses of an vibrating system with and without damping
CO2	□ Able to derive equations of motion and solutions for two and multi degree freedom systems by the application of analytical methods
CO3	□ Able to understand the numerical methods for quick estimation of 1st natural frequency of multi degree freedom systems.
CO4	□ Apply the knowledge of the various physical vibration measuring instruments and their applications in real life vibration data acquisition.
COURSE OUTCOMES	**RENEWABLE ENERGY SOURCES**
CO1	To understand the principles and working of solar, wind, biomass, geo thermal, ocean energies.

CO2	To understand the principles and working and green energy systems and appreciate their significance in view of their importance in the current scenario and their potential future applications
COURSE OUTCOMES	**PRODUCTION PLANNING & CONTROL**
CO1	COApply the systems concept for the design of production and service systems.
CO2	COMake forecasts in the manufacturing and service sectors using selected quantitative and qualitative techniques.
CO3	COApply the principles and techniques for planning and control of the production and service systems to optimize/make best use of resources.
CO4	COUnderstand the importance and function of inventory and to be able to apply selected techniques for its control and management under dependent and independent demand circumstances.
COURSE OUTCOMES	**MACHINE TOOL DESIGN**
CO1	Understand the basic working principles of different machine tools with kinematic mechanisms.
CO2	Distinguish the functional and operational requirements of different machine tools
CO3	Design speed and feed gear boxes for a particular configuration.
CO4	Design machine tool structures for strength and rigidity
CO5	Understand various controls used in machine tools
COURSE OUTCOMES	**INDUSTRIAL AUTOMATION AND ROBOTICS**
CO1	Identify various robot configuration and components,
CO2	Select appropriate actuators and sensors for a robot based on specific application
CO3	Carry out kinematic and dynamic analysis for simple serial kinematic chains
CO4	Perform trajectory planning for a manipulator by avoiding obstacles.
CO5	Use knowledge of robotics for automation in manufacturing applications.
COURSE OUTCOMES	**MICRO AND NANO MANUFACTURING**
CO1	get awareness of different techniques used in micro and nano manufacturing.
CO2	get in-depth idea of thin films and nano composites
CO3	get awareness on Characterization Techniques
CO4	find different materials for Micro and Nano mechanical systems and their applications in mechanical engineering.
CO5	Explain different MEMS & Nano fabrication Techniques.
COURSE OUTCOMES	**POWER PLANT ENGINEERING**
CO1	Understand various conventional methods of power generation
CO2	To understand the principle of operation and performance of respective prime movers along with their economics and their impact on environment.
CO3	To understand the power plant instrumentation and control
COURSE OUTCOMES	**OPTIMIZATION TECHNIQUES**

CO1	Students at the end of the course learn advanced optimization techniques to solve real-life problems
CO2	Students can able to formulate and solve various practical optimization problems in manufacturing and service organizations
COURSE OUTCOMES	**NANO TECHNOLOGY**
CO1	Learn the basic concepts of nanotechnology
CO2	Understand the synthesis of nanomaterials and their application
CO3	Apply their learned knowledge to develop Nanomaterial's.
	IV Year - II Semester
COURSE OUTCOMES	**ADDITIVE MANUFACTURING**
CO1	The student shall be able to identify the use of Rapid Prototyping Techniques in the manufacturing of complex components that are otherwise very difficult to manufacture.
COURSE OUTCOMES	**GAS DYNAMICS AND JET PROPULSION**
CO1	Illustrate fluid flow systems
CO2	Analyze the isotropic flow of an ideal gas and its parameter
CO3	Study simple frictional flow with heat transfer problems
CO4	Analyze the impact of heat transfer on flow parameters.
CO5	Performance evaluation of different propulsion systems
COURSE OUTCOMES	**PRODUCT DESIGN AND DEVELOPMENT**
CO1	Apply the principles of generic development process; conduct customer need analysis; and set product specification for new product design and development.
CO2	Generate, select, screen, and test concepts for new product design and development.
CO3	Apply the principles of product architecture and industrial design to design and develop new products.
CO4	Apply the principles of DFMA and Prototyping to design and develop new product.
CO5	Apply the concepts of economics principles sustainable product development and life cycle assessment.
COURSE OUTCOMES	**RELIABILITY ENGINEERING**
CO1	Explain the basic concepts of Reliability Engineering and its Understand measures.
CO2	CO Predict the Reliability at system level using various models.
CO3	CO Design the test plan to meet the reliability Requirements.
CO4	CO Predict and estimate the reliability from failure data.
CO5	CO Develop and implement a successful Reliability programme
COURSE OUTCOMES	**NON - DESTRUCTIVE EVALUATION**
CO1	Comprehensive, theory based understanding of the techniques and methods of non destructive testing
CO2	Apply methods knowledge of non destructive testing to evaluate products of railways, automobiles, aircrafts, chemical industries etc.
COURSE OUTCOMES	**CONTROL SYSTEMS**

CO1	Derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.
CO2	Determine time response specifications of second order systems and to determine error constants.
CO3	Analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.
CO4	Analyze the stability of LTI systems using frequency response methods.
CO5	Represent physical systems as state models and determine the response. Understanding the concepts of controllability and observability
COURSE OUTCOMES	**ENTREPRENEURSHIP DEVELOPMENT**
CO1	Gain the competency of preparing business plans
CO2	Get the awareness on industrial policies
CO3	Study the impact of launching small business
CO4	Understand the recourse planning and market selection for start ups.
COURSE OUTCOMES	**ROBOTICS**
CO1	Understand the basic components of robots.
CO2	Differentiate types of robots and robot grippers.
CO3	Model forward and inverse kinematics of robot manipulators.
CO4	Analyze forces in links and joints of a robot.
CO5	Programme a robot to perform tasks in industrial applications.
CO6	Design intelligent robots using sensors.
COURSE OUTCOMES	**SUPPLY CHAIN MANAGEMENT**
CO1	COTo realize the importance of Supply chain management frame work in business management
CO2	COUnderstand basic concepts of forecasting and risk management
CO3	COExplain and implement the concept of aggregate planning and inventory
COURSE OUTCOMES	**ENTREPRENEURSHIP**
CO1	Up on completing this course, students are able to
CO2	Gain the competency of preparing business plans
CO3	Get the awareness on industrial policies
CO4	Study the impact of launching small business
CO5	Understand the recourse planning and market selection for start ups.
COURSE OUTCOMES	**ADVANCED MATERIALS**
CO1	Explain various composite materials with their constituents, advantages, limitations and applications
CO2	Describe various manufacturing methods of polymer matrix composites materials.
CO3	Derive stress strain relationships for orthotropic materials and analyze orthotropic lamina.
CO4	Explain various functionally graded materials with their properties, preparation and applications
CO5	Explain different smart materials with their application.

CIVIL ENGINEERING (R16)	
	1ST YEAR - 1ST SEMESTER
COURSE OUTCOMES	**ENGLISH**
CO1	The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly
CO2	The lesson motivates the public to adopt road safety measures. 2. 'War' from 'Panorama : A Course on Reading'
CO3	The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival. 2. 'The Verger' from 'Panorama : A Course on Reading'
CO4	The lesson helps to choose a source of energy suitable for rural India. 2. ' The Scarecrow' from Panorama : A Course on Reading
CO5	The lesson creates an awareness in the reader as to the usefulness of animals for the human society. 2. 'A Village Host to Nation' from Panorama : A Course on Reading
COURSE OUTCOMES	**MATHEMATICS**-1
CO1	Solve linear differential equations of first, second and higher order
CO2	Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
CO3	Calculate total derivative, Jocobian and minima of functions of two variables.
COURSE OUTCOMES	**ENGINEERING CHEMISTRY**
CO1	The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. The impurities present in raw water, problems associated with them and how to avoid them are understood. The advantages and limitations of plastic materials and their use in design would be understood. The commonly used industrial materials are introduced.
COURSE OUTCOMES	**ENGINEERING MECHANICS**
CO1	The students are to be exposed to the concepts of force and friction, direction and its application
CO2	The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.
CO3	The students are to be exposed to concepts of centre of gravity
CO4	The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
CO5	The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion
COURSE OUTCOMES	**COMPUTER PROGRAMMING**
CO1	Understand the basic terminology used in computer programming

CO2	Write, compile and debug programs in C language.
CO3	Use different data types in a computer program.
CO4	Design programs involving decision structures, loops and functions.
CO5	Explain the difference between call by value and call by referencE
COURSE OUTCOMES	**ENVIRONMENTAL STUDIES**
CO1	The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resource
CO2	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO3	Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO4	Social issues both rural and urban environment and the possible means to combat the challenge
CO5	The environmental legislations of India and the first global initiatives towards sustainable development
COURSE OUTCOMES	**ENGINEERING / APPLIED CHEMISTRY LABORATORY**
CO1	The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills
COURSE OUTCOMES	**ENGLISH – COMMUNICATION SKILLS LAB -I**
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
	1ST YEAR - 2ND SEMESTER
COURSE OUTCOMES	**ENGLISH –II**
CO1	The lesson underscores that the ultimate aim of Education is to enhance wisdom. 2. ' A P J Abdul Kalam' from The Great Indian Scientists.
CO2	Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.
CO3	The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.
CO4	The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists
CO5	The lesson imparts the students to manage different cultural shocks due to globalization. 2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.
COURSE OUTCOMES	**MATHEMATICS-II**
CO1	. Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
CO2	2. Compute interpolating polynomial for the given datA
CO3	. Solve ordinary differential equations numerically using Euler’s and RK method
CO4	Find Fourier series and Fourier transforms for certain functions.
CO5	. Identify/classify and solve the different types of partial differential equations.

COURSE OUTCOMES	MATHEMATICS – III
CO1	Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
CO2	Solve simultaneous linear equations numerically using various matrix methods.
CO3	Determine double integral over a region and triple integral over a volume.
CO4	Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.
COURSE OUTCOMES	**ENGINEERING PHYSICS**
CO1	Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study Acoustics, crystallography magnetic and dielectric materials enhances the utility aspects of materials.
COURSE OUTCOMES	**ELEMENTS OF MECHANICAL ENGINEERING**
CO1	The stress/strain of a mechanical component subjected to loading.
CO2	The performance of components like Boiler, I.C. Engine, Compressor, Steam/Hydraulic turbine, Belt, Rope and Gear.
CO3	The type of mechanical component suitable for the required power transmission.
COURSE OUTCOMES	**ENGINEERING DRAWING**
CO1	Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc
CO2	The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.
COURSE OUTCOMES	**ENGLISH – COMMUNICATION SKILLS LAB – I**
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world. The course content along with the study material is divided into six units.
COURSE OUTCOMES	**ENGINEERING/APPLIED PHYSICS LAB**
CO1	Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.
CO2	: Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements
COURSE OUTCOMES	**ENGINEERING WORKSHOP & IT WORKSHOP**
CO1	Common understanding of concepts, patterns of decentralization implementation in Africa
CO2	Identified opportunities for coordinated policy responses, capacity building and implementation of best practices †
CO3	Identified instruments for improved decentralization to the local level †

CO4	Identified strategies for overcoming constraints to effective decentralization and sustainable management at different level
	2ND YEAR 1ST SEMESTER
COURSE OUTCOMES	**PROBABILITY AND STATISTICS**
CO1	Examine, analyze, and compare various Probability distributions for both discrete and continuous random variables.
CO2	Describe and compute confidence intervals for the mean of a population.
CO3	Describe and compute confidence intervals for the proportion and the variance of a population and test the hypothesis concerning mean, proportion and variance and perform ANOVA test.
CO4	Fit a curve to the numerical data.
COURSE OUTCOMES	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
CO1	Able to analyse the various electrical networks.
CO2	Able to understand the operation of DC generators,3-point starter and conduct the Swinburne's Test.
CO3	Able to analyse the performance of transformer
CO4	Able to explain the operation of 3-phase alternator and 3-phase induction motors.
CO5	Able to analyse the operation of half wave, full wave rectifiers and OP-AMPs.
COURSE OUTCOMES	**STRENGTH OF MATERIALS-I**
CO1	The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support condition
CO2	The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forceS
CO3	The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions
CO4	The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lame's equation.
COURSE OUTCOMES	**BUILDING MATERIALS AND CONSTRUCTION**
CO1	The student should be able to identify different building materials and their importance in building construction.
CO2	The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
CO3	The student should have learnt the importance of building components and finishings.
CO4	The student is expected to know the classification of aggregates, sieve analysis and moisture content usually required in building construction.
COURSE OUTCOMES	**SURVEYING**
CO1	To demonstrate the basic surveying skills
CO2	To use various surveying instruments.
CO3	To perform different methods of surveying
CO4	To compute various data required for various methods of surveying.

CO5	To integrate the knowledge and produce topographical map.
COURSE OUTCOMES	**FLUID MECHANICS**
CO1	Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics.
CO2	Calculate the forces that act on submerged planes and curves.
CO3	Identify and analyse various types of fluid flows.
CO4	Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.
CO5	Draw simple hydraulic and energy gradient lines.
CO6	Measure the quantities of fluid flowing in pipes, tanks and channels.
COURSE OUTCOMES	**PROFESSIONAL ETHICS AND HUMAN VALUES**
CO1	It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
CO2	It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.
	2ND YEAR 2ND SEMESTER
COURSE OUTCOMES	**BUILDING PLANNING AND DRAWING**
CO1	Upon successful completion of the course:
CO2	Student should be able to plan various buildings as per the building by-laws.
CO3	The student should be able to distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.
CO4	The student is expected to learn the skills of drawing building elements and plan the buildings as per requirements.
COURSE OUTCOMES	**STRENGTH OF MATERIALS- II**
CO1	The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
CO2	The student can asses stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions
CO3	The student will be able to assess forces in different types of trusses used in construction.
COURSE OUTCOMES	**HYDRAULICS AND HYDRAULIC MACHINERY**
CO1	Solve uniform and non uniform open channel flow problems.
CO2	Apply the principals of dimensional analysis and similitude in hydraulic model testing.
CO3	Understand the working principles of various hydraulic machineries and pumps.
COURSE OUTCOMES	**CONCRETE TECHNOLOGY**
CO1	understand the basic concepts of concrete.
CO2	realize the importance of quality of concrete.
CO3	familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field.
CO4	test the fresh concrete properties and the hardened concrete properties.

CO5	evaluate the ingredients of concrete through lab test results. design the concrete mix by BIS method.
CO6	Familiarize the basic concepts of special concrete and their production and applications. understand the behaviour of concrete in various environments.
COURSE OUTCOMES	**STRUCTURAL ANALYSIS - I**
CO1	Distinguish between the determinate and indeterminate structures.
CO2	Identify the behaviour of structures due to the expected loads, including the moving loads, acting on the structure.
CO3	Estimate the bending moment and shear forces in beams for different fixity conditions.
CO4	Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems.
CO5	Draw the influence line diagrams for various types of moving loads on beams/bridges.
CO6	Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss.
COURSE OUTCOMES	**TRANSPORTATION ENGINEERING – I**
CO1	Plan highway network for a given area.
CO2	Determine Highway alignment and design highway geometrics
CO3	Design Intersections and prepare traffic management plans
CO4	Judge suitability of pavement materials and design flexible and rigid pavements
CO5	Construct and maintain highways
COURSE OUTCOMES	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
CO2	One 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.
CO3	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
	III Year - I Semester
COURSE OUTCOMES	**MANAGEMENT SCIENCE**
CO1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
CO2	Will familiarize with the concepts of functional management project management and strategic management.
COURSE OUTCOMES	**ENGINEERING GEOLOGY**
CO1	Identify and classify the geological minerals
CO2	Measure the rock strengths of various rocks
CO3	Classify and measure the earthquake prone areas to practice the hazard zonation
CO4	Classify, monitor and measure the Landslides and subsidence
CO5	Prepares, analyses and interpret the Engineering Geologic maps

CO6	Analyses the ground conditions through geophysical surveys.
CO7	Test the geological material and ground to check the suitability of civil engineering project construction.
CO8	Investigate the project site for mega/mini civil engineering projects.Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc…
COURSE OUTCOMES	**STRUCTURAL ANALYSIS – II**
CO1	Differentiate Determinate and Indeterminate Structures
CO2	Carryout lateral Load analysis of structures
CO3	Analyze Cable and Suspension Bridge structures
CO4	Analyze structures using Moment Distribution, Kani's Method and Matrix methods
COURSE OUTCOMES	**DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES**
CO1	Work on different types of design philosophies
CO2	Carryout analysis and design of flexural members and detailing
CO3	Design structures subjected to shear, bond and torsion
CO4	Design different type of compression members and footings
COURSE OUTCOMES	**TRANSPORTATION ENGINEERING – II**
CO1	Design geometrics in a railway track.
CO2	Design airport geometrics and airfield pavements.
CO3	Plan, construct and maintain Docks and Harbours.
COURSE OUTCOMES	**CONCRETE TECHNOLOGY LAB**
CO1	Determine the consistency and fineness of cement.
CO2	Determine the setting times of cement.
CO3	Determine the specific gravity and soundness of cement.
CO4	Determine the compressive strength of cement.
CO5	Determine the workability of cement concrete by compaction factor, slump and Vee – Bee tests
CO6	Determine the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
CO7	Determine the flakiness and elongation index of aggregates.
CO8	Determine the bulking of sand.
CO9	Understand the non-destructive testing procedures on concrete.
COURSE OUTCOMES	**ENGINEERING GEOLOGY LAB**
CO1	Identify Mega-scopic minerals & their properties.
CO2	Identify Mega-scopic rocks & their properties.
CO3	Identify the site parameters such as contour, slope & aspect for topography.
CO4	Know the occurrence of materials using the strike & dip problems.
COURSE OUTCOMES	**TRANSPORTATION ENGINEERING LAB**
CO1	Ability to test aggregates and judge the suitability of materials for the road construction
CO2	Ability to test the given bitumen samples and judge their suitability for the road construction
CO3	Ability to obtain the optimum bitumen content for the mix design
CO4	Ability to determine the traffic volume, speed and parking characteristics.

	III Year - II Semester
COURSE OUTCOMES	**DESIGN AND DRAWING OF STEEL STRUCTURES**
CO1	Work with relevant IS codes
CO2	Carryout analysis and design of flexural members and detailing
CO3	Design compression members of different types with connection detailing
CO4	Design Plate Girder and Gantry Girder with connection detailing
CO5	Produce the drawings pertaining to different components of steel structures
COURSE OUTCOMES	**GEOTECHNICAL ENGINEERING – I**
CO1	The student must know the definition of the various parameters related to soil mechanics and establish their inter-relationships.
CO2	The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
CO3	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.
CO4	The student should be able to apply the above concepts in day-to-day civil engineering practice
COURSE OUTCOMES	**ENVIRONMENTAL ENGINEERING – I**
CO1	Plan and design the water and distribution networks and sewerage systems
CO2	Identify the water source and select proper intake structure
CO3	Characterisation of water
CO4	Select the appropriate appurtenances in the water supply
CO5	Selection of suitable treatment flow for raw water treatments
COURSE OUTCOMES	**WATER RESOURCES ENGINEERING–I**
CO1	have a thorough understanding of the theories and principles governing the hydrologic processes,
CO2	be able to quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects
CO3	develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
CO4	be able to develop design storms and carry out frequency analysis
CO5	be able to determine storage capacity and life of reservoirs.
CO6	develop unit hydrograph and synthetic hydrograph
CO7	be able to estimate flood magnitude and carry out flood routing.
CO8	be able to determine aquifer parameters and yield of wells.
CO9	be able to model hydrologic processes
COURSE OUTCOMES	**WASTE WATER MANAGEMENT**
CO1	Suggest treatment methods for any industrial wastewater.
CO2	Learn the manufacturing process of various industries.
CO3	Student will be in a position to decide the need of common effluent treatment plant for the industrial area in their vicinity
COURSE OUTCOMES	**GEOTECHNICAL ENGINEERING LAB**
CO1	Determine index properties of soil and classify them.
CO2	Determine permeability of soils.

CO3	Determine Compaction, Consolidation and shear strength characteristics.
COURSE OUTCOMES	**ENVIRONMENTAL ENGINEERING LAB**
CO1	Estimation some important characteristics of water and wastewater in the laboratory
CO2	Draw some conclusion and decide whether the water is potable or not.
CO3	Decide whether the water body is polluted or not with reference to the state
CO4	parameters in the list of experiments
CO5	Estimation of the strength of the sewage in terms of BOD and COD
COURSE OUTCOMES	**COMPUTER AIDED ENGINEERING LABORATORY**
CO1	Understand the paper –space environment thoroughly
CO2	Develop the components using 2D and 3D wire frame models through various editing commands.
CO3	Generate assembly of various components of compound solids.
COURSE OUTCOMES	**COMPUTER AIDED DRAFTING**
CO1	Plan and design the sewerage systems
CO2	Select the appropriate appurtenances in the sewerage systems
CO3	Analyze sewage and suggest and design suitable treatment system for sewage
CO4	treatment
CO5	Identify the critical point of pollution in a river for a specific amount of pollutant
CO6	disposal into the river
CO7	Suggest a suitable disposal method with respect to effluent standards.
	IV Year - I Semester
COURSE OUTCOMES	**ENVIRONMENTAL ENGINEERING -II**
CO1	Plan and design the sewerage systems
CO2	Select the appropriate appurtenances in the sewerage systems
CO3	Analyze sewage and suggest and design suitable treatment system for
CO4	sewage treatment
CO5	Identify the critical point of pollution in a river for a specific amount of
CO6	pollutant disposal into the river
CO7	Suggest a suitable disposal method with respect to effluent standards.
COURSE OUTCOMES	**WATER RESOURCES ENGINEERING–II**
CO1	estimate irrigation water requirements
CO2	design irrigation canals and canal network
CO3	plan an irrigation system
CO4	design irrigation canal structures
CO5	plan and design diversion head works
CO6	analyse stability of gravity and earth dams
CO7	design ogee spillways and energy dissipation works
COURSE OUTCOMES	**GEOTECHNICAL ENGINEERING – II**
CO1	The student must be able to understand the various types of shallow foundations and
CO2	decide on their location based on soil characteristics.
CO3	The student must be able to compute the magnitude of foundation settlement to decide

CO4	the size of the foundation.
CO5	The student must be able to use the field test data and arrive at the bearing capacity.
CO6	The student must be able to design Piles based on the principles of bearing capacity.
COURSE OUTCOMES	**REMOTE SENSING AND GIS APPLICATIONS**
CO1	be familiar with ground, air and satellite based sensor platforms.
CO2	interpret the aerial photographs and satellite imageries
CO3	create and input spatial data for GIS application
CO4	apply RS and GIS concepts in water resources engineering
CO5	applications of various satellite data
COURSE OUTCOMES	**FINITE ELEMENT METHODS**
CO1	Solve simple boundary value problems using Numerical technique of Finite element method
CO2	Develop finite element formulation of one and two dimensional problems and solve them
CO3	Assemble Stiffness matrices, Apply boundary conditions and solve for the displacements
CO4	Compute Stresses and Strains and interpret the result
COURSE OUTCOMES	**GROUND IMPROVEMENT TECHNIQUES**
CO1	By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.
CO2	The student should be in a position to design a reinforced earth embankment and check its stability.
CO3	The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
CO4	The student should be able to understand the concepts and applications of grouting.
COURSE OUTCOMES	**AIR POLLUTION AND CONTROL**
CO1	Decide the ambient air quality based on the analysis of air pollutants
CO2	Design particulate and gaseous control measures for an industry
CO3	Judge the plume behaviour in a prevailing environmental condition
CO4	Estimate carbon credits for various day to day activities
COURSE OUTCOMES	**ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT**
CO1	Prepare EMP, EIS, and EIA report
CO2	Identify the risks and impacts of a project
CO3	Selection of an appropriate EIA methodology
CO4	Evaluation the EIA report
CO5	Estimate the cost benefit ratio of a project
CO6	Know the role of stakeholder and public hearing in the preparation of EIA
COURSE OUTCOMES	**IPR & PATENTS**
CO1	IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.

CO2	Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements
COURSE OUTCOMES	**GIS & CAD LAB**
CO1	work comfortably on GIS software
CO2	digitize and create thematic map and extract important features
CO3	develop digital elevation model
CO4	use structural analysis software to analyze and design 2D and 3D frames
CO5	design and analyze retaining wall and simple towers using CADD software.
COURSE OUTCOMES	**IRRIGATION DESIGN AND DRAWING**
CO1	At the end of the course the student will be able to To design various irrigation structures
	IV Year - II Semester
COURSE OUTCOMES	**ESTIMATION SPECIFICATION & CONTRACTS**
CO1	The student should be able to determine the quantities of different components of buildings.
CO2	The student should be in a position to find the cost of various building components.
CO3	The student should be capable of finalizing the value of structures
COURSE OUTCOMES	**CONSTRUCTION TECHNOLOGY AND MANAGEMENT**
CO1	appreciate the importance of construction planning
CO2	understand the functioning of various earth moving equipment
CO3	know the methods of production of aggregate products and concreting and usage of machinery required for the works.
CO4	apply the gained knowledge to project management and construction techniques
COURSE OUTCOMES	**PRESTRESSED CONCRETE**
CO1	Understand the different methods of prestressing
CO2	Estimate effective prestress including the short and long term losses
CO3	Analyze and design prestressed concrete beams under flexure and shear
CO4	Understand the relevant IS Codal provisions for prestressed concrete
COURSE OUTCOMES	**SOLID AND HAZARDOUS WASTE MANAGEMENT**
CO1	Design the collection systems of solid waste of a town
CO2	Design treatment of municipal solid waste and landfill
CO3	Know the criteria for selection of landfill
CO4	Characterise the solid waste and design a composting facility
CO5	Know the Method of treatment and disposal of Hazardous wastes.
COURSE OUTCOMES	**PROJECT WORK**
CO1	Apply all levels of Engineering knowledge in solving the Engineering problems.
CO2	Work together with team spirit.
CO3	Use Civil Engineering software at least one.
CO4	Document the projects

MECHANICAL ENGINEERING (R16)	
	I YEAR I-SEMESTER
COURSE OUTCOMES	**MATHEMATICS-1**
CO1	Solve linear differential equations of first, second and higher order
CO2	Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
CO3	Calculate total derivative, Jocobian and minima of functions of two variables.
COURSE OUTCOMES	**ENGINEERING CHEMISTRY**
CO1	: The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. The impurities present in raw water, problems associated with them and how to avoid them are understood. The advantages and limitations of plastic materials and their use in design would be understood. The commonly used industrial materials are introduced.
COURSE OUTCOMES	**COMPUTER PROGRAMMING**
CO1	Understand the basic terminology used in computer programming
CO2	Write, compile and debug programs in C language.
CO3	Use different data types in a computer program
CO4	Design programs involving decision structures, loops and functions.
CO5	Explain the difference between call by value and call by reference
CO6	Use different data structures and create/update basic data files.
COURSE OUTCOMES	**ENVIRONMENTAL STUDIES**
CO1	The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
CO2	The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
CO3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO4	Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO5	Self Sustaining Green Campus with Environment Friendly aspect of – Energy, Water and Wastewater reuse Plantation, Rain water Harvesting, Parking Curriculum.
CO6	The environmental legislations of India and the first global initiatives towards sustainable development.
COURSE OUTCOMES	**ENGINEERING / APPLIED CHEMISTRY LABORATORY**

CO1	The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
COURSE OUTCOMES	**ENGLISH - COMMUNICATION SKILLS LAB- I**
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO2	The course content along with the study material is divided into six units.
COURSE OUTCOMES	**COMPUTER PROGRAMMING LAB**
CO1	Apply and practice logical ability to solve the problems
CO2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
CO3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
CO4	Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
CO5	Identification of various computer components, Installation of software
COURSE OUTCOMES	**ENGLISH - I**
CO1	The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.
CO2	Acquisition of writing skills
CO3	The lesson motivates the public to adopt road safety measures.
CO4	The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.
CO5	To bring into focus different sources of energy as alternatives to the depleting sources.
C06	The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.
	I YEAR II-SEMESTER
COURSE OUTCOMES	**ENGLISH -II**
CO1	The lesson underscores that the ultimate aim of Education is to enhance wisdom.
CO2	The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.
CO3	The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.
CO4	The lesson imparts the students to manage different cultural shocks due to globalization.
CO5	The seminal contributions of Homi Jehangir Bhabha to Indian nuclear programme provide an aspiration to the readers to serve the nation and strengthen it

COURSE OUTCOMES	**MATHEMATICS – II**
CO1	Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
CO2	Compute interpolating polynomial for the given data.
CO3	Solve ordinary differential equations numerically using Euler's and RK method
CO4	Find Fourier series and Fourier transforms for certain functions.
CO5	Identify/classify and solve the different types of partial differential equations.
COURSE OUTCOMES	**MATHEMATICS-III**
CO1	Determine rank, Eigen values and Eigen vectors of a given matrix and solve simultaneous linear equations.
CO2	Solve simultaneous linear equations numerically using various matrix methods.
CO3	Determine double integral over a region and triple integral over a volume.
CO4	Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.
COURSE OUTCOMES	**ENGINEERING PHYSICS**
CO1	Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study Acoustics, crystallography magnetic and dielectric materials enhances the utility aspects of materials
COURSE OUTCOMES	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
CO1	Able to understand the operation of DC generators,3-point starter and DC machine testing by Swinburne's Test.
CO2	Able to analyse the performance of single-phase transformer.
CO3	Able to explain the operation of 3-phase alternator and 3-phase induction motors.
CO4	Able to analyse the operation of half wave, full wave bridge rectifiers and OP-AMPs.
CO5	Able to explain the single stage CE amplifier and concept of feedback amplifier.
CO6	Able to analyse the various electrical networks.
COURSE OUTCOMES	**ENGLISH-COMMUNICATIONS SKILLS LAB-II**
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
CO2	The course content along with the study material is divided into six units
COURSE OUTCOMES	**ENGINEERING / APPLIED PHYSICS LAB**
CO1	Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements
COURSE OUTCOMES	**ENGINEERING / APPLIED PHYSICS - VIRTUAL LABS – ASSIGNMENTS**

C01	Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.
COURSE OUTCOMES	**ENGINEERING WORKSHOP & IT WORKSHOP**
CO1	Common understanding of concepts, patterns of decentralization implementation in Africa †
CO2	Identified opportunities for coordinated policy responses, capacity building and implementation of best practices †
CO3	Identified instruments for improved decentralization to the local level †
CO4	Identified strategies for overcoming constraints to effective decentralization and sustainable management at different levels
	II YEAR I-SEMESTER
COURSE OUTCOMES	**METALLURGY & MATERIALS SCIENCE**
CO1	To understand the regions of stability of the phases that can occur in an alloy system in order to solve the problems in practical metallurgy.
CO2	To know the basic concepts of bonds in metals and alloys. To understand the basic requirements for the formation of solid solutions and other compounds
CO3	To study the basic differences between cast irons and steels, their properties and practical applications.
CO4	To study the affect of various alloying elements on iron-iron carbide system. To understand the various heat treatment and strengthening processes used in practical applications
CO5	To study the properties and applications of widely used non-ferrous metals and alloys so as to use the suitable material for practical applications.
C06	To study the properties and applications of ceramic, composite and other advanced materials so as to use the suitable material for practical applications.
COURSE OUTCOMES	**MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS**
CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
CO2	One 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.
CO3	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making
COURSE OUTCOMES	**MECHANICS OF SOLIDS**

CO1	After studying this unit student will know the basic terms like stress, strain poissons ratio…etc and stresses in bars of varying cross sections, composite bars, thermal stress in members, stresses on inclined planes with analytical approach and graphical approach, strain energy under different loadings and also problem solving techniques.
CO2	After studying this unit student will know the construction of shear force diagrams and bending moment diagrams to the different loads for the different support arrangements and also problem solving techniques.
CO3	After studying this unit student will know the bending and shear stress induced in the beams which are made with different cross sections like rectangular, circular, triangular, I, T angle sections and also problem solving techniques
CO4	After studying this unit student will know how to finding slope and deflection for different support arrangements by Double integration method, Macaulay's method and Moment-Area and also problem solving techniques.
CO5	After studying this unit student will know how to finding slope and deflection for different support arrangements by Double integration method, Macaulay's method and Moment-Area and also problem solving techniques.
COURSE OUTCOMES	**THERMODYNAMICS**
CO1	The student should be able to understand the basic concepts like thermodynamic system, its boundary and related fundamental definitions. Distinction between point function and path function shall be made with respect to energy, work and Heat.
CO2	To learn the first law of thermodynamics, which is also the energy conservation principle, and should be able to apply to different thermodynamic systems. To understand the concept of equality of temperature and the principle of operation of various temperature measuring devices. To learn the applications of steady flow energy equation to the various mechanical components.
CO3	To understand the second law statements and the associated terms and should be able to apply the principles to heat engines. Should be able to analyse the concepts of Carnot cycle, entropy, availability and irreversibility. Should be able to understand the use of Maxwells relations and thermodynamic functions.
CO4	Should be able to use Psychrometric chart and calculate various psychrometric properties of air
CO5	To understand the concept of air standard cycles and should be able to calculate the efficiency and performance parameters of the systems that use these cycles.
COURSE OUTCOMES	**FLUID MECHANICS & HYDRAULIC MACHINES**
CO1	After studying this unit student will know the concept of fluid and its properties, manometry, hydrostatic forces acting on different surfaces and also problem solving techniques.
CO2	In this unit student will be exposed to the basic laws of fluids, flow patterns, viscous flow through ducts and their corresponding problems.

CO3	At the end of this unit student will be aware of the concepts related to boundary layer theory, flow separation, basic concepts of velocity profiles, dimensionless numbers and dimensional analysis.
CO4	In this unit student will know the hydrodynamic forces acting on vanes and their performance evaluation.
CO5	At the end of this unit student will be aware of the importance, function and performance of hydro machinery
CO6	After studying this unit student will be in a position to evaluate the performance characteristics of hydraulic turbines. Also a little knowledge on hydraulic systems and fluidics is imparted to the student.
COURSE OUTCOMES	**COMPUTER AIDED ENGINEERING DRAWING PRACTICE**
CO1	The knowledge of projections of solids is essential in 3D modelling and animation. The student will be able to draw projections of solids. The objective is to enhance the skills they already acquired in their earlier course in drawing of projection.
COURSE OUTCOMES	**ELECTRICAL & ELECTRONICS ENGINEERING LAB**
CO1	Able to find out the efficiency of dc shunt machine without actual loading of the machine.
CO2	Able to estimate the efficiency and regulation for different load conditions and power factors of single phase transformer with OC and SC test.
CO3	Able to analyse the performance characteristics and to determine efficiency of DC shunt motor &3-phase induction motor
CO4	Able to determine the ripple factor of half wave & full wave rectifiers
CO5	Able to find out the characteristics of PN junction diode & transistor
COURSE OUTCOMES	**MECHANICS OF SOLIDS & METALLURGY LAB**
CO1	To impart practical exposure on the microstructures of various materials and their hardness evaluation. Also to impart practical knowledge on the evaluation of material properties through various destructive testing procedures.
	II YEAR II-SEMESTER
COURSE OUTCOMES	**KINEMATICS OF MACHINERY**
CO1	The objective of this unit is to make student understand the purpose of kinematics, Kinematic joint and mechanism and to study the relative motion of parts in a machine without taking into consideration the forces involved
CO2	The objective of this unit is to make student understand various mechanisms for straight line motion and their applications including steering mechanism
CO3	The objective of this unit is to make student understand the velocity and acceleration concepts and the methodology using graphical methods and principles and application of four bar chain. To understand the application of slider crank mechanism etc. and study of plane motion of the body
CO4	The objective of this unit is to make student understand the theories involved in cams. Further the students are exposed to the applications of cams and their working principles.

CO5	The objective of this unit is to make student understand gears, power transmission through different types of gears including gear profiles and its efficiency.
COURSE OUTCOMES	**THERMAL ENGINEERING – I**
CO1	To make the student learn and understand the reasons and affects of various losses that occur in the actual engine operation
CO2	To familiarize the student with the various engine systems along with their function and necessity.
CO3	To learn about normal combustion phenomenon and knocking in S.I. and C.I. Engines and to find the several engine operating parameters that affect the smooth engine operation.
CO4	To make the student learn to perform testing on S.I and C.I Engines for the calculations of performance and emission parameters.
CO5	To make students learn about different types of compressors and to calculate power and efficiency of reciprocating compressors
COURSE OUTCOMES	**PRODUCTION TECHNOLOGY**
CO1	To impart basic knowledge and understanding about the primary manufacturing processes such as casting, joining, bulk forming, sheet metal forming and powder metallurgy and their relevance in current manufacturing industry; To introduce processing methods of plastics.
COURSE OUTCOMES	**DESIGN OF MACHINE MEMBERS – I**
CO1	The student shall gain appreciation and understanding of the design function in mechanical engineering, the steps involved in designing and the relation of design activity with manufacturing activity
CO2	Selection of proper materials to different machine elements based on their physical and mechanical properties
CO3	Learn and understanding of the different types of failure modes and criteria
CO4	Procedure for the different machine elements such as fasteners, shafts, couplings, keys, axially loaded joints etc.
CO5	Identify the loads, the machine members subjected and calculate static and dynamic stresses to ensure safe design.
COURSE OUTCOMES	**MACHINE DRAWING**
CO1	To provide basic understanding and drawing practice of various joint, simple mechanical parts
CO2	The student will be able to draw the assembly from the individual part drawing.
COURSE OUTCOMES	**INDUSTRIAL ENGINEERING AND MANAGEMENT**
CO1	Design and conduct experiments, analyse, interpret data and synthesize valid conclusions
CO2	Design a system, component, or process, and synthesize solutions to achieve desired needs
CO3	Use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal, and environmental constraints

CO4	Function effectively within multi-disciplinary teams and understand the fundamental precepts of effective project management
COURSE OUTCOMES	**FLUID MECHANICS & HYDRAULIC MACHINES LAB**
CO1	To impart practical exposure on the performance evaluation methods of various flow measuring equipment and hydraulic turbines and pumps.
COURSE OUTCOMES	**PRODUCTION TECHNOLOGY LAB**
CO1	To impart hands-on practical exposure on manufacturing processes and equipment
	III YEAR I-SEMESTER
COURSE OUTCOMES	**DYNAMICS OF MACHINERY**
CO1	Analyze stabilization of sea vehicles, aircrafts and automobile vehicles
CO2	Compute frictional losses, torque transmission of mechanical systems.
CO3	Analyze dynamic force analysis of slider crank mechanism and design of flywheel.
CO4	Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement
CO5	Understand balancing of reciprocating and rotary masses.
COURSE OUTCOMES	**METAL CUTTING & MACHINE TOOLS**
CO1	Apply cutting mechanics to metal machining based on cutting force and power consumption.
CO2	Operate lathe, milling machines, drill press, grinding machines, etc.
CO3	Select cutting tool materials and tool geometries for different metals.
CO4	Learn machining economics.
CO5	Learn principles of CNC Machines
COURSE OUTCOMES	**DESIGN OF MACHINE MEMBERS– II**
CO1	The student will able to select the suitable bearing based on the application of the loads and predict the life of the bearing
CO2	Design power transmission elements such as gears, belts, chains, pulleys, ropes, levers and power screws.
CO3	Design of IC Engines parts.
COURSE OUTCOMES	**OPERATIONS RESEARCH**
CO1	After completion of the course, the student will be able to:
CO2	To solve the LP and DP problems
CO3	To solve the Transportation, assignment, game, inventory, replacement, sequencing, queuing problems
COURSE OUTCOMES	**THERMAL ENGINEERING – II**
CO1	After undergoing this course the student is expected to understand the working of steam and gas power plant cycles and also should be able to analyze and evaluate the performance of individual components. The student also should be in a position to understand basic principles of Jet propulsion and rocket engineering.

COURSE OUTCOMES	**MACHINE TOOLS LAB**
CO1	The students can operate different machine tools with understanding of work holders and operating principles to produce different part features to the desired quality.
COURSE OUTCOMES	**IPR & PATENTS**
CO1	IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents
CO2	Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.
	III YEAR II-SEMESTER
COURSE OUTCOMES	**METROLOGY**
CO1	Students will be able to design tolerances and fits for selected product quality. They can choose appropriate method and instruments for inspection of various gear elements and thread elements. They can understand the standards of length, angles, they can understand the evaluation of surface finish and measure the parts with various comparators. The quality of the machine tool with alignment test can also be evaluated by them.
COURSE OUTCOMES	**INSTRUMENTATION & CONTROL SYSTEMS**
CO1	After undergoing the course the student can select appropriate device for the measurement of parameters like temperature, pressure, speed, stress, humidity, flow velocity etc., and justify its use through characteristics and performance.
COURSE OUTCOMES	**REFRIGERATION & AIR CONDITIONING**
CO1	At the end of the course the students should be able to
CO2	After undergoing the course the student should be in a position to analyze various refrigerating cycles and evaluate their performance. The student also should be able to perform cooling load calculations and select the appropriate process and equipment for the required comfort and industrial air-conditioning
COURSE OUTCOMES	**HEAT TRANSFER**
CO1	The student after undergoing this course is expected to know the principles of heat transfer and be able to apply to practical situations where in heat exchange takes place through various modes of heat transfer including phase change
COURSE OUTCOMES	**ENTREPRENEURSHIP**
CO1	Students will gain knowledge and skills needed to run a business.
COURSE OUTCOMES	**DATA BASE MANAGEMENT SYSTEM**
CO1	Describe a relational database and object-oriented database.
CO2	Create, maintain and manipulate a relational database using SQL
CO3	Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.

CO4	Design and build database system for a given real world problem
CO5	Examine issues in data storage and query processing and can formulate appropriate solutions
COURSE OUTCOMES	**WASTE WATER MANAGEMENT**
CO1	Plan and design the sewerage systems
CO2	Characterization of sewage
CO3	Select the appropriate appurtenances in the sewerage systems
CO4	Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river
CO5	Select the suitable treatment flow for sewage treatment
COURSE OUTCOMES	**HEAT TRANSFER LAB**
CO1	The student should be able to evaluate the amount of heat exchange for plane, cylindrical & spherical geometries and should be able to compare the performance of extended surfaces and heat exchangers
COURSE OUTCOMES	**METROLOGY & INSTRUMENTATION LAB**
CO1	Student will become familiar with the different instruments that are available for linear, angular, roundness and roughness measurements they will be able to select and use the appropriate measuring instrument according to a specific requirement (in terms of accuracy, etc)
CO2	Students will be able to select proper measuring instrument and know requirement of calibration, errors in measurement etc. They can perform accurate measurements.
COURSE OUTCOMES	**COMPUTATIONAL FLUID DYNAMICS LABORATORY**
CO1	Solving Problems of fluid mechanics and heat transfer by writing programs in C-language and MATLAB.
CO2	Using ANSYS-FLUENT build a geometry, mesh that geometry, Perform CFD method on the mesh, perform the calculation, and post-process the results
CO3	Understanding the validation of the numerical result by comparison with known analytical results.
CO4	Understanding the numerical result by invoking the physical principles of fluid mechanics and heat transfer
COURSE OUTCOMES	**PROFESSIONAL ETHICS & HUMAN VALUES**
CO1	It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
CO2	It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.
	IV YEAR I-SEMESTER
COURSE OUTCOMES	**MECHATRONICS**
CO1	After completion of this course, the student shall be able to use the various mechatronics systems devices and components in the design of electro mechanical systems.

COURSE OUTCOMES	**CAD/CAM**
CO1	Describe the mathematical basis in the technique of representation of geometric entities including points, lines, and parametric curves, surfaces and solid, and the technique of transformation of geometric entities using transformation matrix
CO2	Describe the use of GT and CAPP for the product development
CO3	Identify the various elements and their activities in the Computer Integrated Manufacturing Systems.
COURSE OUTCOMES	**FINITE ELEMENT METHODS**
CO1	Understand the concepts behind variational methods and weighted residual methods in FEM
CO2	Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements, and 3-D element
CO3	Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements, and 3-D element
CO4	Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form
CO5	Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer, and fluid flow
COURSE OUTCOMES	**POWER PLANT ENGINEERING**
CO1	After undergoing this course the student can understand various conventional methods of power generation and principle of operation and performance of respective prime movers along with their economics and their impact on environment
COURSE OUTCOMES	**CONDITION MONITORING**
CO1	Gaining invaluable insights into the benefits of Condition Monitoring
CO2	Understanding the reasons for selecting particular maintenance strategies
CO3	Awareness of International Standards covering asset management
CO4	Gaining practical approaches to minimize the risk of plant and machinery breakdowns
CO5	Identifying the optimum maintenance strategy for different types of equipment
COURSE OUTCOMES	**DESIGN FOR MANUFACTURE**
CO1	Design components for machining
CO2	Simulate the casting design and choose the best casting process for a specific produc
CO3	Design components for sheet metal work by understanding in depth the sheet metal processes and their formation mechanisms
CO4	Design plastic components for machining and joining and selecting a proper processes for different joining cases
COURSE OUTCOMES	**CAD/CAM LAB**

CO1	The student will be able to appreciate the utility of the tools like ANSYS or FLUENT in solving real time problems and day to day problems
CO2	Use of these tools for any engineering and real time applications
CO3	Acquire knowledge on utilizing these tools for a better project in their curriculum as well as they will be prepared to handle industry problems with confidence when it matters to use these tools in their Employment
COURSE OUTCOMES	**MECHATRONICS LAB**
CO1	Measure load, displacement and temperature using analogue and digital sensors
CO2	Develop PLC programs for control of traffic lights, water level, lifts and conveyor belts
CO3	Simulate and analyse PID controllers for a physical system using MATLAB.
CO4	Develop pneumatic and hydraulic circuits using Automaton studio.
	IV YEAR II-SEMESTER
COURSE OUTCOMES	**PRODUCTION PLANNING AND CONTROL**
CO1	An understanding of the concepts of production and service systems;
CO2	The ability to apply principles and techniques in the design, planning and control of these systems to optimise/make best use of resources in achieving their objectives.
CO3	Identify different strategies employed in manufacturing and service industries to plan production and control inventory.
CO4	Measure the effectiveness, identify likely areas for improvement,develop and implement improved planning and control methods for production systems.
COURSE OUTCOMES	**UNCONVENTIONAL MACHINING PROCESSES**
CO1	After completion of course, the student shall understand the principle of working, mechanism of metal removal in the various unconventional machining process. The student is able to identify the process parameters, their effect and applications of different processes.
COURSE OUTCOMES	**AUTOMOBILE ENGINEERING**
CO1	The student after undergoing the course, shall visualize the layout of an automobile and its systems like transmission, steering, suspension, braking, safety etc and should know the vehicle troubleshooting
COURSE OUTCOMES	**NON - DESTRUCTIVE EVALUATION**
CO1	Comprehensive, theory based understanding of the techniques and methods of non destructive testing
CO2	Apply methods knowledge of non destructive testing to evaluate products of railways, automobiles, aircrafts, chemical industries etc.

ELECTRICAL AND ELECTRONICS ENGINEERING (R19)	
	I Year - I Semester
COURSE OUTCOMES	**ENGLISH**
CO1	Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
CO2	Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
CO3	Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
CO4	Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
CO5	Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing
COURSE OUTCOMES	**MATHEMATICS-I**
CO1	Solve linear differential equations of first, second and higher order.
CO2	. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
CO3	Calculate total derivative, Jocobian and minima of functions of two variables.
	APPLIED CHEMISTRY
CO1	Importance of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
CO2	Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
CO3	Express the increase in demand as wide variety of advanced materials are introduced; which have excellent engineering properties.
CO4	Explain the crystal structures, and the preparation of semiconductors. Magnetic properties are also studied.
CO5	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
COURSE OUTCOMES	**PROGRAMMING FOR PROBLEM SOLVING USING C**
CO1	To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
	To gain knowledge of the operators, selection, control statements and repetition in C

	To learn about the design concepts of arrays, strings, enumerated structure and union types. To learn about their usage
	To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor.
	To assimilate about File I/O and significance of functions
COURSE OUTCOMES	**ENGINEERING DRAWING**
CO1	Engineering drawing being the principal method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc
COURSE OUTCOMES	**APPLIED CHEMISTRY LAB**
CO1	The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
COURSE OUTCOMES	**PROGRAMMING FOR PROBLEM SOLVING USING C LAB**
CO1	Apply the principles of C language in problem solving.
CO2	To design flowcharts, algorithms and knowing how to debug programs.
CO3	To design & develop of C programs using arrays, strings pointers & functions.
CO4	To review the file operations, preprocessor commands.
COURSE OUTCOMES	**ENVIRONMENTAL SCIENCE**
CO1	Overall understanding of the natural resources.
CO2	Basic understanding of the ecosystem and its diversity.
CO3	Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
CO4	An understanding of the environmental impact of developmental activities.
	I Year - II Semester
COURSE OUTCOMES	**MATHEMATICS - II**
CO1	To instruct the concept of Matrices in solving linear algebraic equations
CO2	To elucidate the different numerical methods to solve nonlinear algebraic equations
CO3	evaluate approximating the roots of polynomial and transcendental equations by different algorithms (L5

CO4	apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3)
COURSE OUTCOMES	**MATHEMATICS - III**
CO1	interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
CO2	estimate the work done against a field, circulation and flux using vector calculus (L5)
CO3	find or compute the Fourier series of periodic signals (L3)
CO4	apply the Laplace transform for solving differential equations (L3)
CO5	identify solution methods for partial differential equations that model physical processes (L3)
COURSE OUTCOMES	**APPLIED PHYSICS**
	Impart Knowledge of Physical Optics phenomena like Interference and Diffraction required to design instruments with higher resolution.
	Understand the physics of Semiconductors and their working mechanism for their utility in sensors.
	To impart the knowledge of materials with characteristic utility in appliances.
COURSE OUTCOMES	**FUNDAMENTALS OF COMPUTER SCIENCE**
CO1	Explain the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming.
CO2	Recognize the Computer networks, types of networks and topologies.
CO3	Summarize the concepts of Operating Systems and Databases.
CO4	Recite the Advanced Computer Technologies like Distributed Computing & Wireless Networks
COURSE OUTCOMES	**ELECTRICAL CIRCUIT ANALYSIS - I**
CO1	The Student should be able to solve ? Various electrical networks in presence of active and passive elements. ? Electrical networks with network topology concepts. ? Any magnetic circuit with various dot conventions. ? Any R, L, C network with sinusoidal excitation. ? Any R, L, network with variation of any one of the parameters i.e R, L, C and f. ? Electrical networks by using principles of network theorems.
COURSE OUTCOMES	**ELECTRICAL ENGINEERING WORKSHOP**
CO1	Explain the limitations, tolerances, safety aspects of electrical systems and wiring.
CO2	Select wires/cables and other accessories used in different types of wiring.
CO3	Make simple lighting and power circuits.
CO4	Measure current, voltage and power in a circuit.

COURSE OUTCOMES	ENGINEERING EXPLORATION PROJECT
CO1	Build mindsets & foundations essential for designers
CO2	Learn about the Human-Centered Design methodology and understand their real-world applications
CO3	Use Design Thinking for problem solving methodology for investigating illdefined problems.
CO4	Undergo several design challenges and work towards the final design challenge
COURSE OUTCOMES	**II Year – I SEMESTER**
	ELECTRICAL CIRCUIT ANALYSIS-II
CO1	solve three- phase circuits under balanced and unbalanced condition.
CO2	find the transient response of electrical networks for different types of excitations.
CO3	find parameters for different types of network.
CO4	realize electrical equivalent network for a given network transfer function
CO5	extract different harmonics components from the response of an electrical network.
COURSE OUTCOMES	**ELECTRICAL MACHINES – I**
CO1	assimilate the concepts of electromechanical energy conversion.
CO2	mitigate the ill-effects of armature reaction and improve commutation in dc machines.
CO3	understand the torque production mechanism and control the speed of dc motors.
CO4	arallel transformers, control voltages with tap changing methods and achieve three phase to two-phase transformation
COURSE OUTCOMES	**ELECTRONIC DEVICES AND CIRCUITS**
CO1	understand the concepts of Semiconductor Technology.
CO2	appraise the construction & operation of electronic devices.
CO3	develop the biasing circuits using the electronic devices.
CO4	model the amplifier circuits.
CO5	analyse the characteristics of the devices
COURSE OUTCOMES	**ELECTROMAGNETIC FIELDS**
CO1	determine electric fields and potentials using Guass's law or solving Laplace's or Possion's equations, for various electric charge distributions
CO2	calculate and design capacitance, energy stored in dielectrics.
CO3	calculate the magnetic field intensity due to current, the application of Ampere's law and the Maxwell's second and third equations.
CO4	calculate induced EMF, understand the concepts of displacement current and Poynting vector.
COURSE OUTCOMES	**THERMAL AND HYDRO PRIME MOVERS**

CO1	To make the student understand the types of prime movers, which can be connected to generators for power production and should obtain the skills of performing the necessary calculations with respect to the functioning of the prime movers.
COURSE OUTCOMES	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities 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
COURSE OUTCOMES	**THERMAL AND HYDRO LABORATORY**
CO1	To impart practical knowledge on the performance evaluation methods of various internal combustion engines, flow measuring equipment and hydraulic turbines and pumps.
COURSE OUTCOMES	**ELECTRICAL CIRCUITS LABORATORY**
CO1	The Student should be able to apply various theorems, determination of self and mutual inductances, two port parameters of a given electric circuits. Able to draw locus diagrams, waveforms and phasor diagrams for lagging and leading networks.
COURSE OUTCOMES	**ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**
CO1	Understand the concept of Traditional knowledge and its importance
CO2	Know the need and importance of protecting traditional knowledge
CO3	Know the various enactments related to the protection of traditional knowledge
CO4	Understand the concepts of Intellectual property to protect the traditional knowledge
	II Year – II SEMESTER
COURSE OUTCOMES	**ELECTRICAL MEASUREMENTS AND INSTRUMENTATION**
CO1	choose right type of instrument for measurement of ac and dc Electrical quantities.
CO2	choose right type of instrument for measurement of power and power factor.
CO3	select right type for measurement of R, L,C.
CO4	understand the effectiveness of Transducer.
CO5	able to understand Digital Meters.
COURSE OUTCOMES	**ELECTRICAL MACHINES – II**

CO1	Understand the principle of operation and performance of 3-phase induction motor
CO2	Quantify the performance of induction motor and induction generator in terms of torque and slip.
CO3	To understand the principle of emf generation, the effect of armature reaction and predetermination of voltage regulation in synchronous generators.
CO4	To study parallel operation and control of real and reactive powers for synchronous generators.
COURSE OUTCOMES	**DIGITAL ELECTRONICS**
CO1	To solve a typical number base conversion and analyze new error coding techniques.
CO2	Theorems and functions of Boolean algebra and behavior of logic gates
CO3	To optimize logic gates for digital circuits using various techniques.
CO4	To understand concepts of combinational circuits
CO5	To develop advanced sequential circuits.
COURSE OUTCOMES	**CONTROL SYSTEMS**
CO1	To learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function
CO2	To analyze the time response of first and second order systems and improvement of performance by proportional plus derivative and proportional plus integral controllers
CO3	To investigate the stability of closed loop systems using Routh's stability criterion and the analysis by root locus method
CO4	To discuss basic aspects of design and compensation of linear control system using Bode plot.
COURSE OUTCOMES	**POWER SYSTEMS-I**
CO1	identify the different components of thermal power plants
CO2	identify the different components of nuclear Power plants.
CO3	dentify the different components of air and gas insulated substations.
CO4	identify single core and three core cables with different insulating materials.
COURSE OUTCOMES	**SIGNALS AND SYSTEMS**
CO1	To introduce the terminology of signals and systems.
CO2	To introduce Fourier tools through the analogy between vectors and signals.
CO3	To introduce the concept of sampling and reconstruction of signals.
CO4	To analyze the linear systems in time and frequency domains.
COURSE OUTCOMES	**ELECTRICAL MACHINES – I LABORATORY**

CO1	Determine and predetermine the performance of DC machines and Transformers.
CO2	Control the speed of DC motor.
CO3	Obtain three phase to two phase transformation.
COURSE OUTCOMES	**PROFESSIONAL ETHICS AND HUMAN VALUES**
CO1	To create an awareness on Engineering Ethics and Human Values.
CO2	To instill Moral and Social Values and Loyalty
CO3	To appreciate the rights of others
CO4	To create awareness on assessment of safety and risk
	III Year – I SEMESTER
COURSE OUTCOMES	**POWER SYSTEMS–II**
CO1	To compute inductance/capacitance of transmission lines and to understand the concepts of GMD/GMR.
CO2	To study the short and medium length transmission lines, their models and performance.
CO3	To study the performance and modeling of long transmission lines.
CO4	To study the effect of travelling waves on transmission lines.
COURSE OUTCOMES	**POWER ELECTRONICS**
CO1	explain the characteristics of various power semiconductor devices and analyze the static and dynamic characteristics of SCR's.
CO2	design firing circuits for SCR.
CO3	explain the operation of single phase full–wave converters and analyze harmonics in the input current
CO4	explain the operation of three phase full–wave converters.
CO5	explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
COURSE OUTCOMES	**LINEAR IC APPLICATIONS**
CO1	design circuits using operational amplifiers for various applications.
CO2	analyze and design amplifiers and active filters using Op-amp.
CO3	understand the gain-bandwidth concept and frequency response of the amplifier configurations.
CO4	understand thoroughly the operational amplifiers with linear integrated circuits.
COURSE OUTCOMES	**DIGITAL SIGNAL PROCESSING**
CO1	understand the concepts of signal processing& transforms
CO2	appraise the Fat Fourier algorithm.
CO3	design FIR and IIR filters.
CO4	appreciate the concepts of multirate signal processing
COURSE OUTCOMES	**MICROPROCESSORS AND MICROCONTROLLERS**
CO1	understand the Microprocessor capability in general and explore the evaluation of microprocessors.
CO2	understand the addressing modes of Microprocessors

CO3	understand the Microcontroller capability
CO4	interface Microprocessors and Microcontrollers with other electronic devices
COURSE OUTCOMES	**LECTRICAL MACHINES – II LABORATORY**
CO1	assess the performance of single phase and three phase induction motors.
CO2	control the speed of three phase induction motor.
CO3	predetermine the regulation of three–phase alternator by various methods
CO4	find the Xd/ Xq ratio of alternator and asses the performance of three–phase synchronous motor.
CO5	determine the performance single phase AC series motor.
COURSE OUTCOMES	**CONTROL SYSTEMS LABORATORY**
CO1	analyze the performance and working Magnetic amplifier, D.C and A.C. servo motors and synchros.
CO2	design lag, lead and lag–lead compensators
CO3	control the temperature using PID controller
CO4	control the performance of D.C and A.C Servo Motor.
CO5	test the controllability and observability.
COURSE OUTCOMES	**ELECTRICAL MEASUREMENTS & INSRUMENTATION LABORATORY**
CO1	measure the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance.
CO2	known the characteristics of transducers.
CO3	measure the strains, frequency and phase difference.
COURSE OUTCOMES	**SOCIALLY RELAVENT PROJECTS**
CO1	The student(s) are be able to provide a solutions the technological problems of society
CO2	The student(s) is able suggest technological changes which suits current needs of society
CO3	The student(s) are able to explain new technologies available for problems of the society.
	III Year – II SEMESTER
COURSE OUTCOMES	**ELECTRIC DRIVES**
CO1	explain the fundamentals of electric drive and different electric braking methods.
CO2	analyze the operation of three phase converter fed dc motors and four quadrant operations of dc motors using dual converters.
CO3	know the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
CO4	differentiate the stator side control and rotor side control of three phase induction motor, explain the speed control mechanism of synchronous motors
COURSE OUTCOMES	**POWER SYSTEM ANALYSIS**

CO1	draw impedance diagram for a power system network and to understand per unit quantities
CO2	understand the load flow solution of a power system using different methods.
CO3	find the fault currents for all types faults to provide data for the design of protective devices
CO4	analyze the steady state, transient and dynamic stability concepts of a power system.
COURSE OUTCOMES	**DATA STRUCTURES**
CO1	data structures concepts with arrays, stacks, queues.
CO2	linked lists for stacks, queues and for other applications
CO3	traversal methods in the Trees.
CO4	sorting and searching in the data ret retrival applications.
COURSE OUTCOMES	**DIGITAL CONTROL SYSTEMS**
CO1	learn the advantages of discrete time control systems and the “know how” of various associated accessories.
CO2	understand z–transformations and their role in the mathematical analysis of different systems(like Laplace transforms in analog systems).
CO3	learn the stability criterion for digital systems and methods adopted for testing the same are explained
CO4	understand the conventional and state space methods of design are also introduced.
COURSE OUTCOMES	**DIGITAL IC APPLICATIONS**
CO1	understand the structure of commercially available digital integrated circuit families.
CO2	learn the IEEE Standard 1076 Hardware Description Language (VHDL).
CO3	model complex digital systems at several levels of abstractions, behavioral, structural, simulation, synthesis and rapid system prototyping.
CO4	analyze and design basic digital circuits with combinatorial and sequential logic circuits using VHDL.
COURSE OUTCOMES	**COMMUNICATION SYSTEMS**
CO1	understand the basics of communication system, analog and digital modulation techniques.
CO2	apply the knowledge of digital electronics and understand the error control coding techniques.
CO3	summarize different types of communication systems and its requirements
COURSE OUTCOMES	**COMPUTER NETWORKS**
CO1	Understand state-of-the-art in network protocols, architectures, and applications

CO2	Process of networking research
CO3	Constraints and thought processes for networking research
CO4	Problem Formulation—Approach—Analysis
COURSE OUTCOMES	**CLOUD COMPUTING**
CO1	The cloud environment, building software systems.
CO2	Components that scale to millions of users in modern internetcloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas,
CO3	Developing cloud based software applications on top of cloud platforms.
COURSE OUTCOMES	**POWER ELECTRONICS DEVICES & CIRCUITS**
CO1	To understand the physics of basic semiconductor devices and power diod
CO2	To study the physics and operating characteristics of BJT and power MOSFET.
CO3	To understand the operation and characteristics of thyristor and GTOs.
CO4	To study the operation of emerging devices and their integrated circuits
COURSE OUTCOMES	**POWER ELECTRONICS LABORATORY**
CO1	study the characteristics of various power electronic devices.
CO2	analyze the performance of single–phase and three–phase full–wave bridge converters with both resistive and inductive loads
CO3	understand the operation of single phase AC voltage regulator with resistive and inductive loads.
CO4	understand the working of Buck converter, Boost converter, single–phase square wave inverter and PWM inverter.
COURSE OUTCOMES	**EMPLOYABILITY SKILLS**
CO1	solve aptitude and reasoning problems
CO2	apply the soft skills in dealing the issues related to employability
CO3	successful in getting employment in campus placement interview
	IV Year – I SEMESTER
COURSE OUTCOMES	**SWITCHGEAR AND PROTECTION**
CO1	understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF6 gas type.
CO2	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.
CO4	understand different types of static relays and their applications.
CO5	understand different types of over voltages and protective schemes required for insulation co–ordination
COURSE OUTCOMES	**OOPS THROUGH JAVA**
CO1	understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
CO2	build Java Application for distributed environment.

CO3	design and Develop multi-tier applications.
CO4	identify and Analyze Enterprise applications.
COURSE OUTCOMES	**RENEWABLE ENERGY SYSTEMS**
CO1	analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface.
CO2	design solar thermal collectors, solar thermal plants.
CO3	design solar photo voltaic systems
CO4	develop maximum power point techniques in solar PV and wind energy systems
COURSE OUTCOMES	**UTILIZATION OF ELECTRICAL ENERGY**
CO1	identify most appropriate heating and welding techniques for suitable applications.
CO2	identify a suitable motor for electric drives and industrial applications
CO3	determine the speed/time characteristics of different types of traction systems and determination of various traction parameters
CO4	know the necessity and usage of different energy storage schemes for different applications.
COURSE OUTCOMES	**DATA BASE MANAGEMENT SYSTEMS**
CO1	describe a relational database and object-oriented database.
CO2	create, maintain and manipulate a relational database using SQL
CO3	describe ER model and normalization for database design.
CO4	design and build database system for a given real world problem
COURSE OUTCOMES	**OPERATING SYSTEMS**
CO1	design various Scheduling algorithms.
CO2	apply the principles of concurrency.
CO3	design deadlock, prevention and avoidance algorithms.
CO4	design and Implement a prototype file systems.
COURSE OUTCOMES	**NEURAL NETWORKS AND FUZZY LOGIC**
CO1	use different paradigms of ANN
CO2	classify between classical and fuzzy sets
CO3	use different modules of Fuzzy logic controller
CO4	apply Neural Networks and fuzzy logic for real-time applications.
COURSE OUTCOMES	**LINEAR & DIGITAL IC APPLICATIONS LAB**
CO1	understand the characteristics of ICs-741, 555, 565, 566
CO2	apply the concepts of IC 741 for different applications
CO3	analyse the data connection circuits
CO4	develop the digital circuits
COURSE OUTCOMES	**POWER SYSTEMS & SIMULATION LAB**
CO1	determine the parameters of various power system components which are frequently occur in power system studies and he can execute energy management systems functions at load dispatch center.
	IV Year –II SEMESTER
COURSE OUTCOMES	**POWER SYSTEM OPERATION AND CONTROL**

CO1	compute optimal scheduling of Generators.
CO2	understand hydrothermal scheduling
CO3	understand the unit commitment problem
CO4	understand importance of the frequency.
COURSE OUTCOMES	**MEASUREMENTS AND INSTRUMENTATION**
CO1	choose right type of instrument for measurement of power and power factor.
CO2	select right type for measurement of R, L,C.
CO3	understand the effectiveness of Transducer
CO4	understand Digital Meters
COURSE OUTCOMES	**FUNDAMENTALS OF UTILIZATION OF ELECTRICAL ENERGY**
CO1	learn about various methods used for electrical energy based heating and welding applications
CO2	know about the mechanisms, equipment and technology used in the electric traction
CO3	understand the importance of electrical earthing, earthing equipment and electrical earthing measurement methods.
CO4	know various types of illumination equipment, illumination measurement and illumination techniques
COURSE OUTCOMES	**ELECTRICAL DISTRIBUTION SYSTEMS**
CO1	understand various factors of distribution system.
CO2	design the substation and feeders
CO3	determine the voltage drop and power loss
CO4	understand the protection and its coordination
COURSE OUTCOMES	**HVAC & DC TRANSMISSION**
CO1	calculate voltage and current harmonics, and design of filters for six and twelve pulse conversion
CO2	develop knowledge of reactive power requirements of conventional control, filters and reactive power compensation in AC. side of HVDC system.
CO3	develop knowledge with regard to choice of pulse conversion, control characteristic, firing angle control and effect of source impedance.
CO4	acquire knowledge in transmission of HVDC power with regard to terminal equipments, type of HVDC connectivity and planning of HVDC system

ELECTRICAL AND ELECTRONICS ENGINEERING (R16)	
	1 Year - 1 Semester
Course Outcomes	**English -1**
CO1	The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly. Acquisition of writing skills.
CO2	The lesson motivates the public to adopt road safety measures.
CO3	The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.
CO4	The lesson helps to choose a source of energy suitable for rural India.
CO5	The lesson creates an awareness in the reader as to the usefulness of animals for the human society.
Course Outcomes	**MATHEMATICS-I**
CO1	Solve linear differential equations of first, second and higher order.
CO2	Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
CO3	Calculate total derivative, Jocobian and minima of functions of two variables.
Course Outcomes	**APPLIED CHEMISTRY**
CO1	The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano-materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. Conductance phenomenon is better understood. The students are exposed to some of the alternative fuels and their advantages and limitations.
Course Outcomes	**ENIGINEERING MECHANICS**
CO1	The students are to be exposed to the concepts of force and friction, direction and its application.
CO2	The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces
CO3	The students are to be exposed to concepts of centre of gravity.
CO4	The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
CO5	The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion
Course Outcomes	**COMPUTER PROGRAMMING**
CO1	Understand the basic terminology used in computer programming
CO2	Write, compile and debug programs in C language.
CO3	Use different data types in a computer program.
CO4	Explain the difference between call by value and call by reference
CO5	Use different data structures and create/update basic data files.
Course Outcomes	**ENVIRONMENTAL STUDIES**
CO1	The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
CO2	The concepts of the ecosystem and its function in the environment.
CO3	The need for protecting the producers and consumers in various ecosystems and their role in the

CO4	Social issues both rural and urban environment and the possible means to combat the challenges
CO5	About environmental assessment and the stages involved in EIA and the environmental audit.
Course Outcomes	**APPLIED/ENGINEERING CHEMISTRY LABORATORY**
CO1	The students entering into the professional Course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab Course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.
Course Outcomes	**ENGLISH - COMMUNICATION SKILLS LAB- I**
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
Course Outcomes	**COMPUTER PROGRAMMING LAB**
CO1	Apply and practice logical ability to solve the problems.
CO2	Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
CO3	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
CO4	Understand and apply the in-built functions and customized functions for solving the problems.
	I Year - II Semester
Course Outcomes	**ENGLISH -II**
CO1	The lesson underscores that the ultimate aim of Education is to enhance wisdom
CO2	The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.
CO3	The lesson imparts the students to manage different cultural shocks due to globalization
CO4	The theme projects society's need to re examine its traditions when they are outdated
CO5	The lesson offers several inputs to protect environment for the sustainability of the future generations.
Course Outcomes	**MATHEMATICS-II (Mathematical Methods)**
CO1	Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
CO2	Compute interpolating polynomial for the given data.
CO3	Solve ordinary differential equations numerically using Euler's and RK method.
CO4	Find Fourier series and Fourier transforms for certain functions
CO5	Identify/classify and solve the different types of partial differential equations
Course Outcomes	**MATHEMATICS-III**
CO1	Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
CO2	Solve simultaneous linear equations numerically using various matrix methods.
CO3	**Determine double integral over a region and triple integral over a volume.**
CO4	Calculate gradient of a scalar function, divergence and curl of a vector function.
Course Outcomes	**APPLIED PHYSICS**

CO1	Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study EM-fields and semiconductors under the concepts of Quantum mechanics paves way for their optimal utility.
Course Outcomes	**ELECTRICAL CIRCUIT ANALYSIS – I**
CO1	Various electrical networks in presence of active and passive elements.
CO2	Electrical networks with network topology concepts.
CO3	Any magnetic circuit with various dot conventions.
CO4	Any R, L, C network with sinusoidal excitation.
CO5	Any R, L, network with variation of any one of the parameters i.e R, L, C. and f.
Course Outcomes	**ENGINEERING DRAWING**
CO1	: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.
Course Outcomes	**ENGLISH LANGUAGE COMMUNICATION SKILLS LAB- II**
CO1	To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.
Course Outcomes	**APPLIED/ENGINEERING PHYSICS LAB**
CO1	: Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.
Course Outcomes	**ENGINEERING WORKSHOP & IT WORKSHOP**
CO1	To impart hands-on practice on basic engineering trades and skills. Note: At least two exercises to be done from each trade
	II Year – ISEMESTER
Course Outcomes	**ELECTRICAL CIRCUIT ANALYSIS-II**
CO1	Students are able to solve three- phase circuits under balanced and unbalanced condition
CO2	Students are able find the transient response of electrical networks for different types of excitations.
CO3	Students are able to find parameters for different types of network
CO4	Students are able to realize electrical equivalent network for a given network transfer function.
CO5	Students are able to extract different harmonics components from the response of a electrical network.
Course Outcomes	**ELECTRICAL MACHINES – I**
CO1	Able to assimilate the concepts of electromechanical energy conversion.
CO2	Able to mitigate the ill-effects of armature reaction and improve commutation in dc machines.
CO3	Able to understand the torque production mechanism and control the speed of dc motors
CO4	Able to analyze the performance of single phase transformers.
CO5	Able to predetermine regulation, losses and efficiency of single phase transformers.
Course Outcomes	**BASIC ELECTRONICS AND DEVICES**
CO1	Students are able to understand the basic concepts of semiconductor physics, which are useful to understand the operation of diodes and transistors.
CO2	Students are able to explain the operation and characteristics of PN junction diode and special diodes
CO3	Ability to understand operation and design aspects of rectifiers and regulators.

CO4	Students are able to understand the characteristics of various transistor configurations. They become familiar with different biasing, stabilization and compensation techniques used in transistor circuits.
CO5	Students are able to understand the operation and characteristics of FET, Thyristors, Power IGBTs and Power MOSFETs.
Course Outcomes	**ELECTROMAGNETIC FIELDS**
CO1	To Determine electric fields and potentialsusing guass's lawor solving Laplace's or Possion's equations, for various electric charge distributions.
CO2	To Calculate and design capacitance, energy stored in dielectrics.
CO3	To Calculate the magnetic field intensity due to current, the application of ampere's law and the Maxwell's second and third equations.
CO4	To determine the magnetic forces and torque produced by currents in magnetic field
CO5	To determine self and mutual inductances and the energy stored in the magnetic field.
Course Outcomes	**THERMAL AND HYDRO PRIME MOVERS**
CO1	To make the student understand the types of prime movers, which can be connected to generators for power production and should obtain the skills of performing the necessary calculations with respect to the functioning of the prime movers
Course Outcomes	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
CO1	The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
CO2	To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles
CO3	To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.
Course Outcomes	**THERMAL AND HYDRO LAB**
CO1	: To impart practical knowledge on the performance evaluation methods of various internal combustion engines, flow measuring equipment and hydraulic turbines and pumps.
Course Outcomes	**ELECTRICAL CIRCUITS LAB**
CO1	Able to apply various thermos, determination of self and mutual inductances, two port parameters of a given electric circuits. Able to draw locus diagrams. Waveforms and phasor diagram for lagging and leading networks
	II Year – II SEMESTER
Course Outcomes	**ELECTRICAL MEASUREMENTS**
CO1	Able to choose right type of instrument for measurement of voltage and current for ac and dc.
CO2	Able to choose right type of instrument for measurement of power and energy – able to calibrate energy meter by suitable method
CO3	Able to calibrate ammeter and potentiometer.
CO4	Able to select suitable bridge for measurement of electrical parameters
Course Outcomes	**ELECTRICAL MACHINES – II**
CO1	Able to explain the operation and performance of three phase induction motor.
CO2	Able to analyze the torque-speed relation, performance of induction motor and induction generator.

CO3	Able to explain design procedure for transformers and three phase induction motors.
CO4	Implement the starting of single phase induction motors
CO5	To perform winding design and predetermine the regulation of synchronous generators.
Course Outcomes	**CONTROL SYSTEMS**
CO1	**Ability to derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.**
CO2	Capability to determine time response specifications of second order systems and to determine error constants.
CO3	Acquires the skill to analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.
CO4	Capable to analyze the stability of LTI systems using frequency response methods.
CO5	Able to design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.
Course Outcomes	**POWER SYSTEMS-I**
CO1	Students are able to identify the different components of thermal power plants.
CO2	Students are able to distinguish between AC/DC distribution systems and also estimate voltage drops of distribution systems
CO3	Students are able to identifythe different components of air and gas insulated substations.
CO4	Students are able to identifysingle core and multi core cables with different insulating materials.
Course Outcomes	**MANAGEMENT SCIENCE**
CO1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior
CO2	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior
Course Outcomes	**ELECTRICAL MACHINES – I LABORATORY**
CO1	To determine and predetermine the performance of DC machines and Transformers
CO2	To control the speed of DC motor.
CO3	To achieve three phase to two phase transformation.
	III Year – I SEMESTER
Course Outcomes	**POWER SYSTEMS–II**
CO1	Able to understand parameters of various types of transmission lines during different operating conditions.
CO2	Able to understand the performance of short and medium transmission lines.
CO3	Student will be able to understand travelling waves on transmission lines.
CO4	Will be able to understand various factors related to charged transmission lines
CO5	Will be able to understand sag/tension of transmission lines and performance of line insulators.
Course Outcomes	**RENEWABLE ENERGY SOURCES**
CO1	Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface
CO2	Design solar thermal collectors, solar thermal plants.
CO3	Design solar photo voltaic systems
CO4	Develop maximum power point techniques in solar PV and wind energy systems.
CO5	Explain wind energy conversion systems, wind generators, power generation.
Course Outcomes	**SIGNALS & SYSTEMS**

CO1	Characterize the signals and systems and principles of vector spaces, Concept of orthgonality
CO2	Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform.
CO3	Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
CO4	Understand the relationships among the various representations of LTI systems
CO5	Understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships.
Course Outcomes	**PULSE AND DIGITAL CIRCUITS OBJECTIVES**
CO1	Design linear and non-linear wave shaping circuits.
CO2	Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
CO3	Design different multivibrators and time base generators.
CO4	Utilize the non sinusoidal signals in many experimental research areas
Course Outcomes	**POWER ELECTRONICS**
CO1	Explain the characteristics of various power semiconductor devices and analyze the static and dynamic characteristics of SCR's.
CO2	Design firing circuits for SCR.
CO3	Explain the operation of single phase full–wave converters and analyze harmonics in the input current.
CO4	Explain the operation of three phase full–wave converters.
CO5	Analyze the operation of different types of DC-DC converters. Explain the operation of inverters and application of PWM techniques for voltage
Course Outcomes	**ELECTRICAL MACHINES – II LABORATORY**
CO1	To control the speed of three phase induction motors.
CO2	To determine /predetermine the performance three phase and single phase induction motors.
CO3	To improve the power factor of single phase induction motor .
Course Outcomes	**CONTROL SYSTEMS LAB**
CO1	To impart hands on experience to understand the performance of basic control system components such as magnetic amplifiers, D.C. servo motors, A.C. Servo motors, stepper motor and potentiometer.
CO2	To understand time and frequency responses of control system with and without controllers and compensators.
Course Outcomes	**ELECTRICAL MEASUREMENTS LABORATORY**
CO1	To understand the correct function of electrical parameters and calibration of voltage, current, single phase and three phase power and energy, and measurement of electrical characteristics of resistance, inductance and capacitance of a circuits through appropriate methods.
	III Year – II SEMESTER
Course Outcomes	**POWER ELECTRONIC CONTROLLERS & DRIVES**
CO1	Explain the fundamentals of electric drive and different electric braking methods.
CO2	Analyze the operation of three phase converter fed dc motors and four quadrant operations of dc motors using dual converters.
CO3	Describe the converter control of dc motors in various quadrants of operation

CO4	Know the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
Course Outcomes	**POWER SYSTEM ANALYSIS**
CO1	Able to draw impedance diagram for a power system network and to understand per unit quantitie
CO2	Able to form aYbusand Zbusfor a power system networks.
CO3	Able to understand the load flow solution of a power system using different methods
CO4	Able to find the fault currents for all types faults to provide data for the design of protective devices.
Course Outcomes	**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 mp and mc
Course Outcomes	**DATA STRUCTURES THROUGH C++**
CO1	Distinguish between procedures and object oriented programming.
CO2	Apply advanced data structure strategies for exploring complex data structures. Compare and contrast various data structures and design techniques in the area of Performance.
CO3	Implement data structure algorithms through C++. Incorporate data structures into the applications such as binary search trees, AVL and B Trees
CO4	Implement data structure algorithms through C++. Incorporate data structures into the applications such as binary search trees, AVL and B Trees
Course Outcomes	**UNIX AND SHELL PROGRAMMIN OPEN ELECTIVE**
CO1	Documentation will demonstrate good organization and readability.
CO2	File processing projects will require data organization, problem solving and research
CO3	Scripts and programs will demonstrate simple effective user interfaces
CO4	Scripts and programs will demonstrate effective use of structured programming
Course Outcomes	**POWER ELECTRONICS LAB**
CO1	To study the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR
CO2	To analyze the performance of single–phase and three–phase full–wave bridge converters with both resistive and inductive loads.
CO3	To understand the operation of AC voltage regulator with resistive and inductive loads.
CO4	To understand the working of Buck converter, Boost converter and inverters.
Course Outcomes	**MICRO MPROCESSORS AND MICRO CONTROLLERS LAB**
CO1	To study programming based on 8086 microprocessor and 8051 microcontroller
CO2	To study 8086 microprocessor based ALP using arithmetic, logical and shift operations.
CO3	To study to interface 8086 with I/O and other devices.
CO4	To study parallel and serial communication using 8051& PIC 18 micro controllers.
Course Outcomes	**DATASTRUCTURES THROUGH C LAB**
CO1	To develop skills to design and analyze simple linear and non linear data structures
CO2	To Strengthen the ability to identify and apply the suitable data structure for the given real world problem
	IV Year – I SEMESTER

Course Outcomes	UTILIZATION OF ELECTRICAL ENERGY
CO1	**Able to identify a suitable motor for electric drives and industrial applications**
CO2	Able to identify most appropriate heating or welding techniques for suitable applications.
CO3	Able to understand various level of illuminosity produced by different illuminating sources.
CO4	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
Course Outcomes	**LINEAR IC APPLICATIONS**
CO1	Design circuits using operational amplifiers for various applications.
CO2	Analyze and design amplifiers and active filters using Op-amp
CO3	Diagnose and trouble-shoot linear electronic circuits.
CO4	Understand the gain-bandwidth concept and frequency response of the amplifier configurations
Course Outcomes	**POWER SYSTEM OPERATION AND CONTROL**
CO1	Able to compute optimal scheduling of Generators
CO2	Able to understand hydrothermal scheduling.
CO3	Understand the unit commitment problem.
CO4	Able to understand importance of the frequency.
CO5	Understand importance of PID controllers in single area and two area systems
Course Outcomes	**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.
CO4	Improves the ability to understand various types of protective schemes used for feeders and bus bar protection.
CO5	**Able to understand different types of static relays and their applications.**
Course Outcomes	**ELECTRICAL MACHINE MODELING & ANALYSIS**
CO1	Establish unified theory of rotating machines.
CO2	To understand the concept of phase transformation.
CO3	Analyze different electrical machines for improved performance through modification of their characteristics.
CO4	Develop concepts on mathematical modeling of electrical machines.
Course Outcomes	**ADVANCED CONTROL SYSTEMS**
CO1	State space representation of control system and formulation of different state models are reviewed.
CO2	Able to design of control system using the pole placement technique is given after introducing the concept of controllability and observability.
CO3	Able to analyse of nonlinear system using the describing function technique and phase plane analysis.
CO4	Able to analysethe stability analysis using lypnov method
CO5	Minimization of functionals using calculus of variation studied
Course Outcomes	**ELECTRICAL SIMULATION LAB**
CO1	Able to simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.
CO2	Able to simulate transmission line by incorporating line, load and transformer models

CO3	Able to perform transient analysis of RLC circuit and single machine connected to infinite bus(SMIB).
Course Outcomes	**POWER SYSTEMS LAB**
CO1	The student is able to determine the parameters of various power system components which are frequently occur in power system studies and he can execute energy management systems functions at load dispatch center.
	IV Year – II SEMESTER
Course Outcomes	**DIGITAL CONTROL SYSTEMS**
CO1	The students learn the advantages of discrete time control systems and the "know how" of various associated accessories.
CO2	The learner understand z–transformations and their role in the mathematical analysis of different systems(like Laplace transforms in analog systems).
CO3	The stability criterion for digital systems and methods adopted for testing the same are explained.
CO4	Finally, the conventional and state space methods of design are also introduced
Course Outcomes	**H.V.D.C. TRANSMISSION**
CO1	Learn different types of HVDC levels and basic concepts
CO2	Know the operation of converters
CO3	Acquire control concept of reactive power control and AC/DC load flow.
CO4	Understand converter faults, protection and harmonic effect
CO5	Design low pass and high pass filters
Course Outcomes	**ELECTRICAL DISTRIBUTION SYSTEMS**
CO1	Able to understand various factors of distribution system.
CO2	. Able to determine the voltage drop and power loss
CO3	Able to design the substation and feeders
CO4	Able to understand the protection and its coordination.
Course Outcomes	**HIGH VOLTAGE ENGINEERING**
CO1	To be acquainted with the performance of high voltages with regard to different configurations of electrode systems
CO2	To be able to understand theory of breakdown and withstand phenomena of all types of dielectric materials.
CO3	To acquaint with the techniques of generation of AC,DC and Impulse voltages
CO4	To be able to apply knowledge for measurement of high voltage and high current AC,DC and Impulse.

CIVIL ENGINEERING (R19)	
	1-YEAR-1 SEMESTER
COURSE OUTCOMES	MATHEMATICS-I
CO1	1. Analyze and solve mathematical problems related to civil engineering, such as optimization of structural designs, calculation of loads and stresses, and analysis of fluid flow through pipes and channels.
CO2	2. Apply mathematical concepts and techniques, such as calculus, linear algebra, differential equations, and statistics, to model and solve real-world engineering problems.
CO3	3. Demonstrate proficiency in using mathematical software and tools, such as MATLAB, Mathematica, and Excel, to perform numerical calculations, data analysis, and visualization of results.
CO4	4. Develop critical thinking and problem-solving skills by applying mathematical principles to evaluate and compare different engineering solutions and make informed decisions.
CO5	5. Communicate technical information effectively and professionally, both orally and in writing, using appropriate mathematical notation, terminology, and visualization techniques to convey ideas and results to diverse audiences.
COURSE OUTCOMES	MATHEMATICS-II
CO1	1. Analyze and solve advanced mathematical problems related to civil engineering, such as differential equations for modeling heat transfer, vibrations, and fluid dynamics, and partial differential equations for modeling wave propagation, groundwater flow, and solid mechanics.
CO2	2. Apply advanced mathematical concepts and techniques, such as complex analysis, numerical methods, and optimization, to develop and solve complex engineering problems.
CO3	3. Demonstrate proficiency in using specialized mathematical software and tools, such as ANSYS, ABAQUS, and COMSOL, to model and simulate real-world engineering problems and analyze the results.
CO4	4. Develop critical thinking and problem-solving skills by identifying the underlying mathematical principles of different engineering problems and applying appropriate mathematical methods to analyze and solve them.
CO5	5. Communicate technical information effectively and professionally, both orally and in writing, using advanced mathematical notation, terminology, and visualization techniques to convey complex ideas and results to diverse audiences, such as clients, stakeholders, and other professionals.
COURSE OUTCOMES	**Engineering Physics**
CO1	1. Apply fundamental physics concepts and principles, such as mechanics, electromagnetism, thermodynamics, and optics, to analyze and design civil engineering systems and structures, such as bridges, buildings, and dams.
CO2	2. Demonstrate proficiency in using scientific and engineering software tools, such as MATLAB, Mathematica, and CAD software, to model, simulate, and visualize complex physical systems and analyze their behavior.
CO3	3. Develop critical thinking and problem-solving skills by applying physics principles to evaluate and compare different engineering solutions and make informed decisions.
CO4	4. Demonstrate an understanding of the role of physics in civil engineering, including how advances in physics research and technology can be applied to the design, construction, and maintenance of civil infrastructure.

CO5	5. Communicate technical information effectively and professionally, both orally and in writing, using appropriate physics terminology, notation, and visualization techniques to convey ideas and results to diverse audiences, such as clients, stakeholders, and other professionals.
COURSE OUTCOMES	**Engineering Mechanics**
CO1	1. Apply the principles of statics and dynamics to analyze and design civil engineering systems and structures, such as trusses, frames, and beams, and to calculate forces and moments on various structural elements.
CO2	2. Demonstrate proficiency in using mathematical and computational tools, such as MATLAB, Excel, and CAD software, to model and solve engineering mechanics problems, and to analyze and visualize results.
CO3	3. Develop critical thinking and problem-solving skills by identifying the underlying physics and mechanics of different engineering problems and applying appropriate methods to analyze and solve them.
CO4	4. Demonstrate an understanding of the role of mechanics in civil engineering, including how advances in materials science, computational mechanics, and experimental techniques can be used to design and optimize civil infrastructure.
CO5	5. Communicate technical information effectively and professionally, both orally and in writing, using appropriate mechanics terminology, notation, and visualization techniques to convey ideas and results to diverse audiences, such as clients, stakeholders, and other professionals.
COURSE OUTCOMES	**ENGINEERING DRAWING**
CO1	1. Develop proficiency in creating and interpreting engineering drawings, including plans, sections, elevations, and details, using traditional drafting techniques and computer-aided design (CAD) software.
CO2	2. Understand and apply the fundamental principles of geometric construction, orthographic projection, dimensioning, and tolerancing to accurately and clearly represent civil engineering designs and plans.
CO3	3. Demonstrate an understanding of the role of engineering drawing in civil engineering, including how it serves as a language to communicate design concepts, specifications, and details to various stakeholders, such as clients, contractors, and regulatory agencies.
COURSE OUTCOMES	**English Lab**
CO1	1. Develop effective communication skills in English, including reading, writing, listening, and speaking, for use in a professional context in civil engineering. This can include creating and presenting technical reports, proposals, and presentations, as well as participating in meetings and discussions.
CO2	2. Enhance intercultural competence by practicing communication skills with people from diverse cultural and linguistic backgrounds, and by learning about the cultural norms, values, and practices of other countries and regions where civil engineering projects are located.
COURSE OUTCOMES	**Engineering Physics Lab**
CO1	1. Apply fundamental physics concepts and principles to design and conduct experiments related to civil engineering, and to analyze and interpret experimental data using appropriate statistical methods.
CO2	2. Develop critical thinking and problem-solving skills by troubleshooting experimental setups and equipment, and by designing and testing alternative solutions to achieve desired outcomes.

COURSE OUTCOMES	Engineering Exploration Project
CO1	1. Apply engineering design principles and methods to identify, analyze, and solve complex problems related to civil engineering projects, and to develop and evaluate alternative solutions based on technical, economic, and social criteria.
CO2	2. Develop teamwork and collaboration skills by working in interdisciplinary teams to complete engineering projects, and by communicating effectively and respectfully with team members and project stakeholders.
	1-YEAR-II SEMESTER
COURSE OUTCOMES	**English**
CO1	1. Develop effective communication skills in English for use in a professional context in civil engineering, including technical writing, public speaking, and interpersonal communication with clients, colleagues, and stakeholders.
CO2	2. Enhance intercultural competence by learning and practicing communication skills with people from diverse cultural and linguistic backgrounds, and by understanding and navigating cultural differences and expectations in engineering projects.
COURSE OUTCOMES	**MATHEMATICS-III**
CO1	1. Apply advanced mathematical concepts and techniques, such as differential equations, Fourier series, and numerical methods, to model and solve civil engineering problems related to fluid mechanics, structural analysis, and transportation engineering.
CO2	2. Develop proficiency in using mathematical and computational tools, such as MATLAB, Maple, and Excel, to analyze and solve engineering problems, and to visualize and communicate results to diverse audiences.
CO3	3. Develop critical thinking and problem-solving skills by identifying and analyzing the underlying mathematics of different civil engineering problems, and by applying appropriate mathematical methods to solve them.
COURSE OUTCOMES	**Engineering Chemistry**
CO1	1. Develop a strong foundation in the fundamental principles of chemistry, including atomic and molecular structure, chemical bonding, thermodynamics, and kinetics, and apply these concepts to the analysis and design of civil engineering materials and processes.
CO2	2. Understand the properties and behavior of different types of materials used in civil engineering, such as cement, concrete, metals, polymers, and composites, and learn how to select, process, and test these materials to meet desired performance and sustainability criteria.
CO3	3. Evaluate the environmental impact of civil engineering processes and materials, and develop strategies to minimize pollution, waste, and resource depletion by using green chemistry principles and sustainable design practices.
CO4	4. Develop laboratory skills and techniques for analyzing and characterizing the chemical properties of civil engineering materials, and learn how to use a variety of analytical instruments, such as spectrometers, chromatographs, and microscopy tools, to obtain and interpret experimental data.
COURSE OUTCOMES	**Programming for problem Solving Using C**

CO1	1. Develop proficiency in using the C programming language to solve civil engineering problems related to numerical analysis, data processing, and computational modeling, and to write efficient and well-documented code.
CO2	2. Apply programming concepts and techniques, such as control structures, functions, arrays, and pointers, to develop algorithms and software programs for engineering applications, and to test and debug them using appropriate software tools.
CO3	3. Develop critical thinking and problem-solving skills by analyzing complex engineering problems, and by designing and implementing solutions using C programming techniques and best practices, with consideration for efficiency, accuracy, and reliability.
CO4	4. Collaborate effectively with peers and stakeholders by sharing and presenting programming solutions and results using appropriate communication techniques and software platforms, and by providing and receiving feedback to improve programming skills and practices.
COURSE OUTCOMES	**Computer Aided Engineering Drawing**
CO1	1. Develop proficiency in using computer-aided design (CAD) software, such as AutoCAD, Revit, and SolidWorks, to create and modify 2D and 3D models of civil engineering projects, including buildings, bridges, and other infrastructure.
CO2	2. Understand the principles of engineering graphics, including orthographic projection, isometric drawing, and sectioning, and learn how to apply these principles to create accurate and detailed engineering drawings and schematics.
CO3	3. Collaborate effectively with engineering teams by using CAD software to share and review design files, to annotate and mark up designs with comments and suggestions, and to incorporate feedback from diverse stakeholders into design iterations.
CO4	4. Develop a critical understanding of the ethical and legal considerations related to CAD and engineering drawings, including intellectual property, liability, and safety, and learn how to adhere to industry standards and best practices when creating and sharing design files.
COURSE OUTCOMES	**Programming for problem Solving Using C Lab**
CO1	1. Develop practical programming skills by applying C programming concepts and techniques learned in the classroom to real-world engineering problems and datasets, and by designing and implementing algorithms and software programs to solve these problems.
CO2	2. Learn how to use programming tools and environments, such as compilers, integrated development environments (IDEs), and software libraries, to write, test, and debug C code, and to optimize code performance and efficiency.
CO3	3. Develop teamwork and communication skills by collaborating with peers and instructors in small groups or pairs to solve programming challenges, share code and solutions, and give and receive feedback on coding practices and style.
CO4	4. Develop problem-solving skills and creativity by exploring different types of programming challenges, such as coding puzzles, games, simulations, and data analysis projects, and by presenting and discussing project results with peers and instructors.
COURSE OUTCOMES	**Engineering Chemistry Lab**

CO1	1. Develop hands-on laboratory skills by conducting experiments related to materials science, environmental chemistry, and analytical chemistry, and by using modern laboratory equipment and techniques to analyze and interpret experimental results.
CO2	2. Learn how to apply fundamental concepts in chemistry, such as chemical reactions, stoichiometry, equilibrium, and thermodynamics, to real-world engineering problems related to corrosion, material degradation, and environmental pollution, and to design and test potential solutions.
CO3	3. Develop teamwork and communication skills by collaborating with peers and instructors in small groups to plan, execute, and analyze experiments, to share and discuss experimental data, and to prepare technical reports and presentations based on experimental results.
CO4	4. Develop critical thinking and problem-solving skills by analyzing and interpreting experimental data, and by applying statistical and computational methods to evaluate the accuracy and precision of data, to compare and contrast experimental results, and to draw conclusions and make recommendations based on scientific evidence.
COURSE OUTCOMES	**Communications Skills Lab**
CO1	1. Develop effective communication skills, including written and oral communication, interpersonal skills, and teamwork skills, that are essential for success in the workplace and in professional settings.
CO2	2. Learn how to prepare and deliver effective technical presentations, including project proposals, design reviews, and research reports, using visual aids, such as PowerPoint or other presentation software, and other effective communication techniques.
CO3	3. Develop critical reading and writing skills by analyzing and evaluating technical documents, such as research papers, technical reports, and engineering specifications, and by using these documents as models for effective written communication in civil engineering.
CO4	4. Develop intercultural communication skills by learning how to communicate effectively with people from different cultural backgrounds, and by developing sensitivity and awareness of cultural differences that can impact communication and collaboration in the workplace.
COURSE OUTCOMES	**Workshop Practice Lab**
CO1	1. Develop hands-on skills in using hand tools, power tools, and machines for cutting, shaping, joining, and finishing different types of materials, including wood, metal, and plastic, and for reading and interpreting technical drawings and specifications.
CO2	2. Learn how to use modern design and modeling tools, such as computer-aided design (CAD) software, to design and test engineering prototypes, and to optimize their functionality, durability, and safety.
CO3	3. Develop teamwork and communication skills by collaborating with peers and instructors in small groups to plan, execute, and evaluate hands-on projects, and to share and discuss project results and technical challenges.
CO4	4. Develop problem-solving skills by applying fundamental principles in physics, mechanics, and materials science to design and build practical engineering prototypes, and by testing and validating these prototypes using appropriate testing and measurement tools and techniques.
COURSE OUTCOMES	**Environmental Science**

CO1	1. Develop a comprehensive understanding of environmental systems and the interrelationships between natural and human-made factors affecting these systems.
CO2	2. Learn how to identify, assess, and manage environmental risks and impacts associated with civil engineering projects, including air and water pollution, waste management, and ecosystem degradation.
CO3	3. Develop knowledge and skills in the application of sustainable engineering practices, including the use of renewable energy sources, the reduction of greenhouse gas emissions, and the design of green infrastructure and sustainable transportation systems.
CO4	4. Develop critical thinking and problem-solving skills by evaluating and analyzing environmental data, and by applying statistical and computational methods to understand and model environmental phenomena, and to develop and assess potential solutions.
	II YEAR 1-SEMESTER
COURSE OUTCOMES	**Complex Variables and Statistical Methods**
CO1	1. Develop a strong foundation in complex analysis, including the study of complex functions, Cauchy's theorem, and contour integration, and apply these techniques to solve engineering problems involving fluid dynamics, electromagnetics, and control systems.
CO2	2. Develop statistical reasoning and modeling skills, including hypothesis testing, regression analysis, and analysis of variance, and apply these techniques to analyze and interpret data from engineering experiments and surveys.
CO3	3. Develop proficiency in using mathematical software, such as MATLAB, Mathematica, or R, to solve complex mathematical problems and to visualize and analyze data from engineering experiments and simulations.
CO4	4. Develop critical thinking and problem-solving skills by applying mathematical techniques and statistical methods to model and analyze real-world engineering problems, such as the design of materials and structures, the optimization of production processes, and the analysis of environmental data.
COURSE OUTCOMES	**Strength of Materials-I**
CO1	1. Develop an understanding of the fundamental concepts of stress, strain, and deformation in solid materials, and learn how to analyze and design simple engineering structures subject to axial, torsional, and bending loads.
CO2	2. Learn how to perform experimental testing and measurement of mechanical properties of materials, including tensile strength, compressive strength, and modulus of elasticity, and use these measurements to validate theoretical models and to design safe and reliable structures.
CO3	3. Develop proficiency in using software tools, such as finite element analysis (FEA) and computer-aided design (CAD) software, to simulate and visualize the behavior of engineering structures and to optimize their performance and safety.
CO4	4. Develop critical thinking and problem-solving skills by analyzing and designing more complex engineering structures, such as beams, columns, and frames, under combined loading conditions, and by evaluating the effect of material properties and structural geometry on the behavior of these structures
COURSE OUTCOMES	**Fluid Mechanics**

CO1	1. Develop an understanding of the fundamental principles of fluid mechanics, including fluid properties, fluid statics, fluid dynamics, and energy and momentum conservation, and learn how to apply these principles to analyze real-world engineering problems.
CO2	2. Learn how to perform experimental measurements of fluid properties, such as density, viscosity, and surface tension, and how to use these measurements to develop models for the behavior of fluids under different conditions.
CO3	3. Develop proficiency in using software tools, such as computational fluid dynamics (CFD) software and CAD software, to simulate and visualize the behavior of fluids and fluid flow systems, and to optimize the performance and efficiency of these systems.
CO4	4. Develop critical thinking and problem-solving skills by applying principles of fluid mechanics to analyze and design real-world engineering systems, such as pumps, turbines, pipelines, and hydraulic structures, and to evaluate the impact of environmental factors, such as water quality and climate change, on the behavior of these systems.
COURSE OUTCOMES	**Surveying and Geometrics'**
CO1	1. Develop an understanding of the principles of surveying and geomatics, including geodetic and plane surveying, coordinate systems and transformations, and map projections, and learn how to apply these principles to accurately measure and represent features of the Earth's surface.
CO2	2. Learn how to use surveying instruments and software tools, such as total stations, GPS receivers, and geographic information systems (GIS), to collect and process survey data, create maps and 3D models, and analyze spatial relationships and patterns.
CO3	3. Develop skills in field survey techniques, such as leveling, traversing, and triangulation, and learn how to conduct surveys for engineering design, construction, and land use planning projects.
CO4	4. Develop critical thinking and problem-solving skills by analyzing and solving complex surveying and geomatics problems, such as determining the location and elevation of buildings and infrastructure, identifying and mitigating sources of error in survey measurements, and conducting surveys in challenging terrain and environmental conditions.
COURSE OUTCOMES	**Building Materials, Construction and Planning**
CO1	1. Analyze the properties and behavior of different building materials to determine their appropriate use in various construction applications.
CO2	2. Develop and evaluate construction plans and specifications based on structural and functional requirements.
CO3	3. Apply knowledge of construction techniques and methods to ensure safe and efficient construction practices.
CO4	4. Evaluate sustainability and environmental impact factors in construction projects to design and construct buildings that are both functional and environmentally responsible.
COURSE OUTCOMES	**Transportation Engineering-I**
CO1	1. Apply principles of traffic engineering to analyze and design transportation systems and facilities that meet safety, capacity, and efficiency requirements.
CO2	2. Evaluate and design geometric elements of roadways, intersections, and highways to ensure safe and efficient traffic flow.

CO3	3. Apply knowledge of pavement materials, design, and maintenance to ensure long-lasting and cost-effective roadway infrastructure.
CO4	4. Analyze and design transportation systems with consideration of environmental and sustainability factors to minimize their negative impact on the environment.
COURSE OUTCOMES	**Strength of Materials Lab**
CO1	1. Perform and interpret experiments on mechanical properties of materials to determine their strength, stiffness, and durability.
CO2	2. Apply knowledge of stress and strain analysis to determine the behavior of materials under different loading conditions.
CO3	3. Develop and execute testing procedures to evaluate the performance of structural components and systems under various loads and conditions.
CO4	4. Use testing data and analysis to design and optimize structures to ensure their safety and efficiency under expected loads and conditions.
COURSE OUTCOMES	**Surveying Field Work – I**
CO1	1. Demonstrate proficiency in using surveying equipment and techniques to perform basic measurements and topographical mapping of land and structures.
CO2	2. Apply knowledge of coordinate systems and surveying computations to accurately determine distances, angles, and elevations in field work.
CO3	3. Interpret and analyze surveying data to create maps, drawings, and reports that meet industry standards and regulations.
CO4	4. Apply safety procedures and ethical principles in surveying work to ensure the well-being of surveying team members and the public, and to maintain professional integrity.
COURSE OUTCOMES	**Constitution of India**
CO1	1. Understand the fundamental principles and structure of the Indian Constitution, and its impact on civil engineering practice and governance.
CO2	2. Analyze and evaluate legal and policy issues related to civil engineering projects and practice, with an awareness of the Constitution's role in shaping them.
	II YEAR II-SEMESTER
COURSE OUTCOMES	**Strength of Materials-II**
CO1	1. Analyze and design structural components and systems under different loading and boundary conditions using principles of strength of materials.
CO2	2. Apply knowledge of stress, strain, and deformation to determine the behavior of materials and structures under different types of loading.
CO3	3. Evaluate and select appropriate materials and structural elements to ensure the safety, durability, and efficiency of civil engineering projects.
CO4	4. Apply computer-aided design and analysis tools to optimize the design of structural components and systems, and to evaluate their performance under expected loads and conditions.
COURSE OUTCOMES	**Hydraulics and Hydraulic Machinery**
CO1	1. Analyze and design hydraulic systems to control fluid flow and pressure for various civil engineering applications.
CO2	2. Evaluate the performance of pumps, turbines, and other hydraulic machinery in civil engineering projects to ensure efficient and reliable operation.

CO3	3. Apply principles of fluid mechanics to analyze and design open channel flow and pipe flow systems.
CO4	4. Evaluate the impact of hydraulic systems on the environment and design sustainable and environmentally responsible hydraulic systems.
COURSE OUTCOMES	**Engineering Geology**
CO1	1. Analyze geological processes and structures to assess the suitability of subsurface conditions for civil engineering projects.
CO2	2. Apply knowledge of rock and soil mechanics to design foundations and support structures that ensure stability and safety.
CO3	3. Evaluate the impact of geological hazards such as landslides, earthquakes, and soil liquefaction on civil engineering projects.
CO4	4. Apply knowledge of geological and environmental factors to design sustainable and environmentally responsible civil engineering projects.
COURSE OUTCOMES	**Transportation Engineering - II**
CO1	1. Analyze and design transportation systems and facilities to meet the demands of urban and rural areas with consideration of safety, sustainability, and environmental impact.
CO2	2. Evaluate and design advanced geometric and traffic control features for highways, interchanges, and intersections that maximize safety and efficiency.
CO3	3. Apply principles of pavement design and management to ensure long-lasting and cost-effective roadway infrastructure.
CO4	4. Analyze and design transportation systems that integrate different modes of transportation with consideration of social, economic, and environmental factors.
COURSE OUTCOMES	**Environmental Engineering - I**
CO1	1. Analyze and design water supply and distribution systems that meet drinking water standards and regulations.
CO2	2. Evaluate and design wastewater collection and treatment systems to protect public health and the environment.
CO3	3. Apply principles of water chemistry and microbiology to understand water quality and treatment processes.
CO4	4. Understand the impact of environmental engineering on public health and environmental sustainability and design projects that balance social, economic, and environmental objectives.
COURSE OUTCOMES	**Engineering Geology Lab**
CO1	1. Conduct laboratory tests on rock and soil samples to determine their physical and mechanical properties.
CO2	2. Analyze and interpret laboratory data to evaluate the engineering properties of rock and soil.
CO3	3. Use laboratory testing results to design and evaluate geotechnical structures such as foundations and retaining walls.
CO4	4. Apply safety procedures and ethical principles in laboratory work to ensure the well-being of laboratory team members and the public, and to maintain professional integrity.
COURSE OUTCOMES	**Transportation Engineering Lab**
CO1	1. Conduct laboratory experiments and tests on materials used in transportation engineering such as asphalt, concrete, and aggregates.

CO2	2. Analyze and interpret laboratory data to determine material properties and behavior under different loading and environmental conditions.
CO3	3. Apply laboratory testing results to evaluate the performance of transportation infrastructure components such as pavements and bridges.
CO4	4. Apply safety procedures and ethical principles in laboratory work to ensure the well-being of laboratory team members and the public, and to maintain professional integrity.
COURSE OUTCOMES	**Fluid Mechanics & Hydraulics Machinery Lab**
CO1	1. Conduct laboratory experiments and tests to determine the behavior of fluids in different hydraulic systems and machinery.
CO2	2. Analyze and interpret laboratory data to evaluate the performance of pumps, turbines, and other hydraulic machinery under different flow and pressure conditions.
CO3	3. Apply laboratory testing results to design and optimize hydraulic systems for various civil engineering applications.
CO4	4. Apply safety procedures and ethical principles in laboratory work to ensure the well-being of laboratory team members and the public, and to maintain professional integrity.
COURSE OUTCOMES	**Essence of Indian Traditional Knowledge/ Professional Ethics and Human Values**
CO1	1. Understand the ethical and cultural values that underpin the civil engineering profession, and apply them to decision making and professional practice.
CO2	2. Analyze the societal and environmental impacts of civil engineering projects from an ethical and human values perspective.
	III YEAR I-SEMESTER
COURSE OUTCOMES	**Structural Analysis**
CO1	1. Analyze the behavior of various types of structural elements and systems under different loading conditions using analytical and computational methods.
CO2	2. Design and evaluate structural elements such as beams, trusses, and frames, considering factors such as safety, durability, and cost.
CO3	3. Use structural analysis software to model and analyze complex structures and systems, and interpret the results to make design decisions.
CO4	4. Apply safety procedures and ethical principles in structural analysis work to ensure the well-being of team members and the public, and to maintain professional integrity.
COURSE OUTCOMES	**Concrete Technology**
CO1	1. Understand the properties and behavior of concrete, and the principles of concrete mix design.
CO2	2. Evaluate the performance of concrete in different environmental and loading conditions, and design concrete structures for various applications.
CO3	3. Use laboratory testing and analysis to determine the properties of concrete and troubleshoot issues in concrete construction.
CO4	4. Apply safety procedures and ethical principles in concrete technology work to ensure the well-being of team members and the public, and to maintain professional integrity.
COURSE OUTCOMES	**Water Resources Engineering - I**
CO1	1. Analyze the hydrological cycle and understand the principles of water resources engineering.

CO2	2. Evaluate water resources systems and design hydraulic structures for various applications such as irrigation, flood control, and water supply.
CO3	3. Use computational tools to model and simulate water resources systems and analyze the results to make design decisions.
CO4	4. Apply safety procedures and ethical principles in water resources engineering work to ensure the well-being of team members and the public, and to maintain professional integrity.
COURSE OUTCOMES	**Environmental Engineering - II**
CO1	1. Understand the principles of environmental engineering related to air and noise pollution, solid waste management, and hazardous waste management.
CO2	2. Analyze air and noise pollution problems and design systems to control and mitigate their impacts.
CO3	3. Evaluate the characteristics of solid waste and hazardous waste and design systems for their treatment and disposal.
CO4	4. Apply safety procedures and ethical principles in environmental engineering work to ensure the well-being of team members and the public, and to maintain professional integrity.
COURSE OUTCOMES	**Environmental Impact Assessment**
CO1	1. Understand the properties and behavior of concrete, and the principles of concrete mix design.
CO2	2. Analyze air and noise pollution problems and design systems to control and mitigate their impacts.
CO3	3. Use computational tools to model and simulate water resources systems and analyze the results to make design decisions.
CO4	4. Apply safety procedures and ethical principles in structural analysis work to ensure the well-being of team members and the public, and to maintain professional integrity.
COURSE OUTCOMES	**CONCRETE TECHNOLOGY LAB**
CO1	? Determine consistency and fineness of cement.
CO2	? Determine setting times ofcement.
CO3	? Determine specific gravity and soundness ofcement.
CO4	? Determine compressive strength ofcement.
CO5	? Determine workability of cement concrete by compaction factor, slump and Vee – Beetests
CO6	? Determine specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
CO7	? Determine flakiness and elongation index ofaggregates.
CO8	? Determine bulking ofsand.
CO9	? Understand non-destructive testing procedures on concrete.
	III Year – II Semester
COURSE OUTCOMES	**DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES**
CO1	? Work on different types of design methods
CO2	? Carryout analysis and design of flexural members anddetailing
CO3	? Design structures subjected to shear, bond andtorsion
CO4	? Design different type of compression members andfootings
COURSE OUTCOMES	**Water Resources Engineering – II**
CO1	be able to estimate irrigation water requirements

CO2	ability to design irrigation canals and canal network
CO3	plan an irrigation system
CO4	design irrigation canal structures
CO5	plan and design diversion head works
CO6	analyse stability of gravity and earth dams
CO7	design ogee spillways and energy dissipation works
COURSE OUTCOMES	**Geotechnical Engineering - I**
CO1	a. The student must know the definition of the various quantities related to soil mechanics and establish their inter-relationships.
CO2	b. The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
CO3	c. 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.
CO4	d. The student should be able to apply the above concepts in day-to-day civil engineering practice.
COURSE OUTCOMES	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
CO1	? The Learner is equipped with the knowledge of estimating the Demand and demand elasticities 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.
COURSE OUTCOMES	**Pre-stressed Concrete**
CO1	? At the end of this course the student will be able to
CO2	? Understand different methods of prestressing
CO3	? Estimate effective prestress including short and long termlosses
CO4	? Analyze and design prestressed concrete beams under flexure andshear
CO5	? Understand the relevant IS Code provisions for prestressed concrete
COURSE OUTCOMES	**CAD LAB**
CO1	a) Model the geometry of real-world structure Represent the physical model of structural element/structure
CO2	b) Perform analysis
CO3	c) Interpret from the Post processing results
CO4	d) Design the structural elements and a system as per IS Codes
COURSE OUTCOMES	**EVIRONMENTAL ENGINEERING LAB**
CO1	? Estimate some important characteristics of water, wastewater and soil in the laboratory
CO2	? Draw some conclusion and decide whether the water is suitable for Drinking/Construction / Agriculture/ Industry.
CO3	? Estimate Chloride, EC and Salinity of Soil and suggest their suitability for Construction/Agriculture

CO4	⁃ Estimation of the strength of the sewage in terms of BOD and COD and Decide whether the water body is polluted or not with reference to the stated parameters in the list of experiments
CO5	⁃ Demonstration of various instruments used in testing of water and soil and study of Drinking water standards, WHO guidelines, Effluent standards and standards for Construction/ Agriculture/ Industry.
COURSE OUTCOMES	**Socially Relevant Project**
CO1	The student(s) are be able to provide a solutions the technological problems of society
CO2	The student(s) is able suggest technological changes which suits current needs of society
CO3	The student(s) are able to explain new technologies available for problems of the society.
COURSE OUTCOMES	**Employability Skills**
CO1	(i) solve aptitude and reasoning problems,
CO2	(ii) apply the soft skills in dealing the issues related to employability,
CO3	(iii) successful in getting employment in campus placement interview
	IV Year – I Semester
COURSE OUTCOMES	**Design & Drawing of Steel Structures**
CO1	Work with relevant IScodes
CO2	Carryout analysis and design of flexural members anddetailing
CO3	Design compression members of different types with connectiondetailing
CO4	Design Plate Girder and Gantry Girder with connection detailing
CO5	Produce the drawings pertaining to different components of steelstructures
COURSE OUTCOMES	**Geotechnical Engineering – II**
CO1	a. The student must be able to understand the various types of shallow foundations and decide
CO2	on their location based on soil characteristics.
CO3	b. The student must be able to compute the magnitude of foundation settlement and decide on the size of the foundation accordingly.
CO4	c. The student must be able to use the field test data and arrive at the bearing capacity.
CO5	d. The student must be able to apply the principles of bearing capacity of piles and design them accordingly.
COURSE OUTCOMES	**REMOTE SENSING AND GIS**
CO1	a. Be familiar with ground, air and satellite based sensor platforms.
CO2	b. interpret the aerial photographs and satellite imageries
CO3	c. create and input spatial data for GIS application
CO4	d. apply RS and GIS concepts for application in Civil Engineering
COURSE OUTCOMES	**Industrial Wastewater Treatment**
CO1	a. Know the quality and quantity of water for various industries and Advanced water treatment methods
CO2	b. Learn the common methods of treatment of wastewaters and Biological treatment methods
CO3	c. Study of methods to reduce impacts of disposal of wasters into environment and CETPs.

CO4	d. Study of methods of treatment of wastewaters from specific industries like steel plants, refineries, and power plants, that imply biological treatment methods
CO5	e. Study of methods of treatment of wastewaters from industries like Aqua, dairy, sugar plants, and distilleries that imply biological treatment methods
COURSE OUTCOMES	**Remote Sensing & GIS Lab**
CO1	a. Work comfortably on GIS software
CO2	b. Digitize and create thematic map and extract important features
CO3	c. Develop digital elevation model
CO4	d. Interpretation and Estimation of features from satellite imagery.
CO5	e. Analyze and Modelling using GIS software.
COURSE OUTCOMES	**Geotechnical Engineering Lab**
CO1	a. Determine index properties of soil and classify them.
CO2	b. Determine permeability of soils.
CO3	c. Determine Compaction, Consolidation and shear strength characteristics
	IV Year – II Semester
COURSE OUTCOMES	**Estimation Specifications and Contract**
CO1	The student should be able to determine the quantities of different components of buildings.
CO2	The student should be in a position to find the cost of various buildingcomponents.
CO3	The student should be capable of finalizing the value ofstructures.
COURSE OUTCOMES	**Finite Element Methods**
CO1	Solve simple boundary value problems using Numerical technique of Finite element method
CO2	Develop finite element formulation of one and two dimensional problems and solve.
CO3	Assemble Stiffness matrices, apply boundary conditions and solve for displacements
CO4	Compute Stresses and Strains and interpret theresult.
COURSE OUTCOMES	**Road Safety Engineering**
CO1	a) To understand fundamental of Traffic Engg.
CO2	b) To investigate & determine the collective factors & remedies of accident involved.
CO3	c) To design & planning various road geometrics.
CO4	d) To massage the traffic system from road safety point of view.
COURSE OUTCOMES	**Disaster Management & Mitigation**
CO1	a) the application of Disaster Concepts to Management
CO2	b) Analyzing Relationship between Development and Disasters.
CO3	c) Ability to understand Categories of Disasters and
CO4	d) realization of the responsibilities to society
COURSE OUTCOMES	**Ground Improvement Techniques**
CO1	a. By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.

CO2	b. The student should be in a position to design a reinforced earth embankment and check its stability.
CO3	c. The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
CO4	d. The student should be able to understand the concepts and applications of grouting.
COURSE OUTCOMES	**PROJECT WORK**
CO1	Apply all levels of Engineering knowledge in solving the Engineeringproblems.
CO2	Work together with teamspirit.
CO3	Use Civil Engineering software at leastone.
CO4	Document theprojects

CIVIL ENGINEERING (R16)	
	1ST YEAR - 1ST SEMESTER
COURSE OUTCOMES	**ENGLISH**
CO1	The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly
CO2	The lesson motivates the public to adopt road safety measures. 2. 'War' from 'Panorama : A Course on Reading'
CO3	The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival. 2. 'The Verger' from 'Panorama : A Course on Reading'
CO4	The lesson helps to choose a source of energy suitable for rural India. 2. ' The Scarecrow' from Panorama : A Course on Reading
CO5	The lesson creates an awareness in the reader as to the usefulness of animals for the human society. 2. 'A Village Host to Nation' from Panorama : A Course on Reading
COURSE OUTCOMES	**MATHEMATICS**-1
CO1	Solve linear differential equations of first, second and higher order
CO2	Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
CO3	Calculate total derivative, Jocobian and minima of functions of two variables.
COURSE OUTCOMES	**ENGINEERING CHEMISTRY**
CO1	The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. The impurities present in raw water, problems associated with them and how to avoid them are understood. The advantages and limitations of plastic materials and their use in design would be understood. The commonly used industrial materials are introduced.
COURSE OUTCOMES	**ENGINEERING MECHANICS**
CO1	The students are to be exposed to the concepts of force and friction, direction and its application
CO2	The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.
CO3	The students are to be exposed to concepts of centre of gravity
CO4	The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
CO5	The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion
COURSE OUTCOMES	**COMPUTER PROGRAMMING**
CO1	Understand the basic terminology used in computer programming

CO2	Write, compile and debug programs in C language.
CO3	Use different data types in a computer program.
CO4	Design programs involving decision structures, loops and functions.
CO5	Explain the difference between call by value and call by referencE
COURSE OUTCOMES	**ENVIRONMENTAL STUDIES**
CO1	The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resource
CO2	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO3	Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO4	Social issues both rural and urban environment and the possible means to combat the challenge
CO5	The environmental legislations of India and the first global initiatives towards sustainable development
COURSE OUTCOMES	**ENGINEERING / APPLIED CHEMISTRY LABORATORY**
CO1	The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills
COURSE OUTCOMES	**ENGLISH – COMMUNICATION SKILLS LAB -I**
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world.
	1ST YEAR - 2ND SEMESTER
COURSE OUTCOMES	**ENGLISH –II**
CO1	The lesson underscores that the ultimate aim of Education is to enhance wisdom. 2. ' A P J Abdul Kalam' from The Great Indian Scientists.
CO2	Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.
CO3	The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.
CO4	The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists
CO5	The lesson imparts the students to manage different cultural shocks due to globalization. 2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.
COURSE OUTCOMES	**MATHEMATICS-II**
CO1	. Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
CO2	2. Compute interpolating polynomial for the given datA
CO3	. Solve ordinary differential equations numerically using Euler’s and RK method
CO4	Find Fourier series and Fourier transforms for certain functions.
CO5	. Identify/classify and solve the different types of partial differential equations.

COURSE OUTCOMES	MATHEMATICS – III
CO1	Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
CO2	Solve simultaneous linear equations numerically using various matrix methods.
CO3	Determine double integral over a region and triple integral over a volume.
CO4	Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.
COURSE OUTCOMES	**ENGINEERING PHYSICS**
CO1	Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study Acoustics, crystallography magnetic and dielectric materials enhances the utility aspects of materials.
COURSE OUTCOMES	**ELEMENTS OF MECHANICAL ENGINEERING**
CO1	The stress/strain of a mechanical component subjected to loading.
CO2	The performance of components like Boiler, I.C. Engine, Compressor, Steam/Hydraulic turbine, Belt, Rope and Gear.
CO3	The type of mechanical component suitable for the required power transmission.
COURSE OUTCOMES	**ENGINEERING DRAWING**
CO1	Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc
CO2	The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.
COURSE OUTCOMES	**ENGLISH – COMMUNICATION SKILLS LAB – I**
CO1	A study of the communicative items in the laboratory will help the students become successful in the competitive world. The course content along with the study material is divided into six units.
COURSE OUTCOMES	**ENGINEERING/APPLIED PHYSICS LAB**
CO1	Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.
CO2	: Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements
COURSE OUTCOMES	**ENGINEERING WORKSHOP & IT WORKSHOP**
CO1	Common understanding of concepts, patterns of decentralization implementation in Africa
CO2	Identified opportunities for coordinated policy responses, capacity building and implementation of best practices †
CO3	Identified instruments for improved decentralization to the local level †

CO4	Identified strategies for overcoming constraints to effective decentralization and sustainable management at different level
	2ND YEAR 1ST SEMESTER
COURSE OUTCOMES	**PROBABILITY AND STATISTICS**
CO1	Examine, analyze, and compare various Probability distributions for both discrete and continuous random variables.
CO2	Describe and compute confidence intervals for the mean of a population.
CO3	Describe and compute confidence intervals for the proportion and the variance of a population and test the hypothesis concerning mean, proportion and variance and perform ANOVA test.
CO4	Fit a curve to the numerical data.
COURSE OUTCOMES	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
CO1	Able to analyse the various electrical networks.
CO2	Able to understand the operation of DC generators,3-point starter and conduct the Swinburne's Test.
CO3	Able to analyse the performance of transformer
CO4	Able to explain the operation of 3-phase alternator and 3-phase induction motors.
CO5	Able to analyse the operation of half wave, full wave rectifiers and OP-AMPs.
COURSE OUTCOMES	**STRENGTH OF MATERIALS-I**
CO1	The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support condition
CO2	The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forceS
CO3	The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions
CO4	The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lame's equation.
COURSE OUTCOMES	**BUILDING MATERIALS AND CONSTRUCTION**
CO1	The student should be able to identify different building materials and their importance in building construction.
CO2	The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
CO3	The student should have learnt the importance of building components and finishings.
CO4	The student is expected to know the classification of aggregates, sieve analysis and moisture content usually required in building construction.
COURSE OUTCOMES	**SURVEYING**
CO1	To demonstrate the basic surveying skills
CO2	To use various surveying instruments.
CO3	To perform different methods of surveying
CO4	To compute various data required for various methods of surveying.

CO5	To integrate the knowledge and produce topographical map.
COURSE OUTCOMES	**FLUID MECHANICS**
CO1	Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics.
CO2	Calculate the forces that act on submerged planes and curves.
CO3	Identify and analyse various types of fluid flows.
CO4	Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.
CO5	Draw simple hydraulic and energy gradient lines.
CO6	Measure the quantities of fluid flowing in pipes, tanks and channels.
COURSE OUTCOMES	**PROFESSIONAL ETHICS AND HUMAN VALUES**
CO1	It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
CO2	It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.
	2ND YEAR 2ND SEMESTER
COURSE OUTCOMES	**BUILDING PLANNING AND DRAWING**
CO1	Upon successful completion of the course:
CO2	Student should be able to plan various buildings as per the building by-laws.
CO3	The student should be able to distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.
CO4	The student is expected to learn the skills of drawing building elements and plan the buildings as per requirements.
COURSE OUTCOMES	**STRENGTH OF MATERIALS- II**
CO1	The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
CO2	The student can asses stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions
CO3	The student will be able to assess forces in different types of trusses used in construction.
COURSE OUTCOMES	**HYDRAULICS AND HYDRAULIC MACHINERY**
CO1	Solve uniform and non uniform open channel flow problems.
CO2	Apply the principals of dimensional analysis and similitude in hydraulic model testing.
CO3	Understand the working principles of various hydraulic machineries and pumps.
COURSE OUTCOMES	**CONCRETE TECHNOLOGY**
CO1	understand the basic concepts of concrete.
CO2	realize the importance of quality of concrete.
CO3	familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field.
CO4	test the fresh concrete properties and the hardened concrete properties.

CO5	evaluate the ingredients of concrete through lab test results. design the concrete mix by BIS method.
CO6	Familiarize the basic concepts of special concrete and their production and applications. understand the behaviour of concrete in various environments.
COURSE OUTCOMES	**STRUCTURAL ANALYSIS - I**
CO1	Distinguish between the determinate and indeterminate structures.
CO2	Identify the behaviour of structures due to the expected loads, including the moving loads, acting on the structure.
CO3	Estimate the bending moment and shear forces in beams for different fixity conditions.
CO4	Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems.
CO5	Draw the influence line diagrams for various types of moving loads on beams/bridges.
CO6	Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss.
COURSE OUTCOMES	**TRANSPORTATION ENGINEERING – I**
CO1	Plan highway network for a given area.
CO2	Determine Highway alignment and design highway geometrics
CO3	Design Intersections and prepare traffic management plans
CO4	Judge suitability of pavement materials and design flexible and rigid pavements
CO5	Construct and maintain highways
COURSE OUTCOMES	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
CO1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
CO2	One 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.
CO3	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
	III Year - I Semester
COURSE OUTCOMES	**MANAGEMENT SCIENCE**
CO1	After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
CO2	Will familiarize with the concepts of functional management project management and strategic management.
COURSE OUTCOMES	**ENGINEERING GEOLOGY**
CO1	Identify and classify the geological minerals
CO2	Measure the rock strengths of various rocks
CO3	Classify and measure the earthquake prone areas to practice the hazard zonation
CO4	Classify, monitor and measure the Landslides and subsidence
CO5	Prepares, analyses and interpret the Engineering Geologic maps

CO6	Analyses the ground conditions through geophysical surveys.
CO7	Test the geological material and ground to check the suitability of civil engineering project construction.
CO8	Investigate the project site for mega/mini civil engineering projects.Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc…
COURSE OUTCOMES	**STRUCTURAL ANALYSIS – II**
CO1	Differentiate Determinate and Indeterminate Structures
CO2	Carryout lateral Load analysis of structures
CO3	Analyze Cable and Suspension Bridge structures
CO4	Analyze structures using Moment Distribution, Kani's Method and Matrix methods
COURSE OUTCOMES	**DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES**
CO1	Work on different types of design philosophies
CO2	Carryout analysis and design of flexural members and detailing
CO3	Design structures subjected to shear, bond and torsion
CO4	Design different type of compression members and footings
COURSE OUTCOMES	**TRANSPORTATION ENGINEERING – II**
CO1	Design geometrics in a railway track.
CO2	Design airport geometrics and airfield pavements.
CO3	Plan, construct and maintain Docks and Harbours.
COURSE OUTCOMES	**CONCRETE TECHNOLOGY LAB**
CO1	Determine the consistency and fineness of cement.
CO2	Determine the setting times of cement.
CO3	Determine the specific gravity and soundness of cement.
CO4	Determine the compressive strength of cement.
CO5	Determine the workability of cement concrete by compaction factor, slump and Vee – Bee tests
CO6	Determine the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
CO7	Determine the flakiness and elongation index of aggregates.
CO8	Determine the bulking of sand.
CO9	Understand the non-destructive testing procedures on concrete.
COURSE OUTCOMES	**ENGINEERING GEOLOGY LAB**
CO1	Identify Mega-scopic minerals & their properties.
CO2	Identify Mega-scopic rocks & their properties.
CO3	Identify the site parameters such as contour, slope & aspect for topography.
CO4	Know the occurrence of materials using the strike & dip problems.
COURSE OUTCOMES	**TRANSPORTATION ENGINEERING LAB**
CO1	Ability to test aggregates and judge the suitability of materials for the road construction
CO2	Ability to test the given bitumen samples and judge their suitability for the road construction
CO3	Ability to obtain the optimum bitumen content for the mix design
CO4	Ability to determine the traffic volume, speed and parking characteristics.

	III Year - II Semester
COURSE OUTCOMES	**DESIGN AND DRAWING OF STEEL STRUCTURES**
CO1	Work with relevant IS codes
CO2	Carryout analysis and design of flexural members and detailing
CO3	Design compression members of different types with connection detailing
CO4	Design Plate Girder and Gantry Girder with connection detailing
CO5	Produce the drawings pertaining to different components of steel structures
COURSE OUTCOMES	**GEOTECHNICAL ENGINEERING – I**
CO1	The student must know the definition of the various parameters related to soil mechanics and establish their inter-relationships.
CO2	The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
CO3	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.
CO4	The student should be able to apply the above concepts in day-to-day civil engineering practice
COURSE OUTCOMES	**ENVIRONMENTAL ENGINEERING – I**
CO1	Plan and design the water and distribution networks and sewerage systems
CO2	Identify the water source and select proper intake structure
CO3	Characterisation of water
CO4	Select the appropriate appurtenances in the water supply
CO5	Selection of suitable treatment flow for raw water treatments
COURSE OUTCOMES	**WATER RESOURCES ENGINEERING–I**
CO1	have a thorough understanding of the theories and principles governing the hydrologic processes,
CO2	be able to quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects
CO3	develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
CO4	be able to develop design storms and carry out frequency analysis
CO5	be able to determine storage capacity and life of reservoirs.
CO6	develop unit hydrograph and synthetic hydrograph
CO7	be able to estimate flood magnitude and carry out flood routing.
CO8	be able to determine aquifer parameters and yield of wells.
CO9	be able to model hydrologic processes
COURSE OUTCOMES	**WASTE WATER MANAGEMENT**
CO1	Suggest treatment methods for any industrial wastewater.
CO2	Learn the manufacturing process of various industries.
CO3	Student will be in a position to decide the need of common effluent treatment plant for the industrial area in their vicinity
COURSE OUTCOMES	**GEOTECHNICAL ENGINEERING LAB**
CO1	Determine index properties of soil and classify them.
CO2	Determine permeability of soils.

CO3	Determine Compaction, Consolidation and shear strength characteristics.
COURSE OUTCOMES	**ENVIRONMENTAL ENGINEERING LAB**
CO1	Estimation some important characteristics of water and wastewater in the laboratory
CO2	Draw some conclusion and decide whether the water is potable or not.
CO3	Decide whether the water body is polluted or not with reference to the state
CO4	parameters in the list of experiments
CO5	Estimation of the strength of the sewage in terms of BOD and COD
COURSE OUTCOMES	**COMPUTER AIDED ENGINEERING LABORATORY**
CO1	Understand the paper –space environment thoroughly
CO2	Develop the components using 2D and 3D wire frame models through various editing commands.
CO3	Generate assembly of various components of compound solids.
COURSE OUTCOMES	**COMPUTER AIDED DRAFTING**
CO1	Plan and design the sewerage systems
CO2	Select the appropriate appurtenances in the sewerage systems
CO3	Analyze sewage and suggest and design suitable treatment system for sewage
CO4	treatment
CO5	Identify the critical point of pollution in a river for a specific amount of pollutant
CO6	disposal into the river
CO7	Suggest a suitable disposal method with respect to effluent standards.
	IV Year - I Semester
COURSE OUTCOMES	**ENVIRONMENTAL ENGINEERING -II**
CO1	Plan and design the sewerage systems
CO2	Select the appropriate appurtenances in the sewerage systems
CO3	Analyze sewage and suggest and design suitable treatment system for
CO4	sewage treatment
CO5	Identify the critical point of pollution in a river for a specific amount of
CO6	pollutant disposal into the river
CO7	Suggest a suitable disposal method with respect to effluent standards.
COURSE OUTCOMES	**WATER RESOURCES ENGINEERING–II**
CO1	estimate irrigation water requirements
CO2	design irrigation canals and canal network
CO3	plan an irrigation system
CO4	design irrigation canal structures
CO5	plan and design diversion head works
CO6	analyse stability of gravity and earth dams
CO7	design ogee spillways and energy dissipation works
COURSE OUTCOMES	**GEOTECHNICAL ENGINEERING – II**
CO1	The student must be able to understand the various types of shallow foundations and
CO2	decide on their location based on soil characteristics.
CO3	The student must be able to compute the magnitude of foundation settlement to decide

CO4	the size of the foundation.
CO5	The student must be able to use the field test data and arrive at the bearing capacity.
CO6	The student must be able to design Piles based on the principles of bearing capacity.
COURSE OUTCOMES	**REMOTE SENSING AND GIS APPLICATIONS**
CO1	be familiar with ground, air and satellite based sensor platforms.
CO2	interpret the aerial photographs and satellite imageries
CO3	create and input spatial data for GIS application
CO4	apply RS and GIS concepts in water resources engineering
CO5	applications of various satellite data
COURSE OUTCOMES	**FINITE ELEMENT METHODS**
CO1	Solve simple boundary value problems using Numerical technique of Finite element method
CO2	Develop finite element formulation of one and two dimensional problems and solve them
CO3	Assemble Stiffness matrices, Apply boundary conditions and solve for the displacements
CO4	Compute Stresses and Strains and interpret the result
COURSE OUTCOMES	**GROUND IMPROVEMENT TECHNIQUES**
CO1	By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.
CO2	The student should be in a position to design a reinforced earth embankment and check its stability.
CO3	The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
CO4	The student should be able to understand the concepts and applications of grouting.
COURSE OUTCOMES	**AIR POLLUTION AND CONTROL**
CO1	Decide the ambient air quality based on the analysis of air pollutants
CO2	Design particulate and gaseous control measures for an industry
CO3	Judge the plume behaviour in a prevailing environmental condition
CO4	Estimate carbon credits for various day to day activities
COURSE OUTCOMES	**ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT**
CO1	Prepare EMP, EIS, and EIA report
CO2	Identify the risks and impacts of a project
CO3	Selection of an appropriate EIA methodology
CO4	Evaluation the EIA report
CO5	Estimate the cost benefit ratio of a project
CO6	Know the role of stakeholder and public hearing in the preparation of EIA
COURSE OUTCOMES	**IPR & PATENTS**
CO1	IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.

CO2	Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements
COURSE OUTCOMES	**GIS & CAD LAB**
CO1	work comfortably on GIS software
CO2	digitize and create thematic map and extract important features
CO3	develop digital elevation model
CO4	use structural analysis software to analyze and design 2D and 3D frames
CO5	design and analyze retaining wall and simple towers using CADD software.
COURSE OUTCOMES	**IRRIGATION DESIGN AND DRAWING**
CO1	At the end of the course the student will be able to To design various irrigation structures
	IV Year - II Semester
COURSE OUTCOMES	**ESTIMATION SPECIFICATION & CONTRACTS**
CO1	The student should be able to determine the quantities of different components of buildings.
CO2	The student should be in a position to find the cost of various building components.
CO3	The student should be capable of finalizing the value of structures
COURSE OUTCOMES	**CONSTRUCTION TECHNOLOGY AND MANAGEMENT**
CO1	appreciate the importance of construction planning
CO2	understand the functioning of various earth moving equipment
CO3	know the methods of production of aggregate products and concreting and usage of machinery required for the works.
CO4	apply the gained knowledge to project management and construction techniques
COURSE OUTCOMES	**PRESTRESSED CONCRETE**
CO1	Understand the different methods of prestressing
CO2	Estimate effective prestress including the short and long term losses
CO3	Analyze and design prestressed concrete beams under flexure and shear
CO4	Understand the relevant IS Codal provisions for prestressed concrete
COURSE OUTCOMES	**SOLID AND HAZARDOUS WASTE MANAGEMENT**
CO1	Design the collection systems of solid waste of a town
CO2	Design treatment of municipal solid waste and landfill
CO3	Know the criteria for selection of landfill
CO4	Characterise the solid waste and design a composting facility
CO5	Know the Method of treatment and disposal of Hazardous wastes.
COURSE OUTCOMES	**PROJECT WORK**
CO1	Apply all levels of Engineering knowledge in solving the Engineering problems.
CO2	Work together with team spirit.
CO3	Use Civil Engineering software at least one.
CO4	Document the projects