PO, PSOs and COs of the First Year B.E. (ALL)

Program Outcomes (POs)

Engineering Graduates will be able to:

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

Course Outcome (Cos)

Semester-I

1A1 Engineering Mathematics-I

CO 1 All branches of engineering are most closely allied with the differential calculus. Hence students able to apply knowledge of differential calculus to identify, formulate and analyze engineering problems.

CO 2 After learning partial diff. Equation students are able to distinguish between total derivative and partial derivative.

CO 3 After learning Jacobian students are able to concept of jacobian transformation.

CO 4 After learning complex number students are able to apply knowledge in design of dynamos ,electric motors ,electric lighting and radio.

CO 5 After learning Diff. Equation of First order and First degree students are able to apply

knowledge in electrical circuit, orthogonal trajectory, mechanical System.

CO 6 After learning Diff. Equation of First order and higher degree students are able to apply to identify claraut's equations and obtain singular solutions and extraneous loci.

1A2 Engineering Physics

CO 1 **Solid State Physics**:
Students understand the importance of semiconductors, and the got the idea about electronics field.

CO 2 **Modern Physics**: After studying de Broglie's hypothesis i.e. matter waves, they know about Quantum physics and its importance.
Also they know about LASER and its applications.

CO 3 **Electric and Magnetics fields**:
After studying this unit student know motion of charge particles in electric and magnetic fields, Bainbridge Mass Spectrograph, CRO and its applications.

CO 4 **Interference and Diffraction**:
After studying this unit students know interference in thin film, Newton's rings and its application, Types of diffraction, Plane transmission grating

CO 5 **Fiber Optics**: After studying this unit student know about Principle and construction of optical fiber, its advantages and applications.

CO 6 **Fluid Dynamics and Acoustics**: After studying this unit student know about Continuity equation, Bernoulli's theorem and its applications, Viscosity, capillary tube, Stoke's formula. Production and application of Ultrasonic. Acoustics of buildings.

1A3 Engineering Mechanics

CO 1 After learning this unit student knows Free body diagrams, system of forces.

CO 2 After learning this unit student understands analytical and graphical condition of equilibrium, centre of gravity, second moment of area of plane figures.

CO 3 After learning this unit student knows Various types of supports, analysis of simple plane trusses and simple beams, friction, inclined plane, wedge.

CO 4 After learning this unit student understands equations of motion and definition and analysis of plane motion, relation between translation and rotation for spheres on rough plane, instantaneous centre and axis of rotation.

CO 5 After learning this unit student knows D'Alembert's principle, a rigid body, and dynamic equilibrium in plane motion. Work, power and energy, conservation of momentum and energy.

CO 6 After learning this unit student expose mechanism of simple machine, Transmission of power by belts, gears.

1A4 Engineering Drawing

CO 1 After studying this unit student know about Conic Section, Cycloidal curves, Involutes, Loci of points and able to solve the problems on this topics.

CO 2 After learning this unit student understands 1st angle , 3rd angle method of projection and able to solve the problems on this topics

CO 3 After learning this unit student understands conversion of simple pictorial views into orthographic views.

CO 4 After studying this unit student know about projection of prism, pyramid, cone, cylinder, Projection on auxiliary planes.

CO 5 After learning this unit student understands section of solids keeping solids in different positions.

CO 6 After studying this unit student know about Construction of isometric scale, Isometric views & projection of objects having rectangular, cylindrical surfaces & representation of sloping faces and slots, Dimensioning of isometric views/projection.

Semester-II

1B1 Engineering Mathematics-Ii

CO 1 After learning matrices students are able to apply knowledge in algebraic and diff equations, mechanics theory of electrical circuits, nuclear physics, aerodynamics, astronomy.

CO 2 After learning Fourier Series students are apply knowledge in study of periodic phenomenon in conduction of heat , electrodynamics.

CO 3 After learning Vector Algebra And DUIS rule students are able to understand the new technique of evaluating integral and and volume of parallelepiped , tetrahedron, concept of coplanarity of vectors.

CO 4 After learning Beta Gamma Functions And Rectification students are able to understand the relation between beta and gamma functions and the length of arc of given curve.

CO 5 After learning Double integral students are able to obtained the area and use double integral in integral transform.

CO 6 After learning triple integral students are able to obtained the volume and apply knowledge in Mean and RMS.

1B 2 Engineering Chemistry

CO 1 **Water Technology**: After studying this unit the students get the knowledge Hardness of water and there units, determination of hardness, and how water can be softening by different commercial methods.

CO 2 **Corrosion, Corrosion Control:** After studying this unit the students get the knowledge about, what are corrosion and its mechanism, types of corrosion and how to control corrosion by different methods?

Nano-Chemistry : After studying this unit the students get the basic knowledge about, nano materials, their manufacturing processes and their applications.

CO 3 **Portland cement:** After studying this unit the students will have a brief knowledge about, raw materials & manufacturing process of cement, and some quality control tests like soundness of cement, and mechanism of setting and hardening of cement.

Nuclear fuels and Power generation: After studying this unit the students will have a brief knowledge about, some basic terms of nuclear chemistry like nuclear binding energy, nuclear fission and fusion, critical mass, and how power is generated by using nuclear fuels.

CO 4 **Fuel and Combustion:** After studying this unit the students will have a brief knowledge about, how fuels are classification, analysis of coal, cracking of petroleum fractions, and quality control tests of petrol and diesel.

Lubricants: After studying this unit the students will have a basic knowledge about, lubricants, their mechanism and quality control tests of lubricants.

CO 5 **Polymers, Resins/Plastics, Rubbers** After studying this unit the students will have a brief knowledge about, how polymers are classification, what is natural rubber and how it is vulcanised, different methods of polymerization, type of resins, and industrial manufacturing processes of different polymers.

CO 6 **Environmental Chemistry:** After studying this unit the students will have a brief knowledge about, different spears of atmosphere, what is green house Effect, acid rain, ozone depletion and their consequences, and different methods and equipments for controlling of particulate emissions.

1B3 Computer Programming

CO 1 After learning this unit student knows Organization of PC, Basic concepts of problem solving on computer, Input-Process-Output cycle. Algorithms, Flowcharts and algorithm development and various searching and Sorting Techniques.

CO 2 After learning this unit student knows the fundamentals of C language

CO 3 After learning this unit student knows C Control constructs: Decision-making and various Loops .

CO 4 After learning this unit student knows Storage classes, Introduction to arrays, programme for Searching and sorting the arrays of strings.

CO 5 After learning this unit student knows Definition and uses of pointers.

CO 6 Declaring and using the Structures. Introduction to Files. File types. File handling functions. Command line arguments.

1B4 Electrical Engineering

CO 1 Kirchoff's laws, Superposition theorem, Thevinin's theorem, Maximum Power Transfer Theorem

CO 2 Magnetic Circuit, Series Magnetic circuits, Principles of Electromagnetic induction self and mutual induction coefficient of coupling and Energy stored in magnetic circuit

CO 3 Single phase A.C. Series circuit with Resistance Inductance, Capacitance and phasor

Diagrams, Impedance Triangle, Active and Reactive power

CO 4 Balanced Three phase circuits: Production of three phase supply, Star and Delta balanced load, Relationship of phase and line values of voltage and current for Star and Delta connections

CO 5 Single Phase Transformer, Principle of operation Construction and Classification EMF Equation, Losses, Efficiency. Working principle, Construction and various parts of D.C. Machines, Classification, characteristics and applications of D.C. Machine

CO 6 Measurement of Current, Voltage, Power, Energy, Range extension of Ammeter, Voltmeter, and Wattmeter and Energy meter, Necessity of earthing

PSOs and COs of the CSE – DEPARTMENT

Program Specific Outcomes (PSOs)

PSO1 An ability to design a software system, components, processes and their interfaces to meet desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturing and sustainability.

PSO2 Ability to design, implement and evaluate secure hardware and /OR software systems with assured quality and efficiency.

PSO3 Skills to use modern engineering tools, software and equipment to analyze automation problems.

PSO4 An ability to analyze, identify, formulate and solve the real life problems; design algorithms, code the programs and conduct experiments with computer systems, analyze and interpret relevant data.

Course Outcome (Cos)

Semester-III

1.3 KS 01/3 KE 01 -M-III

CO 1 Students will be able to apply the concepts, analyze the importance and applications of Fourier analysis

CO 2 Students solve problems using numerical techniques and are able to apply them for different situations

CO 3 Students are able to solve problems using combinatorial techniques.

2. 3 KS 02/3 KE 02- Program Methodology

CO 1 Distinguish between top-down and bottom-up programming approach and apply bottom-up approach to solve real world problems

CO 2 Interpret the difference between static and dynamic binding. Apply both techniques to solve problems

CO 3 Analyse generic data type for the data type independent programming which relate it to reusability.

CO 4 Interpret and design the Exception Handling Techniques for resolving run-time errors and handle large data set using file I/O

CO 5 Apply object oriented programming concepts in problem solving.

CO 6 Design and implement Applet and event handling mechanisms in application programs

3. 3 KS 03/3 KE 03-Electronics Devices & Circuits

CO 1 Understand the applications of various electronic components like diodes and transistors

CO 2 Evaluate the important parameters related to transistor biasing and various AC models

CO 3 Analyze types of voltage amplifiers and MOSFET

CO 4 Illustrate the working of non linear op amp circuits

4. 3 KS 05/3 KE 05-Computer Organizations

CO 1 Ability to understand the organization of computer and machine instructions and programs

CO 2 Ability to understand Input / Output Organization

CO 3 Analyze the working of the memory system and basic processing unit.

CO 4 Ability to solve problems of multicores, multiprocessors and clusters.

5. 3 KS 04/3 KE 04-Discrete Structure

CO 1 Students analyze basics knowledge gained by mathematical logic, functions and relation and apply them.

CO 2 Students are able to apply concepts of coding theory and model different situations

CO 3 Students will be able to apply the concepts acquired for different purposes

Semester-IV

1. 4 KS 01/4 KE 01-Data Structure

CO 1 Can able to write C programs using structures, unions, dynamic memory allocation functions and command line arguments

CO 2 Can Describe and simulate various linear data structures like stacks, queues, linked lists using static and dynamic allocation and use them in solving problems.

CO 3 Simulate nonlinear data structures like binary search tree and threaded binary trees and use them in designing applications like sorting, expression trees etc.

2. 4 KS 02/4 KE 02-Analog & Digital ICs

CO 1 Design circuits using discrete components.

CO 2 Analyze the performance characteristics of electronic devices and their applications.

CO 3 To provide a modest experience to handle and experiment with IC's used for various applications

CO 4 Design and analyze the frequency response of amplifiers.

CO 5 Design combinational logic circuits using digital IC's.

3. 4 KS 03/4 KE 03-Object Orientation Programming

CO 1 Distinguish between top-down and bottom-up programming approach and apply bottom-up approach to solve real world problems

CO 2 Interpret the difference between static and dynamic binding. Apply both techniques to solve problems

CO 3 Analyze generic data type for the data type independent programming which relates it to reusability.

CO 4 Interpret and design the Exception Handling Techniques for resolving run-time errors and handle large data set using file I/O

4. 4 KS 04/4 KE 04-Assembly Language Programming

CO 1 Understand the architecture of 8086 microprocessor and learn the instruction set

CO 2 Can Design software and hardware programs using assembly language programming

CO 3 Can Analyze the working of special purpose processors like 8255, 8259 and understand interfacing external devices like memory

CO 4 Can design simple programs using 8086,8255,8259 assembly level programming

5. 4 KS 05/4 KE 05-Theory of Computations

CO 1 Can able to design Deterministic finite automata ,Nondeterministic finite automata, conversion of NFA to DFA , design of E- NFA and regular expressions

CO 2 Can Obtain minimized DFA and convert automata to regular expressions and regular expression to automata and proving languages are not regular

CO 3 Writing CFG's , Construction of parse trees, finding and removing ambiguity in grammars, designing problems on Pushdown Automata will be simplified

CO 4 Conversion of grammar to Chomsky Normal Form ,Greibach normal form and conversion of grammar to PDA.Prove that languages are not context free using pumping lemma

CO 5 Designing turing machines, understanding the working of various types of turing machines and solving post correspondence problems

Semester-V

1. 5 KS 01/5 KE 01-Data Communication

CO 1 Able to define data communication, explain different reference models and categorize coding techniques in analog and digital signals.

CO 2 Able to describe different switching techniques and identify errors in transmitted signal and solve error detection and correction techniques.

CO 3 Able to explain concepts of protocol and identify different addressing formats.

CO 4 Able to compare different connecting devices and identify different IEEE Ethernet standards.

2. 5 KS 02/5 KE 02-File Structure And Data Processing

CO 1 Learn about the different file system e.g. Unix, Windows,CDROM, and Secondary Storage
CO 2 Learn about the file structure i.e. field and record organization
CO 3 Able to learn data compression Techniques, buffer and I/O management in Storage devices
CO 4 Learn how files are store and searching, indexing is done , different file searching techniques.

3. 5 KS 03/5 KE 03-System Software

CO 1 Understand basics of Compilers and its phases and will be able to solve problems related to Shift reduce parsing, compute FIRST and FOLLOW sets, LR(0), LR(1) and LALR sets of items and parse table for a given grammar
CO 2 Demonstrate the ability to write syntax directed translations of simple statements and understand the working of procedure calls
CO 3 Can able to demonstrate the ability to write intermediate code for a given high level programming language (preferably C or FORTRAN) and be able to represent the intermediate code as Quadruples, Triples and Indirect Triples
CO 4 Able to write 3 address code and identify the basic blocks , draw flow graphs and represent directed Acyclic graphs for the identified basic blocks. They will also be able to write the target optimized code (assembly code) for the given three address code.

4. 5 KS 04/5 KE 04Switching theory and Logic Design

CO 1 Understand binary number system, logic gates, Boolean laws
CO 2 Simplify the Boolean equations using k-map and tabulation method and design different combinational circuits
CO 3 Can design and implement different sequential circuits with flip flops, registers and counters
CO 4 Can design and implement analog to digital and digital to analog convertors5. Data structure and Algorithm

6. (5 KS 06/5 KE 06-Communication Skill

CO 1 To develop inter personal skills and be an effective goal oriented team player.
CO 2 To develop professionals with idealistic, practical and moral values.
CO 3 To develop communication and problem solving skills.
CO 4 To re-engineer attitude and understand its influence on behavior.

Semester-VI

1. 6 KS 01/6 KE 01-Operating System

CO 1 To understand the role and responsibilities of OS in the computer system.
CO 2 To explain how the OS deals with process management, memory management and secondary storage management. Analyze Scheduling algorithms and formulate solutions for critical section problem
CO 3 Describe System model for deadlock, Methods for handling deadlocks and memory management strategies
CO 4 Define File ,directory and learn various Access methods and implementation

2. 6 KS 02/6 KE 02-Database System

CO 1 Able to apply the concepts and design database for given information system.
CO 2 Develop database programming skills in SQL.
CO 3 Apply the concepts of Normalization and design database which possess no anomalies.
CO 4 Able to write application programs considering the issues like concurrency control, recovery and security.

3. 6 KS 03/6 KE 03-Computer Resource & management

CO 1 Able to learn the Computer Service Industry and its Management
CO 2 Able to Learn the concept of ITIL, its Configuration Management, Network Management, Storage Management
CO 3 Able to Learn the Storage Techniques
CO 4 Able to learn how the Service Industry Works, Process of Recruitment

4. 6 KS 04/6 KE 04-Computer Architecture

CO 1 Foundation for readers to study hardware and software
CO 2 Design of scalable computer system.
CO 3 Internal data forwarding, software interlocking, hardware score boarding
CO 4 Hazards avoidance, branch handling and instruction issuing techniques

5. 6 KS 05/6 KE 05-Software Project Management

CO 1 Lean Conventional Software Management and Evolution of Software Economics
CO 2 Summarize Transitioning to an iterative process and Life cycle phases:
CO 3 Can able to Understand Artifacts of the process
CO 4 Can able to explain how a Software process flows
CO 5 Can able to Understand Project Organizations and Responsibilities

Semester-VII

1. 7 KS 01-Digital Signal Processing

CO 1 To classify signals and systems and its mathematical representation.
CO 2 To analyze the discrete time systems.
CO 3 To study various transformation techniques and computation.
CO 4 To study about filters and design for digital implementation.
CO 5 To study about a programmable digital signal processor and quantization effects.

2. 7 KS 02/ 7 KE 02-Computer Networks

CO 1 To understand packet switching networks and routing in packet switching networks with different routing algorithms.
CO 2 To describe traffic management at packet level, flow level and flow aggregate levels of packet switching networks.
CO 3 To explain the architecture of TCP/IP and protocols associated with TCP/IP and to analyze the network applications, network management and security issues
CO 4 To apply the knowledge about QoS, VPNs, and tunneling and overlay networks and to understand mobile networking and wireless sensor networking.

3. 7 KS 03-Design And Analysis of algorithm

CO 1 Understand and use asymptotic notations to analyze the performance of algorithms
CO 2 Identify and analyze various algorithm design techniques
CO 3 Understand and evaluate algorithms under various algorithm design techniques
CO 4 Solve problems by applying appropriate algorithm design techniques
CO 5 Analyze the efficiency of various algorithms.

4. 7 KS 04-Object Oriented Analysis and Design

CO 1 Able to analyze the system requirements and model the domain problem.
CO 2 Able to evaluate the quality of an analysis, and be able to explain how to Improve it.
CO 3 Able to design and build object-oriented systems.
CO 4 Able to evaluate the quality of a design, and be able to explain how to improve it.
CO 5 Able to read and write analysis and design documentation in the Unified Modeling Language (UML).

5. 7 KS 05-Web Engineering

CO 1 Learn how web pages are store in web server and how web server work
CO 2 Able to create web pages in HTML, Create Dynamic web pages using CSS
CO 3 Able to design static and dynamic web pages with the use of J-Script
CO 4 Able to learn how XML is working and how data store and retrieve in dynamic web pages

Semester-VIII

1. 8 KS 01-Artificial Intelligence

CO 1 Can able to describe models of the brain and neuron function with mathematical methods.
CO 2 Can design and develop artificial neural networks in software.
CO 3 Can describe more complex neural networks and the training methods for the same.
CO 4 Able to compare and analyse various associative memory architectures.

2. 8 KS 02/ 8 KE 02-Embedded Systems

CO 1 Can explain the purpose of embedded systems and compare microprocessors with microcontrollers
CO 2 Can design with microcontrollers and explain the design of a processor for specific purpose
CO 3 Can Understand Model processes and their interactions using state machine approach
CO 4 Can design and implement embedded software and hardware, also illustrate the working

3. 8 KS 03/ 8 KE 03-Software Engineering

CO 1 Learn various software development process models and their suitability
CO 2 Able to apply the methods of requirement elicitation
CO 3 Learn to design software and apply strategies of project management
CO 4 Apply rapid software development methods and decide on appropriate software

4. 8 KS 04-Network Security

CO 1 Able to Analyze the possible security attacks in complex real time systems and their effective
counter measures
CO 2 Can identify the security issue in the network and resolve it
CO 3 Can explain and analyze the basic Cryptographic algorithm for security
CO 4 Can evaluate security mechanism using rigorous approaches
CO 5 Attack and countermeasures with network management aspect are guided with examples

PSOs and COs of the IT Department

Program Specific Outcomes (PSOs)

PSO1. Understand the core features of Information Technology to contribute effectively to the needs of industry and the society.
PSO2. Gain capabilities in technologies used particularly in the sectors of communications, networking and software development.
PSO3. Develop, analyze, and design IT solutions and awareness about basic soft skills necessary for working in community and professional teams.
PSO4. Ability to pursue higher studies or get placed in IT based companies or Government organizations.

Course Outcome (COs)

Semester -III

1. 3IT01 – Mathematics – III

CO1 Define the ordinary differential equations by using various methods
CO2 Explain Laplace Transform using various Methods such as e Laplace transform, initial and final value theorem, convolution theorem, Laplace transform of impulse function Laplace transforms of periodic function
CO3 Develops Difference equation:- solution of difference equations of first order & Z-transform:- Definition, standard forms, Z-transform of impulse function, Unit step functions, Properties of Z- transforms
CO4 Review Fourier transforms- Definition, standard forms, inverse Fourier transforms, properties of Fourier transforms, convolution theorem, Fourier sine and Fourier cosine transforms and integrals.
CO5 Classify Complex Analysis: - Functions of complex variables, Analytic function, Cauchy-Riemann conditions, Harmonic function, Harmonic conjugate functions.
CO6 Illustrate Vector calculus:- Scalar and vector point functions, Differentiation of vectors, Curves in space, Gradient of a scalar point function

2. 3IT02-Prpgramming Methodology

CO1 Explain features of OOPS and HDLC.
CO2 Write JAVA program on Arithmetic, relational, assignment operators, control statements, repetition statements and math class.

CO3 Discuss the concept of classes, declaration of objects, constructor, this keyword, string and string buffer classes.
CO4 Implement Event handling mechanism, delegation event model and discuss AWT control and event model.
CO5 Explain Applet class and its methods, Inheritance, Polymorphism and multithreaded programming.
CO6 Discuss java file I/O concept, byte stream concept and Exception handling concept.

3. **3IT03- Discrete Structure**

CO1 Illustrate the concept of mathematical logic, statements and notations, normal forms, theory of predicate calculus.
CO2 Explain concepts of set theory, representation of discrete structure, relation and ordering, function and recursion.
CO3 Discuss different algebraic structures, polish expression & their compilation.
CO4 Evaluate lattice and Boolean algebra.
CO5 Discuss the basic concepts of graph theory.
CO6 Explain finite state machines, finite state acceptors, and regular grammars.

4. **3IT04- Electronics Devices and Circuits**

CO1 Describe semiconductor diode, classification of rectifiers and use of filters in rectifiers and photodides.
CO2 Discuss BJT, transistor configurations and FET.
CO3 Discuss different oscillators and design by using PSPICE software.
CO4 Explain operational amplifier and design of its application by using IC-741.
CO5 Design of linear and non linear applications of operational amplifier and voltage regulator with IC78XX and 79XX.
CO6 Discuss timer IC-555, PLL and its applications.

5. **3IT05: Assembly Language Programming**

CO1 Solve Number System problem and explain architecture of 8086.
CO2 Discuss 8086 instruction set and explain addressing modes.
CO3 Programming of 8086 by using logical instructions, shift instructions and rotate instructions.
CO4 Explain the stack and subroutines. Implement the concept of recursion in 8086 programming.
CO5 Discuss 8086 I/O, explain 8255 PPI.
CO6 Discuss 8086 interrupts and programmable interrupt controller 8259.

Semester -IV

1. **4IT01: Data Structures**

CO1 Explain basic concepts of data structures.
CO2 Define linear array, their representation in memory and searching algorithms.
CO3 Explain linked list and their representation in memory.
CO4 Implement stacks, queue and their array representation.
CO5 Explain trees and their representation in memory.
CO6 Discuss graph theory and various sorting techniques.

2. **4IT02: Communication Engineering**

CO1 Explain AM Transmitter.
CO2 Describe AM receivers.
CO3 Discuss FM Transmitters.
CO4 Explain FM Receivers.
CO5 Explain different pulse modulation techniques.
CO6 Explain signal analysis by using Fourier transform.

3. **4IT03: Object Oriented Technologies**

CO1 Explain the concepts of object oriented programming.
CO2 Discuss the string class and operator overloading with example in C++.
CO3 Implementation of inheritance in C++.
CO4 Explain virtual function concept and abstract classes in C++.
CO5 Describe streams and file handling in C++.
CO6 Explain function template, exception handling and discuss the containers in C++.

4. **4IT04: Social Sciences & Engineering Economics**

CO1 Explain importance of social science and discuss salient features of Indian constitution.
CO2 Discuss about Indian Parliament, council of ministers and Prime minister.
CO3 Describe Impact of science and technology on culture and civilization.
CO4 Explain nature and scope of economics.
CO5 Discuss banking, taxation and market schemes.
CO6 Discuss economic of development and planning.

5. **4IT05: Numerical Methods and operation research Techniques**

CO1 Discuss error analysis and solution of non linear and polynomial equation.
CO2 Discuss the solution of Linear systems of equation.
CO3 Solve the integration and differential equations.
CO4 Describe the operations research models and dynamic programming.
CO5 Explain linear programming and sequencing.
CO6 Illustrate PERT and CPM.

Semester-V

1. **5IT01: Operating System**

CO1 Discuss the basic concepts of operating system.
CO2 Explain the CPU scheduling, process synchronization and deadlock handling.
CO3 Describe the memory management and virtual memory management.
CO4 Discuss file system management in operating system.
CO5 Explain the I/O system concepts in operating system.
CO6 Discuss the case study of Linux operating system.

2. **5IT02: Digital Integrated Circuits**

CO1 Simplify Boolean functions by Boolean Algebra and discuss logic families.
CO2 Simplify Boolean functions by using K-map and Tabulation method.
CO3 Design of adder, subtractor, code converter, Parity Generator and checker circuit by combinational logic design.
CO4 Design of MSI and PLD components like binary parallel adder, subtractor and comparator.
CO5 Design of Synchronous sequential circuits like registers and counters with flip flops.
CO6 Design of shift registers and discuss about RAM, DRAM and ASM.

3. **5IT03: Computer Architecture & Organization**

CO1 Describe the basic structure of computer.
CO2 Explain processing unit.
CO3 Discuss I/O organization and I/O interfaces.
CO4 Discuss memory unit and cache memory.
CO5 Solve Arithmetic operations on sign numbers and explain floating-point representation along with related operations on it.
CO6 Illustrate different computer peripherals, online storage and communication devices

4. **5IT04: Communication Skills**

CO1 Discuss the grammatical aspects of the unseen passages.
CO2 Explain importance of communication, its model and type.
CO3 Discuss the specific formats for written communication.

5. **5FEIT05(i) : Introduction to Computer Networks**

CO1 Discuss the concepts of computer network and physical layer cabling.
CO2 Explain the fundamentals of computer and discuss FAT, NTFS.
CO3 Explain network interconnecting model OSI and discuss the networking devices.
CO4 Describe the TCP/IP layers and IPV4, IPV6 addressing
CO5 Examine the router with its configuration, mode and interface.
CO6 Discuss the various Routing protocols.

Semester-VI

1. **6IT01: Principles Of Management**

CO1 Define the concept of management and explain management functions, control, and responsibilities.
CO2 Describe organization planning, design and development.

CO3 Discuss the concept of product design and development.
CO4 Explain the maintenance and system reliability.
CO5 Discuss marketing management.
CO6 Explain the management of project.

2. **6IT02: Database Management Systems**

CO1 Write application of database systems and explain the concept of ER diagram.
CO2 Design a relational model and explain normal form.
CO3 Write SQL query for DBMS.
CO4 Discuss query processing and query optimization.
CO5 Explain transaction management.
CO6 Enlist and explain the concurrency control protocols.

3. **6IT03: Theory Of Computation**

CO1 Explain alphabet, language, its operation and FSM.
CO2 Define regular sets and state its properties.
CO3 Design CFG and state properties of CFL.
CO4 State and design Turing machine for arithmetic operation.
CO5 Discuss Chomsky hierarchy.
CO6 Prove properties of recursive and recursively enumerable language.

4. **6IT04: Computer Networks**

CO1 Discuss the fundamental concepts of computer network.
CO2 Discuss design issues of Data link layer.
CO3 Explain the concepts of MAC sublayer.
CO4 Describe the network layer and routing algorithms.
CO5 Explain the service primitive and different protocols from transport layer.
CO6 Describe the various protocols of the application layer.

5. **6FEIT05 (ii) : E-Commerce**

CO1 Explain importance and features of E-commerce.
CO2 Discuss E-commerce business models.
CO3 Describe E-commerce infrastructure.
CO4 Build an E-commerce web site.
CO5 Develop online security and payment systems.
CO6 Discuss E-commerce marketing concepts.

Semester-VII

1. **7IT01: Digital Signal Processing**

CO1 Explain Digital Signal Processing concepts and sampling theorem.
CO2 Discuss DTLTI systems.
CO3 State Z-transform and analysis of LTI system.
CO4 Discuss fourier transforms and DFT, FFT.
CO5 Design the digital filters.
CO6 Discuss the realization of discrete time systems.

2. **7IT02: Object Oriented Analysis And Design**

CO1 Discuss modeling concepts.
CO2 Explain advance object and class concept.
CO3 Draw nested state diagram and different case models.
CO4 Explain development life cycle of systems.
CO5 Discuss application analysis of system.
CO6 Describe designing algorithm and overview of class design.

3. **7IT03: Web Technology**

CO1 Describe the essentials of web and basics of XHTML 1.0.
CO2 Write the cascading style sheet.
CO3 Discuss the client-side programming using Java Script and explain host objects.
CO4 Explain the servlet, session, cookies and URL rewriting.
CO5 Describe the representation of web data.
CO6 Discuss the web services and explain XML schema, SOAP.

4. **7 IT04: Real Time & Embedded Systems**

CO1 Explain fundamentals of embedded systems.
CO2 Discuss structural unit of processor.
CO3 Write software programming in assembly language and in C.
CO4 Discuss modeling process and Petri net model.
CO5 Discuss semaphores and its use.
CO6 Discuss RTOS and explain POSIX1003.1B.

5. **7IT05 (4) : Multimedia Technologies**

CO1 Explain multimedia authoring and data representation.
CO2 Differentiate color models of image and viedeo and discuss chroma subsampling.
CO3 Explain digital audio and components of MIDI.
CO4 Explain multimedia data compression, discuss lossless and lossy compression.
CO5 Discuss basics of video compression techniques, such as H.261, MPEG1.
CO6 Explain basic audio compression technique.

Semester-VIII

1. **8IT01: Digital And Wireless Communication**

CO1 Explain the information theory, elements of digital communication system and coding theorems.
CO2 Discuss error controlling and coding using different methods and explain convolution code.
CO3 Describe model of spread spectrum and basic principles of TDMA, FDMA and CDMA.
CO4 Explain the concepts of cellular telephone networks.
CO5 Illustrate the GSM and CDMA technologies.
CO6 Explain various standards used in wireless network topology, wireless sensor network and RFID technology.

2. **8IT02: Network Administration and Security**

CO1 Explain the different aspects of network security and discuss the model for network security.
CO2 Describe security mechanism cryptography.
CO3 Discuss the keberos and e-mail security.
CO4 Explain IP security.
CO5 Discuss SNMP protocol and differentiate between SNMPv1, SNMPv2 and SNMPv3.
CO6 Discuss System security and explain firewall.

3. **8IT03: Software Engineering**

CO1 Discuss evolving role of software and explain software process models.
CO2 Explain measures, metrics and indicators.
CO3 Describe project scheduling concept and SQ Assurance.
CO4 Illustrate concept of system engineering and design process.
CO5 Demonstrate software architecture techniques on project and explain golden rule.
CO6 Discuss different software testing fundamentals.

4. **8IT04 (2) :Web Commerce**

CO1 Explain the concepts of web commerce and EDI.
CO2 Illustrate the approach to safe e-commerce.
CO3 Describe electronic cash and electronic payment schemes.
CO4 Discuss internet security issues and solution.
CO5 Discuss secure email technologies and how does e-mail work.
CO6 Explain internet and web site establishment.

PSOs and COs of the E &TC Department

Program Specific Outcome (PSOs):

PSO1. An ability to apply the knowledge of core Electronic & Tele-communication engineering subjects with recent trends and technologies for analysis of real time problems.
PSO2. An ability to design and implement an application oriented engineering system using signal processing, embedded systems, communications engineering, and

instrumentation & control systems.

PSO3. Apply the knowledge of Electronics and Tele-communication engineering with professional ethics and functions to assess social, environmental issues effectively to provide probable solutions.

Course Outcomes (COs)

Semester-III

1. **3ET01: Mathematics-III**

CO 1 Solve contour integration as applied to analog systems.

CO 2 Comprehend knowledge of complex analysis in terms of complex variables, harmonic functions and conformal mapping.

CO 3 Apply numerical methods to obtain approximate solutions to mathematical problems.

CO 4 Emonstrate the knowledge of differential equations to solve engineering problems of analog systems.

CO 5 Identify and solve certain forms of partial difference equations as applied to discrete systems.

CO 6 Apply Laplace transform to solve differential equations.

2. **3ET02: Object Oriented Programming**

CO 1 Justify the basics of object-oriented programming concepts such as data types, functions, classes, objects, constructors, inheritance, overloading etc.

CO 2 Design, implement, test, and debug simple programs in C++.

CO 3 Describe how the class mechanism supports encapsulation and information hiding.

CO 4 Design and test the implementation of Java programming concepts

CO 5 To Study Classes & Objects

CO 6 Multiple Inheritance in java & Interface

3. **3ET03: Electronic Devices & Circuits**

CO 1 Comprehend the knowledge of diode and its applications in rectifier and regulator circuits.

CO 2 Understand basics of BJT, and their operational parameters.

CO 3 Understand feedback concepts, topologies and their applications.

CO 4 Implement and analyze various electronic circuits.

CO 5 Types of Power Amplifier & Modifications

CO 6 To Study JFET,MOSFET & UJT

4. **3ET04: Instrumentation & Sensors**

CO 1 Describe various sensors, transducers and their performance specifications.

CO 2 Understand working principle of various transducers.

CO 3 Make comparative study of various transducers and understand their Applications in industry.

CO 4 Understand Data Acquisition Systems.

CO 5 Measurement of Velocity, Strain & Miscellaneous Sensors

CO 6 Analog & Digital Data Acquisition System and applications

5. **3ET05: Electromagnetic Fields**

CO 1 Apply vector calculus to understand the behavior of static electric and magnetic fields.

CO 2 Formulate and solve problems in electrostatics and magnetostatics in dielectric media.

CO 3 Describe and analyze electromagnetic wave propagation in free-space.

CO 4 Analyze plane electromagnetic waves at boundaries between homogeneous media.

CO 5 Analyze the electromagnetic radiation from localized charges considering retardation effects.

CO 6 Radiation: Scalar & Vector magnetic Potentail

Semester-IV

1. 4ET01: Signal & Systems

CO 1 Describe signals mathematically and understand how to perform mathematical operations on signals and systems.

CO 2 Analyze the spectral characteristics of continuous-time periodic and aperiodic signals using Fourier analysis.

CO 3 Classify systems based on their properties and determine the response of LTI system.

CO 4 Analyze system properties based on impulse response and Fouri analysis.

CO 5 Understand the process of sampling and its effects.

CO 6 Apply the Laplace transform and Z- transform for analysis of continuous-time and discrete-time systems. .

2. 4ET02: Network Analysis

CO 1 Analyze electrical circuits using mesh and node analysis.

CO 2 Draw oriented graph of the network to determine their currents and voltages.

CO 3 Apply Laplace Transform for circuit analysis

CO 4 Apply suitable network theorems to analyze electrical circuits.

CO 5 Relate various two port network and apply two-port network theory for network analysis.

CO 6 Two Port Network: Open Circuit Impedance Parameter & short Circuit Admittance parameter

3. 4ET03: Analog Electronics-I

CO 1 Analyze different wave shaping circuits.

CO 2 Perform evaluation of the switching behaviour of semiconductor devices.

CO 3 Switching Characteristics of Semiconductor Device

CO 4 Comprehend the knowledge of basic concepts and performance parameters of Op-Amp.

CO 5 Use Op-Amp for implementation of linear and non-linear applications.

CO 6 Comprehend the knowledge of PLL, its applications and data converters.

4. 4ET04: Digital Electronics

CO 1 Use Boolean algebra to solve logic functions, number systems and its conversion.

CO 2 Understand digital logic families and their characteristics.

CO 3 Identify, analyze and design combinational and sequential circuits.

CO 4 Use the knowledge of semiconductor memories, programmable logic devices in digital design.

CO 5 Understand Analysis of Clock Sequential Network

CO 6 Use Semiconductor Memories & Programmable Logic Devices

5. 4ET05: Communication Engg-I

CO 1 Understand the necessity of modulation and identify the various components of analog communication systems.

CO 2 Understand different modulation and demodulation schemes in analog communication systems.

CO 3 Compare and contrast the strengths and weaknesses of various communication systems.

CO 4 Describe the properties and characteristics of Transmission lines and antennas.

CO 5 To Study RF Transmission Line & Parameters.

CO 6 Understand the Operation of Types of Antennas.

Semester-V

1. **5XT01: Electronic Devices & Circuits-II**

CO 1 To study & Understand the Linear wave shaping using RC and RL circuits, analysis and calculations of RC low pass and high pass filters.

CO 2 To know & Evaluate Switching characteristics of semiconductor devices.

CO 3 To illustrate the Collector coupled bistable, monostable and a stable multivibrators.

CO 4 To describe the operation of Flip-Flops: R-S, J-K, Master slave J-K, D-type, T-type.

CO 5 List & justify Types of semiconductor memories, sequential memories.

CO 6 To Study various Digital Logic Families Such as RTL,TTL,DTL,HTL & ECL

2. **5XT02: Power Electronics**

CO 1 To understand the constructions, features & operation of Silicon Controlled Rectifier.

CO 2 To study how to connect Silicon Controlled Rectifier is series or in parallel.

CO 3 To design the Principle of phase control, half wave controlled rectifier, half controlled bridge & fully controlled bridge rectifier for resistive and RL load.

CO 4 Define & Explain the Classification of ckt for forced commutation, series inverter, improved series inverter, parallel inverter.

CO 5 Explain the Basic principles of chopper, time ratio control and current limit control techniques.

CO 6 Know the operation of Speed control of DC series motors using chopper, speed control of DC shunt motor.

3. **5XT03: Control System Engineering**

CO 1 To define Open loop & close loop system and transfer function.

CO 2 To analyze time response such as impulse response.

CO 3 To study Root locus techniques in time domain & frequency domain.

CO 4 To illustrate Bode plot & Nyquist criteria for response.

CO 5 To design state model and variable models in different functions.

CO 6 To explain sample data control system such as Z Transform and its different properties.

4. **5XT04: Communication Engineering-II**

CO 1 Understand the Modulation techniques such as AM Modulation,FM Modulation

CO 2 To study block diagram of AM Receiver and its various parameters.

CO 3 Analyze operation of FM Transmitter and analysis of FM generation.

CO 4 Define the FM Receiver and its basic operations of various blocks.

CO 5 To explain pulse modulation techniques and sampling theorems.

CO 6 Discuss telephone switching techniques such as tone dialing and pulse dialing.

5. **5XT05: Consumer Electronics**

CO 1 Develop the system of Audio & Microphone and know various types of speakers.

CO 2 To design Video system & display such as color TV, Plasma TV and HDTV.

CO 3 To Study the operation and troubleshooting of Washing machines, Microwave ovens, Air- conditioners and Refrigerators, Computers Office Systems: FAX, Xerox, Telephone Switching System, Mobile Radio System.

CO 4 To know the operation of Recording and Reproduction Systems: Disc recording and reproduction, Magnetic recording and reproduction, Video disc.

CO 5 Explain the various aspects of Power Supplies and other systems: SMPS, UPS and Preventive Maintenance, Set Top Boxes, Remote controls, Bar codes.

CO 6 Understand the aspects of Calculators its Structure and internal organization.

6. **5XT05: Fibre Optics**

CO 1 To Study Light Ray Theory in different Media
CO 2 To Understand Losses & Dispensation in Optical Fibre
CO 3 To Know about Optical Sources
CO 4 Explain phenomena of Optic Detection
CO 5 To Understand about Optical Data Communication
CO 6 To study about various Parameter Measurement.

7. **5XT06: Communication Skill**

CO 1 To know a Comprehension over an unseen passage & word study: - Synonym, antonym, meanings, matching words, misspelled words etc.
CO 2 To understand simple & compound sentences & make use of not only but also, if clause etc.
CO 3 To Study the aspects of Theoretical background - importance of communication, its process; model of communication its components, important text factors & Non verbal communication.
CO 4 To understand Specific formats for written communication like – business correspondence, formal reports.
CO 5 Learn oral communication, Face to face communication, group discussion, personal interview etc.
CO 6 To Know about technical proposals, day to day written communication applications like notice, orders etc

Semester-VI

1. **6XT01: Digital Integrated Circuit**

CO 1 Design the Logic Circuit by using Boolean algebraic equations.
CO 2 Study the circuits of Multiplexer, Demultiplexer Decoder, and Encoder and design it for expression.
CO 3 Illustrate circuit operations of Combinational Logic Design using ROM array, PLA, PAL.
CO 4 Design of counters and sequential networks.
CO 5 Analyze the asynchronous sequential networks and design of network.
CO 6 Fault detection and location in combinational circuits.

2. **6XT02: Linear Integrated Circuits**

CO 1 Study of Operational Amplifier and Block diagram of Op Amp.
CO 2 Explain linear applications of Operational Amplifier such as Inverting & Non Inverting.
CO 3 Discuss Non linear applications of Operational Amplifier such as Clipping & Clamping Circuits.
CO 4 Design the Voltage Regulator using IC 741 and using IC 78XX & 79XX.
CO 5 Design the Timer circuit using IC 555 and study of related parameters.
CO 6 Study of Phase Lock Loop (PLL) and introduction of Function Generator.

3. **6XT03: Introduction to Microprocessor**

CO 1 Understand 8085 Architecture and instruction set of 8085.
CO 2 Study of Assembly Language Programming of 8085.
CO 3 To know about the various Interrupt of 8085 and related issues.
CO 4 Design & study of internal architecture, programming and interfacing of PPI 8255.
CO 5 Discuss the 8086: CPU architecture, internal operations, addressing modes, and instruction formats.
CO 6 Understand the Instruction set of 8086, Assembly language programming.

4. **6XT04: Digital Communication**

CO 1 To define the Digital Communication System and explain its Block represtation.
CO 2 To know about the Information Theory Measure of Information.
CO 3 Understand the various Bands pass Modulation and Demodulation techniques.
CO 4 Study of Base Band Transmission and related various techniques.

CO 5 Illustrate the Error Control Coding Introduction to Error Control Coding; Types of Errors; Methods of Controlling Errors.

CO 6 To study various Multiple Access Schemes and Spread Spectrum Communication Multiple Access schemes: Time Division Multiple Access, Frequency Division Multiple Access and Code Division Multiple Access.

5. **6XT05: Introduction to Wireless Technology**

CO 1 To study about Network & Models such as OSI Reference Model

CO 2 To Understand different Wireless Protocol

CO 3 To Know about Wireless Application Protocol Model & Architecture

CO 4 To Study about Cellular Telephony & its Design Principle

CO 5 To understand about Wireless LAN Principle & Its Configuration

CO 6 To know about Satellite Orbits (LEOs, MEOs GEO & HEOs) Systems

6. **6XT05: Electronic Test Instruments- Analog & Digital**

CO 1 To Understand about various Meters Such as Analog, Digital, DC Voltmeter,AC Voltmeter etc

CO 2 Study about floating and Grounded Outputs & Sine wave sources

CO 3 To Know about Oscilloscopes & its Block Diagram

CO 4 To Understand Oscilloscope Measurement & Basic Waveform Measurement

CO 5 To Understand about Spectrum & Network Analyser

CO 6 To Study about Logic Analyser, Logical Probes & Logical Measurements

Semester-VII

1. **7XT01 : Digital Communication Network**

CO 1 Understand the Communication Network Functions; Network Topology; Types of network: LAN, MAN, WAN.

CO 2 Study of Peer to Peer Protocols and Data Link control, Point to Point Protocol and service models.

CO 3 Design of Local Area Networks and Access Control Protocols, LAN Architecture; Medium Access Control (MAC).

CO 4 Understand the operation of various Networking Devices such as Hubs; Switches; Bridges; Routers; Gateways; Routing Switches Routing Algorithms.

CO 5 Know about the Asynchronous Transfer Mode (ATM), Frame Relay and ISDN ATM.

CO 6 Illustrate the concept of TCP/IP Protocol Overview of TCP/IP; IP Services; Internet Protocol (IPv4).

2. **7XT02: Microcontroller Application**

CO 1 To Understand An Introduction to Microcontroller C 8051and Architecture of 8051.

CO 2 Study of Instruction set of 8051 and addressing modes of 8051.

CO 3 Review concept and Study of ADC 0809, DAC 0808 and its interfacing with 8051.

CO 4 Discuss the Interfacing LCD & Keyboard with 8051.

CO 5 To know about the Serial port programming in assembly: Basics of serial communication, 8051 connection to RS232C.

CO 6 Apply the concept of 8051 programming in C : Data types and time d delay in 8051 C

3. **7XT03: Digital Signal Processing**

CO 1 Study of Introduction to DSP, Frequency domain description of signals & systems.

CO 2 Design of Z- transform: complex Z-plane, ROC determination of filter.

CO 3 Understand the Introduction to Fourier transform of discrete time signal and its properties. Inverse Fourier transforms DFT and its properties.

CO 4 Design of Filter Structures: Direct form I, Direct form II, Cascade and parallel structure for IIR and FIR Filter.

CO 5 Compare the Methods to convert analog filter into IIR digital: Mapping of differential equation.

CO 6 Understand the Multi rate DSP, Introductory concept of multi rate signal processing, Design of Practical sampler.

4. **7XT04: Satellite & Optical Fiber Communication**

CO 1 To study different types of satellite and study their orbital parameters.
CO 2 To know about EMF and antennas and also study about link analysis and frequency reuse
CO 3 To know about VSAT and GPS in details
CO 4 To study about optical fiber waveguide and transmission characteristics of optical fiber cable
CO 5 To study the different types of optical source and optical detectors like LED, LASER, APD and PIN photodiode.
CO 6 To study the optical transmitter and receiver and study about coherent and non coherent source and also about Wavelength multiplexing and optical switches.

5. **7 XT04: VLSI Design**

CO 1 To Study Various Logic Gates
CO 2 To Design Circuit Using VHDL language
CO 3 To study Modelling & sub programme.
CO 4 To Know about PLD,CPLD & FPGA
CO 5 To Design CMOS Circuit & Related Issues
CO 6 To Know about Digital Circuit Verification.

Semester-VIII

1. **8XT01: UHF & Microwave**

CO 1 Study of Limitation of Conventional devices at high frequency, Microwave Tubes.
CO 2 To understand the Semiconductor microwave Devices: Gunn diode: RWH theory.
CO 3 Analyze of Transmission of Microwaves: Waveguides: Rectangular Wave guide.
CO 4 Know about Microwave Resonator: Basic Resonant circuits RLC, transmission line resonators.
CO 5 Illustrate the concept of Microwave Components: Microwave passive components, terminator, Attenuator.
CO 6 Understand the Microwave Measurements: Frequency Measurements, Power Measurements, and Attenuation Measurements.

2. **8XT02: Electronics Circuit Design**

CO 1 Design of regulated power supply using transistor, design of DC amplifier.
CO 2 Design of waveform generator using IC 741, IC 8038, IC 566. Design of sweep generator.
CO 3 Design of instrumentation amplifier, Temperature controller / indicator using thermocouple.
CO 4 Introduction to CMOS / VLSI circuits, MOS Transistor switch.
CO 5 VHDL: Design flow, EDA tools, code structures, data types, operators and attributes.
CO 6 Design of combinational blocks such as multi-bit adders, ALU, MUX, DEMUX.

3. **8XT03: Wireless Communication**

CO 1 Define & know CELLULAR FUNDAMENTALS Evolution of cellular mobile system (1G, 2G, and 3G).
CO 2 Understand the CELLULAR RADIO SYSTEM DESIGN FUNDAMENTALS Frequency managements: Cellular system spectrum, frequency assignment.
CO 3 Study of MOBILE RADIO PROPAGATION MECHANISM Radio propagation.
CO 4 To know about GSM system architecture, radio subsystem, channel types, frame structure, GSM Signaling Protocols.
CO 5 Illustrate Frequency and channel specification, physical and logical channels of IS-95, call processing in IS-95.
CO 6 Analyze of Bluetooth: Bluetooth enable devices network, Bluetooth protocol, layers, Zigbee Architecture.

4. **8XT04: Biomedical Engineering**

CO 1	Understand Physiological system of heart, Man instrument system, Sources of bioelectric potentials.
CO 2	Study of Biomedical recorders for EEG, ECG, EMG, Blood pressure variation as a function of time.
CO 3	Define & explain Instrumentation for diagnostics X-ray, X- ray basics properties, X-ray machine, and Special imaging technique.
CO 4	Illustrate the Need of Physiological and electrotherapy equipments. Cardiac pacemaker machine.
CO 5	Analyze the System concepts, Bedside patient monitors, central monitors, Average reading heart monitor.
CO 6	To know about Computerized Axial Tomography (CAT).

5. **8XT04: Digital Image Processing**

CO 1	To define & Explain digital Image processing
CO 2	To Design Image Transform Concept
CO 3	To know how to Enhance image.
CO 4	To know about Image Restoration
CO 5	To Understand the concept of Image Compression
CO 6	To Analyse Image Segmentation

PSOs and COs of the Mechanical Engineering Department

Program Specific Outcome (PSOs)

PSO1.	The Mechanical Engineering graduate will have the ability to understand, analyze and try to prepare the solution for complex problems regarding mechanical engineering design.
PSO2.	The Mechanical Engineering graduate will have the ability to understand, analyze and try to prepare the solution for complex problems regarding thermal engineering.
PSO3.	The Mechanical Engineering graduate will have the ability to understand, analyze and try to prepare the solution for complex problems regarding manufacturing processes of various components.
PSO4.	The mechanical engineering graduate will be able to develop/ model the complex engineering solutions
PSO5.	The Mechanical Engineering graduate will have the ability to understand the recent techniques, advance software, like CATIA, ANSYS, Fluent, etc.

Course Outcomes (COs)

Semester-III

1. **3ME01-Mathematics-III**

CO1	Understand ordinary differential equation
CO2	Learn about Laplace transformation and its applications
CO3	Understand PDEs of 'n'th order with constant coeffecients
CO4	Learn about Numerical Methods
CO5	Understand the concept of Complex variables
CO6	Undertsnd the concept of Statistics

2. **3ME02-Mechanics of Materials**

CO1	To emphasize on the mechanical properties of materials. Mainly stess-strain diagram, uniaxial and biaxial tesions and compressions
CO2	To makethe students understand about the beams and their loading effects like axial force and shear force, shear force and axial load diagram.
CO3	Provide knowledge about stresses in beams mainly in shear and bending, strain energy and its effects.
CO4	To explain in details about the phenomenon of torsion in thick and thin cylinders, solid and similar such geometries.
CO5	To study the efffects of combined, bending and principal stresses

3. **3ME03-Fluid Power-I**

CO1	To make the students aware about the concepts of fluid mechanics incluiding the concept of mass and momentum conversion.

CO2 To make the students able to understand and apply the Bernoulli's equation to solve the problems in fuid mechanics
CO3 To apply the Control-Volume analysys to the problems in fluid mechanics
CO4 To apply the Darcy-Weisbach equation to solve the problems in pipe flow
CO5 To develop the ability to perform dimensional analysis for complexities in Fluid Mech.
CO6 To grasp the concept of Laminar, Turbulent and Boundary Layer fundamentals.
CO7 To make the students able to undertand and apply the concept of Viscosity which is important in real fluid flow

4. 3ME04-Engineering Thermodynamics

CO1 Students will understand the fundamental concepts of Thermodynamics
CO2 Students will be able to solve theoretical problem of heat and work.
CO3 Students will understand First Law of Thermodynamics and its appplication in engineering devices
CO4 Students will understand Second Law of Thermodynamics and its appplication in engineering devices
CO5 Students will understand importance of Entropy and its effect on different processes.
CO6 Students will study different power cycles and learn to derive work and efficiency.

5. 3ME05-Manufacturing Process-I

CO1 Students will understand the basic casting process and its elements like patter, sand etc.
CO2 Students will understand fuctioning of furnaces and its types. Also they will be able to inspect defects in castings.
CO3 Students will understand different types of casting processes.
CO4 Students will understand cold and hot working processess and its applications in production engg
CO5 Use the knowledge of different joining processes in production.
CO6 Understand conventional and non-conventional joining processes. Also they will be introduced to surface treatments.

Semester IV

1. 4ME01-Basic Electrical Driver & Control

CO1 Understand concept of general electric drive and its applications.
CO2 Understand the technical characteristics of motors and their construction
CO3 Understand different kinds of 3 Phase motors, their working and applications.
CO4 Understand different kind of voltage control devices
CO5 Understand different kinds of sensors, switches, contacts and their basic applications
CO6 Learn industrial application of industrial drives

2. 4ME02-Engineering Metallurgy

CO1 Classify materials on the basis of structures and alloys along with their applications
CO2 Construct Fe-C equilibriu, diagram along with important properties.
CO3 Acquire knowledge about compsoite materials, their application and advantages
CO4 Utilize non ferrous metals and its alloys theoretically such as Al, Zn, Pb
CO5 Study the heat treatment processes for improving the metal properties for materials. This would involve study of Annealing, Normalizing, Tempering etc
CO6 Study the mechanical working of metals such as Carburizing, Nitriding, Cyaniding, hot and cold working of metals etc.
CO7 Grasp the concept of Powder metallurgy and study the methods of manufacturing metal powders

3. 4ME03-Energy Conversion-I

CO1 Learn the various properties of steam and utilizzation of steam as a working fluid
CO2 Acquire basic knowledge of various boilers, its mountings and acccesories and about the paramters govering the perforamnce of boilers
CO3 Get the knowledge of fuel and ash handling systems.
CO4 Know about the basic layout of steam power plant and its site selection.
CO5 Analyse the steam turbines and know about the concept of governing

4. 4ME04-Manufacturing Process-II

CO1 Study in details about all the parametsers related to tool such as tool life, tool wear, cutting forces etc.

CO2 Study the details of construction, working and operation of Centre Lathe, Capston and Turret Lathe
CO3 Study the details of construction, working and operation of Drilling, Boring and Broaching
CO4 Study the details of construction, working and operation of Millimg
CO5 Study Unconvetional machining processes including Mechanical, Thermal and Electrochemmical machining
CO6 Study finishing and superfinishing processes like

5. **4ME05-Machine Design & Drawing-I**

CO1 Solve for the view which aren't visible/solved with the help of sectional view
CO2 Understand the principles of development of tin smithy and sheet metal work. Development of surfaces and intersection of solids.
CO3 Study the types of stresses like Thermal, Torsional stresses in straight and curved beam. Frequently used in industrial applications such as hooks, C-clamp
CO4 Study the construction, working and principles of riveted joints and welded joints
CO5 Classify springs and understand their industrial applications
CO6 Design power screw

Semester V

1. **5ME01-Production Technology**

CO1 Understand the concept of TQM
CO2 Understand the quality charts such as ND-curve, control charts
CO3 Understand the principles of work study
CO4 Understand the standards of measurements
CO5 Understand linear measurement devices like comparators and angular measurements, screw thread measurements
CO6 Undersatnd Gear measurement devices and errors in gear measurements like runout and backlash

2. **5ME02-Heat Transfer**

CO1 differentiate between thermoodynamics and heat transfer
CO2 acquire knowledge about various heat transfer processes
CO3 apply the governing equations of conduction for various geometries
CO4 be able to calculate the size of insulation for geometries undergoing heat transfer
CO5 understand the phenomenon of convection and be able to solve problems of convection
CO6 understand the effect of radiation and its significance in daily life
CO7 Design and develop heat exchangers using methologies like LMTD, NTU

3. **5ME03-Measurement System**

CO1 Study the types, configurations and functional elements of measuring instruments
CO2 Find different types of characteristics and errrors in measuring instruments
CO3 Study devices used for strain and pressure measurement with special reference to industrial applns
CO4 Study the methodolgies, construction and detail working of Force, Power, Flow and Torque measurement
CO5 Study the methodolgies, construction and detail working of Temperature and Liquid level measurements
CO6 Study the methodolgies, construction and detail working of Speed, Vibration, Displacement measurements

4. **5ME04-Theory of Machine –I**

CO1 Get introduced to mechanisms, its types and inversions
CO2 Kinematically analyse the mechanisms
CO3 Perform velocity and acceleration analysis of simple and compound mechanisms with different methods such as instantenous centre method etc
CO4 Study the types of synthesis of mechanisms with graphical methods, overlay method etc
CO5 Study the working, construction and details of instruments utilizing friction such a s bearings, clutches, brakes.
CO6 Study the profile and utilzation of cams, followers by Graphical methods
CO7 Define the terminologies used in gears along with their profile

5. 5ME05-Free Elective-I/ PROJECT MGT

CO1	Understand the meaning and concept of projects, managements, constraints of projects
CO2	Understand the concept of project organization and planning
CO3	Learn the budgeting and cost estimation of projects
CO4	Learn the scheduling and resource allocations such as CPM, PERT etc
CO5	Understand the project controls, monitoring, project cost over runs and cost controls
CO6	Understand issues in management of projects, concepts, techniques, cost escalation and study of the feasibility of project

Semester VI

1. 6ME01-Fluid Power-II

CO1	Get the basic knowledge of hydraulic prime movers like impulse and reaction turbine. Also they should gather knowledge about their characteristics and governing equations.
CO2	select and use appropriate pumps as per given applications. They will be able to interpret the characteristics of a pump.
CO3	understand the working and difference between axial flow pumps . Get acquired about the knowledge of CFD.
CO4	Deal with the working and analysis of positive displacement pumps.
CO5	know about compressible fluid flow.
CO6	Get acquainted with hydrostatic and hydrokinetic system

2. 6ME02-Computer Software Applications

CO1	Understand the concept of DBMS
CO2	Understand the structure of relational databases along with algebra operations
CO3	Understand the concept of Database design and entity relational model
CO4	Undertsand the SQL
CO5	Understand trealational database design along with automic domains and modeling temporal data
CO6	Understand the concept of modeling and simultaion

3. 6ME03-Control System Engineering

CO1	Understand the transfer function of feed back system
CO2	Conceptualize industrial controllers, their types, construction and working
CO3	Learn time domain analysis
CO4	Conceptulaize stabilty using Root locus and Bode plots
CO5	Understand the concept of Gain margin and Phase margin
CO6	Study the importance of automatic speed control systems like prime movers, generators etc

4. 6ME04-Theory of Machine –II

CO1	Study static force anlysis to plane motion mechanisms
CO2	Learn about hydrodynamic lubrication, thin and thick film lubrication system
CO3	To find the output of machineries using Crank Effort and Turning moment diagram
CO4	Study the effect of inertia forces in various parts of reciprocating engine by graphical method
CO5	Conceptual Vehicle Dynamics
CO6	Study and realize the importance of mechanical vibrations and also find their frequency
CO7	Study multi rotor vibration systems and learn about static andbalancing of masses

5. 6ME05-Free Elective-II/NES

CO1	Familiarize themselves with varoius Non Conventional Sources of energy and way of harnessing them
CO2	Conceptualize the use of solar radiations as a source of energy
CO3	Study the instruments used for measuring radiations
CO4	Learn about the methodologies used for collecting the solar energy
CO5	Learn about techniques and methods for solar energy utilization and storage
CO6	Conceptualize the availability and harnessing ways for energy available in Oceans
CO7	Provide solutions related to variopus environmental issues assocaited with the use of conventional fuels
CO8	Learn about the energy resources such as Biomass, Solar energy plantation
CO9	Study direct energy conversion technologies
CO10	Focus upon the use of vegetable oil as liquid fuels

6. **6ME06-Communication Skills**

CO1 Study newer lexicons and comprehension ways
CO2 Communicate more effectively
CO3 Create stage daring and open environment for communication
CO4 Explore newer and more effective styles of communication
CO5 Develop writing skills
CO6 Effective commincate in teams and groups
CO7 Know about correct ways of conducting meetings, conferences, symposiums etc

Semester VII

1. **7ME01-Machine Design & Drawing-II**

CO1 To make the students aware about types of power transmission devices and their design such as for shafts, keys and couplings in details.
CO2 To make students able to calculate amount of heat generated in various types of bearings, energy stored in flywheels and applications of wire rope in industries
CO3 To be able to calculate various stresses in IC Engine parts
CO4 To introduce the concept of Governor and find the mass and centrifugal forces of fly balls
CO5 To be able to find the bending, tensile stresses in gears
CO6 To determine the torsional rigidity, strength, stiffness, specific weight of the shaft

2. **7ME02-Energy Conversion –II**

CO1 To understand to study P-V & T-S diagram of compressor & we able to solve design based problem of reciprocating Compressor
CO2 To understand to study P-V & T-S diagram of compressor & we able to solve design based problem of RotaryComp
CO3 To understand basic Refrigeration & Air -conditioning and solve numerical
CO4 To Understand Construction & operation of Gas turbine will able to solve numerical on gas turbine
CO5 Understand basic working of Nuclear Power plant theorotically.
CO6 Non conventional energy system and its application in engg.& society.

3. **7ME03-Industrial Management and Costing**

CO1 Understand the Functions of management, organization structure & relationship
CO2 understand the Marketing & sales Management
CO3 student will able to identify responsibility and task of different organizational function such as Marketing,Product development etc.
CO4 explain the main managerial concepts & tools used withinin different organisational functions
CO5 learn to interpret financial statements and analyse how managerial decision impacts financial outcomes
CO6 understand human beahaviour in multi-culture environments

4. **7ME04-Automation Engineering**

CO1 Know about automation and its types
CO2 Develop codes for NC/CNC working of machine
CO3 Understand the importance of robots in manufacturing
CO4 Understand importance of Group technology
CO5 Learn abot felxible manufacturing techniques
CO6 Grasp the importance and know about the methods of using computer for manufacturing purposes

5. **7ME05-Elective – I/ TOOL ENGG**

CO1 Develop knowlegde about cutting tools, their geoemetries, machinabilty
CO2 Learn about various metal cutting processes
CO3 Awareness regarding press tool dies
CO4 Know about various types of press tools
CO5 Design Jigs and Fixtures
CO6 Aware about cutting fluids, tool materials,, tool signature

Semester VIII

1. **8ME01-Elective –II/ AUTOMOBILE ENGG**

CO1 Classify automobiles on the basis of chassis, power unit etc
CO2 Learn about fuel feeding systems

CO3 Learn about the electrical connections in an automobile including ignition system
CO4 Learn about varoius possibilities for transmitting power from the engine
CO5 Learn about the braking systems in automobiles
CO6 Learn about the steering systems in automobiles
CO7 Learn about the lubrication systems in automobiles
CO8 Learn about the suspension systems in automobiles

2. **8ME02-Elective –III/ RAC**

CO1 know about the basic refrigeration cycles with special impetus on Vapour Compression Refrigeration Cycles
CO2 Use and solve problems with the help of p-h, T-s, p-v charts for specific refrigerants
CO3 Apply the basic principles of psychrometry and applied psychrometry
CO4 Get familarized with different refrigerants and be able to classify them as per the applications
CO5 Perform load calculations and design ducts at elemtary level for air conditioning purposes
CO6 Understand and know about the various components of VCR, VAR systems

3. **8ME03-I.C. Engines**

CO1 Identify the engine types and its components
CO2 Develop deatil understanding of engine functions and performance
CO3 Aply the principles of Thermodnamics, Fluid Mechanics and Heat Transfer for analysing IC Engines
CO4 Develop awareness of environmental and social issues due to usage of IC Engines for various purposes
CO5 Perform differenttest on Petrol and Diesel engine and verify the characteristics
CO6 Make use of modern tools for engine management

4. **8ME04-Operations Research Techniques**

CO1 Apply mathematical models that are needed to solve optimization problems.
CO2 Solve practical problem of LPP
CO3 Understand CPM & PERT. Also apply to apply it in enginnering for complex problem analysis
CO4 Understand waiting line modelds and apply it.
CO5 Apply simulation for problem solving in engineering
CO6 Apply Dynamic programming for solving budgeting issues.

PSOs and COs of the Textile Engineering Department

Program Specific Outcome (PSOs)

PSO 1 Students will be solve Textile industry based problems by utilizing the principals of mathematics, basic science and engineering analysis.
PSO 2 Students will possess an appreciation for and commitment to being life –long learners by seeking educational and developmental opportunities in their personal and professional lives and obtain the tools to successfully identified and adopt to ever changing technology.
PSO 3 Students will excel careers in diverse fields in the public, private sectors and across various industries within or outside the textile complex.
PSO 4 Students will demonstrate productive engineering practices, entrepreneurial behavior, research and leadership management within the public, private or academic sectors by using the technical, professional, ethical and societal knowledge, skill, and attitudes required for success in the modern world.

Course Outcomes (COs)

Semester-III

1. **3TX01 YARN MANUFACTURING-I**

CO.1 Analyze the concepts and operation of ginning and cotton harvesting.
CO.2 Understand the brief outline of spinning department
CO.3 Understand the concepts and mechanism of opening and cleaning of blow room machines
CO.4 Understand the principle and mechanism of fibre individualization in carding
CO.5 Understand the various setting of carding which influences on card quality and production

CO.6 Calculate the lap variation and CV%.

2. 3TX02 FABRIC MANUFACTURING-I

CO.1 Understand the concept and mechanism of warping and sizing process in woven fabric Manufacturing
CO.2 Understand the concept and mechanism of winding process in woven fabric manufacturing
CO.3 Analyze the functioning of weaving machine and its important motions
CO.4 Select and control the process variables at sizing
CO.5 Create the new designs in woven fabric manufacturing
CO.6 Understand the modern development of sizing

3. 3TX03 TEXTILE FIBRE-I

CO.1 Outline the fundamentals of fibre structures and various properties of natural fibres.
CO.2 Interpret the relationship between various parameters and the moisture properties of Natural fibres
CO.3 Understand the classification of fibres
CO.4 Analyze the various regenerated fibres with properties
CO.5 Understand about the fundamentals and measurement of physical and chemical properties of fibre
CO.6 Understand the various method of fibre formation.

4. 3TX04 MACHINE DRAWING

CO.1 Understand development of surfaces of cubes, prisms, cylinders, pyramids, cones
CO.2 Draw the freehand sketches of keys, cotter, joints , couplings
CO.3 Use of specification for limits and fit
CO.4 Understand principles, procedure, preparations of detail drawings
CO.5 Preparation of assembly drawing and part list of simple machine assembly
CO.6 Latest L.S.I convention covering the standard practice in machine drawing

5. 3TX05 THERMAL SCIENCE AND AIR CONDITIONING

CO.1 Define various components of mechanisms and construction of steam boiler
CO.2 Define various components of boiler mounting and accessories.
CO.3 Analyze the working principle of refrigeration and air conditioning systems
CO.4 Understand various properties of steam
CO.5 Understand the various calculations of air conditioning systems
CO.6 Understand the air conditioning and distribution system.

Semester-IV

1. 4TX01 YARN MANUFACTURING –II

CO.1 Understand the basic principles of different spinning system
CO.2 Understand the concept of fibre parallelization in draw frame
CO.3 Understand the principle and working of draw frame
CO.4 Understand the concept & mechanism in comber process
CO.5 Calculate the production as well as draft of all the comber systems
CO.6 Apply the setting of comber machine and gauge used for setting.

2. 4TX02 Fabric Manufacturing –II

CO.1 Generalize the functions of machine elements in conventional weaving machines
CO.2 Understand the concept and mechanism of automatic loom
CO.3 Summarize the working of each elements in fancy weaving machines
CO.4 Generalized the weft insertion cycle of jacquard weaving machines
CO.5 Understand the fabric defects and value loss
CO.6 Analyze the limitation of plain loom.

3. 4TX03APPLIED ELECTRONICS AND CONTROL SYSTEM

CO.1 Understand the basic principles of semiconductor devices
CO.2 Understand the basic principles of transistor
CO.3 Understand the construction and working of photoelectric devices.
CO.4 Understand the different types of transducer
CO.5 Understand the various types of control system and component.

CO.6 Verify the truth various types of logic gates.

4. 4TX04 TEXTILE FIBRE-II

CO.1 Outline the fundamentals of fibre structures and various properties of synthetic Fibres
CO.2 Interpret the relationship between various parameters and the moisture properties of Fibres
CO.3 Understand the concepts of mechanical properties of fibres
CO.4 Analyze the optical and frictional parameters related with fibre properties
CO.5 Acquire the knowledge about the fundamentals and measurement of electrical and thermal properties of fibre
CO.6 Understand the microstructure and macrostructure of fibres.

5. 4TX05 GARMENT MANUFACTURING TECHNOLOGY

CO.1 outline of process involved in garment manufacturing
CO.2 Develop the pattern making, grading and marker making for Kids, Baby's, Men's and Women's wear
CO.3 Understand the principle and methodologies use in drafting
CO.4 acquire the knowledge of different types of Stitches & Seams and sewing machine
CO.5 Compare different production systems used in garment industry
CO.6 Understand the pressing technology of fabric.

Semester-V

1. 5TX01 YARN MANUFACTURING –III

CO.1 Understand the principle and working of Speed frame
CO.2 Understand the principle and working of Ring frame
CO.3 Understand the spinning geometry
CO.4 Analyze the gearing diagram & building mechanism of Ring frame
CO.5 Understand the principle of doubling, twisting and blending
CO.6 Understand the the various yarn faults.

2. 5TX02 FABRIC MANUFACTURING –III

CO.1 Understand the concept of knitting
CO.2 Summarize the working Principle of plain, rib and interlock knitting machine
CO.3 Understand the fundamentals and working of warp knitting machine and weft knitting machine
CO.4 Summarize the various nonwoven fabric characterization techniques.
CO.5 Analyze the concept of nonwoven
CO.6 Understand the various nonwoven web laying and web bonding systems

3. 5TX03 TEXTILE TESTING-I

CO.1 Understand the objectives and principal of testing
CO.2 Understand the concepts of quality and statistical application in textiles
CO.3 Understand the measurement of fibre properties
CO.4 Understand the various yarn numbering systems
CO.5 Understand the selection of samples for testing
CO.6 Understand maturity of fibre.

4. 5TX04 TEXTILE COSTING AND ECONOMICS

CO.1 Evaluate the economic theories, cost concepts and pricing policies
CO.2 Outline the cost management concepts
CO.3 Understand elements of cost of a product
CO.4 Discuss various expenses incurred in textile industry
CO.5 Understand the measures of national income, the functions of banks and concepts of globalization
CO.6 Outline the Inventory management concepts

5. 5TX05 FREE ELECTIVE

(i) TECHNICAL TEXTILES

CO.1 Understand the scope and classification of technical textiles
CO.2 Outline the fibres, yarns and fabric types used in technical textiles

CO.3 Classify the properties required for fabric constituent to use in Agro textiles, Geo textiles and filtration textiles
CO.4 Deduce role of textile materials in the medical textiles product development
CO.5 Outline the functions and various requirements of protective textiles, sports textiles and transportation textiles.
CO.6 Understand the method of production and its application of cords and ropes.

6. 5TX05 FREE ELECTIVE

(ii) FASHION AND CLOTHING SCIENCE

CO.1 Outline dimensional stability of clothing with different mechanisms.
CO.2 Analyze tailor ability and serviceability of woven and knitted fabrics.
CO.3 Summarize handle and aesthetic properties of fabrics.
CO.4 Relate human-clothing-environment system in terms of comfort.
CO.5 Understand thermal properties of clothing related to clothing comfort.
CO.6 Understand the fashion marketing planning.

Semester-VI

1. 6TX01 FABRIC STRUCTURE

CO.1 Design various weave structures
CO.2 Analyze colour and weave effects
CO.3 Draw pile and corded structures
CO.4 Illustrate special weaves
CO.5 Learn to create new structures
CO.6 Understand different types of selvedges and their application .

2. 6TX02 ADVANCE YARN MANUFACTURING TECHNOLOGY

CO.1 Outline of modern blowroom department
CO.2 Understand the modern development of card
CO.3 Understand the principle and working of Roter spinning
CO.4 Understand the principle and working of Air jet spinning
CO.5 apply the principal, construction, working, properties of open end spun yarn
CO.6 Analyze various yarn structure & properties of yarn.

3. 6TX03 TEXTILE TESTING-II

CO.1 Understand the measurement of fibre properties
CO.2 Generalize the advanced testing instruments
CO.3 Summarize the working Principle of tensile testing instruments
CO.4 Evaluate different tensile properties of textile material
CO.5 Understand nature of irregularity and its effect on textile material
CO.6 Calculate the thickness, EPI, PPI, CRIMP% of fabric.

4. 6TX04 APPAREL MARCHANDISING

CO.1 Understand the marketing and merchandising concept in textile industry
CO.2 Analyze the marketing segmentation
CO.3 Recall the pricing methods and their application
CO.4 Summarize the export documentation for export the product
CO.5 Understand the sourcing strategies in textile marketing
CO.6 Understand foreign exchange regulation acts .

5. 6TX05 FREE ELECTIVE –II

(i) COMPUTER AIDED TEXTILE &FASHION DESIGNING

CO.1 Practice weave design using software tools
CO.2 Develop 2D fabric simulation with different weaves for dobby and jacquard design
CO.3 Create various types of motifs for printing with repeat designs
CO.4 Develop garment patterns for T-Shirt, trouser, ladies top, skirt using CAD software
CO.5 Calculate the Marker efficiency for T-Shirt, Ladies top, skirt using CAD software
CO.6 Understand the fashion software.

6. 6TX05 FREE ELECTIVE –II

6 FE TX 05 (ii) FASHION TECHNOLOGY

CO.1 Understand the Principles of fashion, Fashion cycle.
CO.2 Understand Fashion Research and Analysis.
CO.3 Understand Adoption of fashion.
CO.4 Understand the marketing segmentation.
CO.5 Understand the Interpreting customer demand
CO.6 Understand the fashion buying methods.

7. 6TX06 COMMUNICATION SKILL

CO.1 Imparting the role of communicative ability as one of the soft skills needed for Placement
CO.2 Developing communicative ability and soft skills needed for placement
CO.3 Making students Industry-Ready through inculcating team-playing capacity
CO.4 Demonstrate leadership and Teamwork skills.
CO.5 Create effective PPT"s, Resumes and Reports.
CO.6 Prepare job applications, covering letters and emails.

8. 6TX07 MINI PROJECT

CO.1 Formulate an experimental design to solve textile industrial problems
CO.2 Conduct survey of literature
CO.3 Scientific Presentation skills
CO.4 Apply an engineer's work in the context of its impact on society
CO.5 Compare the result with standards.
CO.6 Summarize the results and submit a report

Semester-VII

1. 7TX01 TEXTILE METHEMATICS

CO.1 Understand the Textile fibre qualitative analysis.
CO.2 Understand the basic calculation on card machanism.
CO.3 Calculate the twist in roving and yarn .
CO.4 understand various the mechanisms of winding machines.
CO.5 Understand the warp and weft preparation .
CO.6 Understand the woven fabric structure and weaving mechanisms

2. 7TX02 TEXTILE TESTING-III

CO.1 Summarize the working principles of textile testing.
CO.2 Understand the comfort and its measurement.
CO.3 Understand the serviceability of textile material
CO.4 Understand the different types of quality and labeling of textile material
CO.5 Check the colour fastness properties of textile material.
CO.6 Understand the various testing of technical textile.

3. 7TX03 CHEMICAL PROCESSING –I

CO.1 Understand the sequence of wet processing for cotton material
CO.2 Understand the various methods of bleaching and mercerizing of grey fabric processing
CO.3 Understand the classification of dyes
CO.4 Understand the principal and working of different dyeing machines
CO.5 Understand the dyeing of protein and synthetic fibres.
CO.6 Understand various dyeing faults their causes and remedies

4. 7TX04 TEXTILE MILL MANAGEMENT

CO.1 Understand the factors governing site selection of textile mill
CO.2 Understand the different kinds of plant layout
CO.3 Understand principles of scientific management
CO.4 Calculate production and man power requirement in spinning and weaving department
CO.5 Outline the factory act 1948
CO.6 Understand the marketing management.

5. 7TX05 PROFESSIONAL ELECTIVE

(i) ADVANCE NONWOVEN TECHNOLOGY

CO.1 Understand the nonwoven technology
CO.2 Summarize the various nonwoven web laying and web bonding system
CO.3 Understand the principle of working of various web laying and web bonding system
CO.4 Review the various finishing process on nonwoven fabrics
CO.5 Summarize the various nonwoven fabric characterization techniques.
CO.6 Understand the permeability characteristics of nonwoven fabric.

5. 7TX05 PROFESSIONAL ELECTIVE

(ii) ADVANCE KNITTING TECHNOLOGY

CO.1 Understand the concept of knitting
CO.2 Summarize the working Principle of plain, rib and interlock knitting machine
CO.3 Summarize the working Principle of Double needle bar warp knitting machine.
CO.4 Understand the advance knitting techniques
CO.5 Illustrate the computerized knitting programming and controls.
CO.6 Understand the development of weft knitting machine.

Semester-VIII

1. 8TX01 PROCESS CONTROL TEXTILE MANUFACTURING

CO.1 Outline the various fibre quality characteristics and fibre quality indices
CO.2 Analyze and interpret the defects occur in the spinning process
CO.3 Evaluate yarn realization, waste%, Invisible loss and cleaning efficiency
CO.4 Solve the productivity calculations
CO.5 Interpret the problems relevant to process control in the spinning and Weaving process.
CO.6 Understand the loom productivity control.

2. 8TX02 ADVANCE FABRIC MANUFACTURING TECHNOLOGY

CO.1 Generalize the functions of machine elements in unconventional weaving machines
CO.2 Understand the concept and mechanism of projectile weaving machine
CO.3 Summarize the working of each elements in rapier weaving machine
CO.4 Generalized the weft insertion cycle of fluid jet weaving machines
CO.5 understand the mechanism of multiphase weaving and 3-D weaving
CO.6 Understand the weaving of certain commercial fabric.

3. 8TX03CHEMICAL PROCESSING –II

CO.1 Understand the style and methods of printing
CO.2 understand the working principle of various printing machines
CO.3 Contrast the mechanism of various finishes
CO.4 understand the mechanism of functional finishes
CO.5 Understand the various styles of printing
CO.6 Understand the computer colour matching concept.

4. 8TX04 PROFESSIONAL ELECTIVE

(i) TECHNICAL TEXTILE

CO.1 Understand the scope and classification of technical textiles
CO.2 Outline the fibres, yarns and fabric types used in technical textiles
CO.3 Classify the properties required for fabric constituent to use in Agro textiles, Geo textiles and filtration textiles
CO.4 Understand the role of textile materials in the medical textiles product development
CO.5 Outline the functions and various requirements of protective textiles, sports textiles and transportation textiles.
CO.6 Understand the method of production and its application of cords and ropes.

4. 8TX04 PROFESSIONAL ELECTIVE-II

(ii) NEW FIBRE SCIENCE

CO.1 Demonstrate about the various aspects of new generation fibres.
CO.2 Analyze the aramid and carbon based fibres.
CO.3 Understand the fundamentals, manufacturing, properties and applications of carbon and glass fibres.

CO.4 Acquire knowledge of application new generation fibre in textile.
CO.5 Understand the high-tech fibres.
CO.6 Understand various new cellulosic fibre derivatives.

5. 8TX05 PROJECT AND SEMINAR

CO.1 Identify a problem in textile engineering field through literature survey.
CO.2 Construct a design to overcome its problems
CO.3 Make use of analysis, to confirm the identity
CO.4 Develop and analyse the product
CO.5 Experiment of the model developed.
CO.6 Summarize the results and submit a report.
CO.7 Present the technical presentation confidentially

PSOs and COs of the Chemical Engineering Department

Programme Specific Objectives (PSOs)

PO1. To impart quality education in basic Science those support Chemical Engineering and
PO2. to teach the students fundamentals in element of Chemical Engg. So as to identify, formulate and solve Chemical Engg. Process design problems.
PO3. To acquire modern experimental techniques, concepts and tools in Chemical Engg and inculcate them in the students. To train students to apply software and computational skills to formulate and solve problems related process development and economics.
PO4. To train the students to use latest information from journals, websites, new books for development of their presentation skills.
PO5. To encourage the students to understand importance of lifelong learning, professionalism and social responsibilities.

Course Outcomes

Semester-III

1. 3CH01 Applied Mathematics

CO.1 To study Ordinary differential equation
CO.2 To study Laplace transforms:
CO.3 To study Probability & Probability Distribution
CO.4 To study Complex Analysis with Milne's method, singular points, expansion of function in Taylor's and Laurent's series, Cauchy's integral theorem and formula, Residue theorem.
CO.5 To study Numerical Analysis by Solution of first order ordinary differential equations by modified Euler's, method Runge - Kutta method
CO.6 To study Vector Calculus

2. 3CH02 Process Instrumentation

CO.1 Knowledge of field instrumentations
CO.2 Dynamic modeling and system behavior study
CO.3 Design of controllers
CO.4 Application of control systems in processes

3. 3CH03 Strength of Materials:

CO.1 The learning outcomes are mechanical properties, stress strain relationship and characteristics of metals
CO.2 To Elaborate behavior of shear force and bending moment under variable loads
CO.3 Understand concept of tension and shear stress distribution on various section of beams
CO.4 Known the properties and concept of thick and thin shells subjected to pressure
CO.5 Different concept of strain energy under various loads
CO.6 Behavior of various types of beams under deflection

4. 3CH04 Chemical Engg. Thermodynamics –I

CO.1 Ability to apply fundamental concepts of thermodynamics to engineering applications
CO.2 Ability to estimate thermodynamic properties of substances in gas and liquid states

CO.3 Capability to determine thermodynamic efficiency of various energy related processes.

5. 3CH05Process Calculation

CO.1 Ability to make material balances on unit operations and processes
CO.2 Ability to perform simultaneous material and energy balances
CO.3 Understanding of the degrees of freedom analysis and its significance
CO.4 Understanding of the concept of humidity and usage of psychrometric chart.

Semester-IV

1. 4CH01 Fluid Flow Operation

CO.1 Properties of fluids and their classification
CO.2 Kinematics of flow, Description of velocity field, Stream functions, Angular velocity, Fluids in circulation, Irrational flow. Dimensional analysis; Buckingham'sÐ.theorem ; Dimensionless numbers and their physical significance
CO.3 Fluid flow: Laminar and turbulent flows; Pressure drop in pipes and tubes, pipe fittings and pipe network and friction factor, Mechanical energy balance and Bernoulli's Theorem.
CO.4 Flow measuring devices for chemical plants: Orifice meter, nozzle and venturi meters, rotameter and pitot tube.
CO.5 Flow past immersed bodies, flow through packed bed fluidized bed, Introductory concepts of two-phase flow.
CO.6 Pumping and compressing of chemical and gases Mixing and agitation of fluids. Compressible fluid flow and aerodynamics.

2. 4CH 02 Chemical Engineering thermodynamics-II

CO.1 First law of thermodynamics, equation of state, critical properties, Vander Wall's constants, Thermodynamics relations based on second law. Relation between Cp and Cv, compressibility factor and coefficient of thermal expansion,
CO.2 Partial molar and apparent molar properties, Gibbs Duhem equation, chemical potential, effect of temperature and pressure fugacity
CO.3 Colligative properties, Ebulliometric constant. Determination of molecular weight of unknown chemical substances. Solubility law, Raoult's law and Henry's law, Deviations from Raoult's law. Comparison of ideal and nonideal systems.
CO.4 Phase equilibria in non reacting multi-components, binary and ternary systems, Statistical thermodynamics, thermodynamics probability, its relation with entropy, partition function and its relation with thermodynamic functions,
CO.5 Statistical thermodynamics, thermodynamics probability, its relation with entropy, partition function and its relation with thermodynamic functions, Thermodynamics charts and their uses
CO.6 Chemical equilibrium, feasibility of chemical reaction, free energy change, Heterogeneous equilibria, various methods of calculating free enegy charge, equilibrium conversions, case study of feasibility report for manufacture of industrial chemicals.

3. 4CH03 Machine design and Drawing

CO.1 To study the general consideration for machine design
CO.2 To study Mechanical properties of Metals
CO.3 To study the Types of weldings
CO.4 To study the Drives
CO.5 To study the Gear drives
CO.6 To study the thick and thin cylinder at high pressure.

4. 4CH 04 Applied Physical Chemistry.

CO.1 Electrochemistry Ion transport in electrolytes, Electrical phenomenon at interface, Applications of electrochemistry, Electrometric titration
CO.2 Kinetic theory of gases, Postulates of kinetic theory, derivation of equation of state, Van-der-waal's equation, critical phenomenon, calculation of critical constants from Van-der-waal's equation, MaxwelBoltzmann's law of distribution of molecular speed
CO.3 Radiation chemistry and spectroscopy, Radiation chemistry, Spectroscopy
CO.4 Surface phenomenon and Catalysis, Catalysis with Concepts of acid- base catalysis, Contact theory of Heterogeneous catalysis
CO.5 Chemical Equilibrium and kinetics and molecular reaction dynamics
CO.6 Thermodynamics, Origin of First law, thermodynamic terms and their definitions, Heat ,Energy and work function Second law, Third law of Thermodynamic.

Semester-V

1. **4CH05 Mechanical operation**

CO.1 To study the versus types Size reduction, laws of energies, energy requirements.
CO.2 to see Type of Equal falling particles, equipment, Gravity settling, Sedimentation.
CO.3 to observe Storage and handling of solids, transportation.
CO.4 To study the Filtration operation and Filter calculations.
CO.5 To study Centrifuges, types and calculations, Cyclones.
CO.6 To study Adsorption, type and application, Langmuir's FreundLich;s equation,

2. **5CH01 Heat Transfer**

CO.1 Basic modes of heat transfer
CO.2 Convection and radiation at industrial level and domestic plane
CO.3 Applications of heat transfer in daily life
CO.4 Design concepts of various heat exchanger used in industry
CO.5 Evaporation significance
CO.6 Boiling and Condensation

3. **5CH02 Inorganic Chemical Technology (CEP-I)**

CO.1 Introduction to Unit Operations and Chemical Engineering Processes and Overview of Indian chemical industry, raw material and energy sources, role of catalysis, inorganic products, organic intermediates and final products.
CO.2 Pulp and Paper Industries: Types, raw materials, manufacture of pulp and paper also In detail about cement Industry and lime industry
CO.3 To study Organic chemicals based on methanol and ethanol (e.g., formaldehyde, acetaldehyde, acetic acid)
CO.4 Concept of Industrial processes for ammonia, syngas and hydrogen, methanol, chemicals from oxo-synthesis and Acids: Sulfuric acid, nitric acid, hydrochloric acid and Fertilizer Industry
CO.5 In detail of Principles of electro-chemical technological process; Electrolytic process in igneous and molten system; caustic soda, chlorine
CO.6 Detail concept of Electro-thermal Industries: aluminum, lithium, titanium. Electro-chemical sources of energy and storage.

4. **5CH03 Economics & Management**

CO.1 To study the types of Mangement
CO.2 To study the different types of market
CO.3 Introduction about globalization and taxes
CO.4 To study the function and scope of personal management
CO.5 To study the advertisement and market research
CO.6 To study the function of financial management and material management.

5. **5CH 04 Material science & Engineering**

CO.1 Stress and strain developed in various engg materials
CO.2 Inspecting various physical properties of engg materials
CO.3 To study metals and their important properties
CO.4 Corrosion and its control
CO.5 importance of polymers in industry
CO.6 Importance of ceramics and glasses in industry.

6. **5CH 05 Project management**

CO.1 Concepts of Project & Project Selection : Project & development, concept of a project, Types of project selection models, Analysis under high uncertainty, project proposals.
CO.2 Project organization and planning: organizational form, strategic variables, need for planning with project coordination
CO.3 Budgeting and Cost Estimation: estimating project budgets, improving the process of cost estimation, Life-cycle-costing, project cost reduction methods.
CO.4 Scheduling and resource allocation ; Network Techniques CPM and PERT, Gantt Charts, resource constraints, resource loading, resource leveling,
CO.5 Project Control: monitoring and information systems MIS, purposes of control, types of control processes, project cost overruns and cost control, project audit.
CO.6 Issues in project Management: Multicultural, issues, project cost escalation, conflict zones in project management,

7. **5CH06 Communication Skill**

CO.1 Demonstrate critical and innovative thinking, Display competence in oral, written, and visual communication.
CO.2 Apply communication theories, Show an understanding of opportunities in the field of communication.
CO.3 Use current technology related to the communication field, Respond effectively to cultural communication differences, Communicate ethically,Demonstrate positive group communication exchanges.

Semester-VI

1. 6CH01 Chemical Engineering Operation (Mass Transfer-I)

CO.1 Students will learn about the diffusion mass transfer
CO.2 Operation of cooling tower will be clearly understood
CO.3 Operation of Dryer will be understood
CO.4 Student will understand the mechanism of crystallization and absorption
CO.5 Principles of crystallization process of crystallizations and terminology membrane separation principle concept and application.
CO.6 Different thermodynamics cycle such as vapor compression cycle, refrigeration cycle, Rankin power cycle.

2. 6 CH 02: Organic Chemical Technology (Chemical Engineering Process –II)

CO.1 Fermentation Industries: Industrial alcohol, absolute alcohol, wine, Organic acid production: Acetic acid, lactic acid, citric acid.
CO.2 Polymerization Industries: Polyethylene, polypropylene, PVC, polyester synthetic fibers, Rubber Industries: Natural rubber, synthetic rubber, SBR.
CO.3 Petroleum Refinery: Refining of crude oil, products of refining, Petrochemicals: Significant petrochemicals and their derivatives.
CO.4 Nitration: Nitration agents, kinetics, mechanism, industrial preparation of nitrobenzene, nitronaphthalene, chloronitronaphthalene, nitroacetanilide, Sulphonation and Sulfation: agents, kinetics, mechanism, technical preparation of aliphatic sulphonates, sulphonation of lauryl alcohol, dimethyl ether
CO.5 Hydrogenation and hydrolysis
CO.6 Halogenation: Technical preparation of halogen compounds- allyal chloride, DDT, BHC, chlorobenzene, vinyl chloride, Oxidation: Liquid and vapour phase oxidation, technical oxidation of isopropyl benzene, naphthalene, benzene, ethyl benzene, naphthalene sulfonic acid

3. 6CH03 Computer Programming & Application

CO.1 Numerical solution of first order differential equations with initial condition, Euler's method,Runge-Kutta method.
CO.2 Systems of linear equations, solution by the method of determinants, matrix inversion for the solution of linear equations, Gauss elimination method
CO3: Roots of algebraic and transcendental equation, iteration methods, Regula-Falsi method, Newton-Raphson method..

CO.3 Regression analysis - Least Square, error approach, approximation by Chebychev orthogonal polynomial
CO.4 Elements of optimization techniques, single variable function, optimization-direct search,
CO.5 Computer programming in modular form, use of subroutine libraries, Block diagrams of preliminary aids in programming.

4. 6CH04 Process Equipment Design & Drawing

CO.1 Knowledge of basics of process equipment design and important parameters of equipment design
CO.2 Ability to design internal pressure vessels and external pressure vessels
CO.3 Ability to design special vessels (e.g. tall vessels) and various parts of vessels (e.g. heads)
CO.4 Knowledge of equipment fabrication and testing methods.

5. 6CH05 Non conventional energy source

CO.1 To explain various concept of Renewable energy solar energy
CO.2 To choose the appropriate renewable energy as an alternate for conventional power in any application that is wind energy
CO.3 Biomass resources and their classification chemical constituents and physicochemical

characteristics of biomass - Biomass conversion processes - Thermo chemical conversion:

CO.4 Thermodynamics and electrochemical principles - basic design, types, and applications, production methods, hydrogen and fuel cells and Biophotolysis

CO.5 Other Types of Energy that is Ocean energy resources, principles of ocean thermal energy conversion systems, ocean thermal power plants, principles of ocean wave energy conversion and tidal energy conversion

CO.6 Analysis of the cost effectiveness of renewable energy sources, present status, comparison, forecast.

6. 6CH08 Mini Project

The learning outcomes are assessed through an oral examination assessed by one internal examiner and one external examiner.

Semester-VII

1. 7CH-01 Chemical Engineering Operation-III (Mass Transfer-II)

CO.1 To study the liquid – liquid extraction process for different mixture solution

CO.2 To study the extractor for liquid-liquid Extraction process

CO.3 To study the Leaching process for solid material

CO.4 To study different types of Distillation method

CO.5 To study minimum And maximum reflux ratio for process

CO.6 To study the design of Packed distillation column.

2. 7CH02 Chemical Reaction Engineering-I

CO.1 Develop rate laws for homogeneous reactions

CO.2 Design of ideal reactors for single and complex reactions

CO.3 Develop skills to choose the right reactor among single, multiple, recycle reactor, etc. schemes.

CO.4 Design of non-isothermal reactors and the heat exchange equipment required.

3. 7CH03 Process Dynamic & Control

CO.1 Transmit response of control systems, optimization.

CO.2 Stability, Root locus, Transient response. Application of root locus to control system. Frequency response methods, Design of Nyquist criteria.

CO.3 Process applications, Controller mechanisms

CO.4 Development and control systems for various chemical industries case studies

CO.5 Introduction on advanced control techniques as feed forward, control, cascade control, ratio control, adaquative control and digital computer control.

CO.6 Dynamics and control of chemical equipments such as heat exchangers, distillation columns, absorption column, etc

4. 7CH 04 Industrial Waste Treatment.

CO.1 Understand the different types of wastes generated in an industry, their effects on living and non-living things.

CO.2 Understand environmental regulatory legislations and standards and climate changes.

CO.3 Understand about the quantification and analysis of wastewater and treatment.

CO.4 Understand the different unit operations and unit processes involved in conversion of highly polluted water to potable standards.

CO.5 Understand the atmospheric dispersion of air pollutants, and operating principles, design calculations of particulate control devices.

CO.6 Understand about analysis and quantification of hazardous and nonhazardous solid waste wastes, treatment and disposal.

5. 7CH04 Plant Design & Project Engineering

CO.1 Understand concepts of process design and project management

CO.2 Synthesize feasible and optimum flow-sheet

CO.3 Estimation of capital investment, total product costs, and profitability.

CO.4 Optimum design of equipments based on economics and process considerations.

Semester-VIII

1. 8CH01 Transport Phenomena

CO.1 Understanding of transport processes.

CO.2 Ability to do heat, mass and momentum transfer analysis.

CO.3 Ability to analyze industrial problems along with appropriate boundary conditions.

CO.4 Ability to develop steady and time dependent solutions along with their limitations.

2. 8CH 02 Chemical Reaction Engineering –II

CO.1 To distinguish between various RTD curves and predict the conversion from a non-ideal reactor using tracer information.
CO.2 Develop rate laws for heterogeneous reactions
CO.3 Design of reactors for non-catalytic and catalytic reactions.
CO.4 Design of towers for gas–liquid operations with and without chemical reaction.

3. 8CH03 System Modeling

CO.1 Understand the important physical phenomena from the problem statement
CO.2 Develop model equations for the given system
CO.3 Demonstrate the model solving ability for various processes/unit operations
CO.4 Demonstrate the ability to use a process simulation
CO.5 Identify different types of optimization problems
CO.6 Understanding of different optimization technique and Ability to solve various multivariable optimization problems.

4. 8CH04 Elective * (Petrochemical technology)

CO.1 History, Economics and future of petrochemical energy crises
CO.2 First generation Petrochemicals, olefins, alkenes and alkynes
CO.3 Second generation petrochemicals: synthesis and properties
CO.4 Third generation petrochemicals: Synthesis and properties
CO.5 Miscellaneous petrochemicals like petroleum, proteins, and synthesis, detergent, resin and rubber chemicals
CO.6 Technological forecasting of petroleum and petrochemicals

5. 8CH06 project & Seminar

Seminar

The learning outcomes are assessed through quality of searching the topics, presentation skills, understanding and report writing.