PROGRAM OUTCOMES (PO's)

Engineering Graduates will be able to:

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

PO2: **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

1st SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**C Programming for Problem Solving**
Course Code	**18CPS13/23**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Understand the basic components of a computer system and the concepts related to software, hardware and networking, structure of a C program
CO2	Develop conditional and iterative statements to write C programs
CO3	Use and implement data structures like arrays to obtain solutions for different sorting and searching techniques.
CO4	Modularize the given problem using functions with recursion
CO5	Understand and develop c programs using pointers, strings and structures
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**C Programming Laboratory**
Course Code	**18CPL17/27**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Illustrate the knowledge of various parts of a computer.
CO2	Develop flowcharts and algorithms for a given problem.
CO3	Understand basic structure of the C programming, declaration and usage of variables.
CO4	Develop C programs using iterative and conditional statements using arrays.
CO5	Develop modular programming skills using pointers, strings and structures.

2nd SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**C Programming for Problem Solving**
Course Code	**18CPS13/23**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Understand the basic components of a computer system and the concepts related to software, hardware and networking, structure of a C program
CO2	Develop conditional and iterative statements to write C programs
CO3	Use and implement data structures like arrays to obtain solutions for different sorting and searching techniques.
CO4	Modularize the given problem using functions with recursion
CO5	Understand and develop c programs using pointers, strings and structures
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**C Programming Laboratory**
Course Code	**18CPL17/27**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Illustrate the knowledge of various parts of a computer.
CO2	Develop flowcharts and algorithms for a given problem.
CO3	Understand basic structure of the C programming, declaration and usage of variables.
CO4	Develop C programs using iterative and conditional statements using arrays.
CO5	Develop modular programming skills using pointers, strings and structures.

3rd SEMESTER	
Course Name	**Transform Calculus, Fourier Series And Numerical Techniques**
Course Code	**18MAT31**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
CO2	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
CO3	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
CO4	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.
CO5	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**III**
Course Name	**Data Structures And Applications**
Course Code	**18CS32**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Apply the fundamental concepts of data structures and their applications essential for programming/problem solving.

CO2	Make use of stacks to evaluate mathematical expressions and queues for mazing problem.
CO3	Choose linked lists to implement of lists, stacks, queues, polynomials and sparse matrix.
CO4	Construct various types of trees using linked lists and apply tree traversal methods for expressions evaluation.
CO5	Utilize BFS, DFS, searching, sorting, hashing and files concepts to develop various applications.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**III**
Course Name	**Analog And Digital Electronics**
Course Code	**18CS33**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Design the applications of analog circuits using photo devices, timer IC, power supply and regulator and IC op-amp for various applications such as Schmitt trigger, relaxation oscillator etc..
CO2	Choose the Combinational Logic circuits and simplification techniques such as Karnaugh Maps, Quine McClusky Techniques for designing various digital circuits.
CO3	Construct different circuits using Decoders, Encoders, Multiplexers, Adders and Subtractors.
CO4	Make use of the latches, Flip-Flops, HDL programs for constructing and simulating sequential circuits.
CO5	Obtain the steps to design counters and registers
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**III**

Course Name	**Computer Organization**
Course Code	**18CS34**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Construct architecture & organization of a computer system, machine instruction formats and addressing modes.
CO2	Build techniques for I/O communication with standard bus interfaces and interrupt service routines.
CO3	Identify different memories and memory mapping techniques.
CO4	Design different Arithmetic operational units.
CO5	Derive control sequences for hardwired and micro-program control units for both single and multi bus processors.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**III**
Course Name	**Software Engineering**
Course Code	**18CS35**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Able to outline the software engineering principles and illustrate the activities involved in building large software and also illustrating the process of requirements, requirements classification.
CO2	Demonstrate Object Orientation Modelling Concepts and Class Modelling
CO3	Analyze the system models, examine the object oriented design patterns and list out the open source development tools
CO4	To choose the appropriate software testing type, also identify the significance of software maintenance.
CO5	To choose the right software pricing and measurements of software metrics. Also to identify the software quality parameters and standards

Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**III**
Course Name	**Discrete Mathematical Structures**
Course Code	**18CS36**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Interpret propositional and predicate logic in knowledge representation and truth verification.
CO2	Demonstrate the properties of integers and fundamental principle of counting in discrete structures.
CO3	Utilize the understandings of relations and functions and be able to determine their properties
CO4	Solve the problems using the concept of graph theory and trees properties
CO5	Solve problems using recurrence relations and Principle of Inclusion and Exclusion
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**III**
Course Name	**Analog And Digital Electronics Laboratory**
Course Code	**18CSL37**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Utilize Operational Amplifier and timers for different applications also make use of simulation package to design circuits
CO2	Build window comparator and simulate.
CO3	Choose the Combinational Logic circuits for realizing adders, subtractors and multiplexers and also simulate the same
CO4	Design MSJK Flip Flop, also make use of simulation package to design

	circuits.
CO5	Construct code converters circuits, synchronous and asynchronous counters.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**III**
Course Name	**Data Structures Laboratory**
Course Code	**18CSL38**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Experiment with array operations and string application programs.
CO2	Construct the programs to implement stacks, queues and their applications.
CO3	Develop the programs to implement various operations of linked lists and their applications.
CO4	Make use of tree concepts to implement programs for their applications
CO5	Apply DFS/BFS method for graph traversals and linear probing approach for hashing programs
4th SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**IV**
Course Name	**Complex Analysis, Probability And Statistical Methods**
Course Code	**18MAT41**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
CO2	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.

CO3	Fit a suitable curve for given data and analyze the relationship between two variables using statistical methods.
CO4	Utilize conformal transformation and complex integral arising in fluid flow visualization and image processing.
CO5	Apply the knowledge of joint probability distributions in attempting engineering problems for feasible random events and also Understand the concepts of sampling theory and apply it to related real life problems.
Class	**COMPUTER SCIENCE ENGINEERING**
Semester	**IV**
Course Name	**Design And Analysis Of Algorithms**
Course Code	**18CS42**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Describe computational solution to well-known problems like searching, sorting etc.
CO2	Estimate the computational complexity of different algorithms
CO3	Devise an algorithm using appropriate design strategies for problem solving.
CO4	Analyze space and time tradeoffs for algorithms using both approaches
CO5	Develop solutions using Backtracking for some of NP complete problems
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**IV**
Course Name	**Operating Systems**
Course Code	**18CS43**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify various types of Operating Systems, its need and services.

CO2	Apply suitable techniques for process scheduling, synchronization and thread management.
CO3	Make use of different methods for preventing or avoiding deadlock and managing memory efficiently.
CO4	Interview the benefits of virtual memory; explore file system and directory structures.
CO5	Experiment with different disk management schemes and realize the concepts of Operating System with case studies
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**IV**
Course Name	**Microcontroller And Embedded Systems**
Course Code	**18CS44**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Apply ARM processor architecture concept to the assembly language programming
CO2	Apply ARM processor programming concept to solve complex problem
CO3	Illustrate the Applicability of the Embedded system
CO4	Illustrate the Design process of Embedded system
CO5	Comprehend the real time operating system used for the Embedded system
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**IV**
Course Name	**Object Oriented Concepts**
Course Code	**18CS45**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Learn fundamental features of object oriented language and programming in

	C++.
CO2	Learn how to set up JDK environment to create, debug and run simple Java programs.
CO3	Create and handle run-time errors using Exception handling mechanism, create and work with packages and interfaces.
CO4	Create multi-threading programs and event handling mechanisms.
CO5	Introduce event driven Graphical User Interface (GUI) programming using Applets.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**IV**
Course Name	**Data Communication**
Course Code	**18CS46**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the different types of network topologies and protocols.
CO2	Construct the different line coding schemes, Transmission modes.
CO3	Apply different error detection and correction methods for digital data and construct the different switching circuits, link addressing.
CO4	Distinguish different data link protocols and select suitable media access control protocol for data transmission.
CO5	Identify the architecture of wired and wireless Local Area Networks (LANs)
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**IV**
Course Name	**Design And Analysis Of Algorithm Laboratory**
Course Code	**18CSL47**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**

CO1	Experiment with object oriented concepts of JAVA programming language.
CO2	Construct the JAVA program by using the approach of Divide and Conquer such as Merge Sort, Quick Sort.
CO3	Make use of Greedy method to solve knapsack and minimum cost spanning tree using JAVA programming.
CO4	Apply Dynamic Programming techniques to solve All pair's shortest path (Floyd's algorithm) and Travelling sales person (TSP) problem using JAVA programming.
CO5	Choose the Backtracking techniques to solve Sum of subset problem and Hamiltonian cycles using JAVA programming.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**IV**
Course Name	**Microcontroller And Embedded Systems Laboratory**
Course Code	**18CSL48**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Demonstrate different instructions of ARM7/TDMI/LPC2148 using Keil µvision-4 tool/compiler.
CO2	Apply the knowledge of assembly language programming to solve problems using ARM7/TDMI/LPC2148 instruction set.
CO3	IIlustrate various ports, configuration registers of 32 bit microcontroller ARM7/TDMI/LPC2148.
CO4	Illustrate various input/output devices to interface with ARM7/TDMI/LPC2148 evaluation board.
CO5	Demonstrate interfacing of various hardware devices using embedded C and evaluation board ARM7/TDMI/LPC2148.
Class	**COMPUTER SCIENCE & ENGINEERING**

Semester	**III/IV**
Course Name	**Consitution of India Professional ethics and Human Rights**
Course Code	**18CPH49**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Have constitutional knowledge and legal literacy.
CO2	Understand Engineering and Professional ethics and responsibilities of Engineers.
CO3	Understand the the cybercrimes and cyber laws for cyber safety measures.
5TH SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**Management And Entrepreneurship For It Industry**
Course Code	**18CS51**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Outline the functional areas of management, evolution of management theories and classifying planning, organizing and staffing
CO2	Make use of directing and controlling principles in management also identifying the motivational theories and developing leadership styles
CO3	Utilize the entrepreneurial types, roles and its characteristics in the Indian business and also identify business opportunities in terms of market, technical, financial and social feasibility
CO4	Examine the need of the project. Dissect the significance and content formulation of project report. Classify Enterprise Resource Planning and Supply Chain Management

CO5	Classify the characteristics, steps and policies in establishing micro and small enterprises. Examine the case studies, different intuitional support and importance of IPR
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**COMPUTER NETWORKS AND SECURITY**
Course Code	**18CS52**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Explain principles of application layer protocols
CO2	Recognize transport layer services and infer UDP and TCP protocols
CO3	Classify routers, IP and Routing Algorithms in network layer
CO4	Apply the Principles of network security and encryption
CO5	Describe Multimedia Networking protocols their usage in watching multimedia video communication
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**Database Management System**
Course Code	**18CS53**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the different relational database management systems and it concepts.
CO2	Design entity-relationship diagrams to represent simple database application scenarios. Convert entity-relationship diagrams into relational tables.
CO3	Design and implement a database schema for a given problem-domain

CO4	Apply the concepts of Normalization and design database which possess no anomalies
CO5	Make use of Transaction processing concepts to handle concurrency control, recovery and security.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**Automata Theory And Computability**
Course Code	**18CS54**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Understand the basic concepts and Apply them in solving formal languages, automata and grammar types, as well as the use of formal languages and reduction in normal forms
CO2	Construct Finite-State Machines-Deterministic Finite-State Automata, Nondeterministic Finite-State Automata.
CO3	Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata.
CO4	Construct push down automata and Turing machines performing tasks of moderate complexity.
CO5	Understand the concepts and Solve Undecidability and Post's Correspondence problem
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**Application Development Using Python**
Course Code	**18CS55**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**

CO1	Make use of Python syntax and semantics to work on control statements and functions
CO2	Utilize the concepts of Strings and File Systems
CO3	Build Python programs using core data structures like Lists, Dictionaries and use Regular Expressions in python.
CO4	Make use of the concepts of Object-Oriented Programming as used in Python.
CO5	Construct exemplary applications related to Network Programming, Web Services and Databases in Python.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**Unix Programming**
Course Code	**18CS56**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the UNIX features, architecture, structure and organization of UNIX file system.
CO2	**Construct** the regular expression for grep commands and implement shell programs.
CO3	**Develop** system programs using different categories of API's.
CO4	**Build** Interprocess communication using various techniques.
CO5	**Utilize** POSIX API for implementing signals.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**Computer Network Laboratory**
Course Code	**18CSL57**
At the end of this course, the student will be able to:	

Course Outcome #	**Course Outcome**
CO1	Utilize socket program using TCP & UDP
CO2	Develop security algorithm to provide network security
CO3	Make use of CRC to develop the code for Data link layer protocol
CO4	Develop the performances of Routing protocol
CO5	Build Wired and Wireless network using network simulator
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**DBMS Laboratory With Mini Project**
Course Code	**18CSL58**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Construct tables with different data types and constraints.
CO2	Experiment with SQL DML/DDL commands querying a table once it is populated
CO3	Implement a database using trigger and stored procedure.
CO4	18CSL58.CO4: Develop the queries and views for the given database
CO5	Demonstrate solutions for real world problems using the above learnt concepts.
6TH SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**
Course Name	**System Software and Compilers**
Course Code	**18CS61**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**

CO1	Identify the functions of System Software such as Assemblers and loaders
CO2	Make use of the Lexical analysis phase of the compiler to generate tokens
CO3	Utilize different parsers to parse the given input string
CO4	Build Lex and YACC programs
CO5	Construct the syntax directed translation, intermediate code and target code for any given input code
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**
Course Name	**Computer Graphics and Visualization**
Course Code	**18CS62**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Design and implement algorithms for 2D graphics primitives and attributes.
CO2	Construct Geometric transformations on both 2D and 3D objects.
CO3	Apply concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models.
CO4	Design suitable hardware and software for developing graphics packages using OpenGL
CO5	Interview the representation of curves, surfaces, Color and Illumination models.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**
Course Name	**Web Technology and Its Applications**
Course Code	**18CS63**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Adapt HTML and CSS syntax and semantics to build web pages.

CO2	Construct and visually format tables and forms using HTML and CSS
CO3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.
CO4	Appraise the principles of object oriented development using PHP with CSS, html
CO5	Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**
Course Name	**System Modelling and Simulations**
Course Code	**18CS645**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the System components and apply analytical modeling methods to simulate the activities of systems- Queuing, inventory & reliability.
CO2	Make use of the characteristics of a Discrete system and Event scheduling time advance algorithm to model the Single Queuing Simulation in Java. Identify useful statistical models, discrete and continuous distributions.
CO3	Model the behaviour of M/G/1 queue behaviour with measures of performance of queuing systems, Random number and variate generation, Tests for random numbers.
CO4	Identify the steps in Input Modelling by choosing parameters, Solve Goodness of fit tests problems.
CO5	Apply effective verification, calibration and validation of methods, Plan Optimization through Simulation.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**

Course Name	**Supply Chain Management**
Course Code	**18CS653**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	
CO2	
CO3	
CO4	
CO5	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**
Course Name	**System Software and Compiler Design Laboratory**
Course Code	**18CSL66**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	**Utilize** LEX and YACC to execute programs to recognize valid arithmetic expression, evaluation of expression, to recognize strings
CO2	**Construct** LL(1) parser for given grammar
CO3	**Make use of** triples to generate machine code
CO4	**Develop** programs for CPU Scheduling, deadlock detection, page replacement policies
CO5	**Choose** LEX and YACC to eliminate comment lines and recognize valid identifiers
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**
Course Name	**Computer Graphics & Visualization Laboratory**
Course Code	**18CSL67**

At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Develop programs using OpenGL Graphics Primitives and attributes.
CO2	Design and implement algorithms for Geometric transformations on 2D objects and 3D objects
CO3	Make use of line drawing and clipping algorithms using OpenGL functions.
CO4	Construct programs using double buffers for spinning the objects and viewing API to demonstrate lighting and shading concepts.
CO5	Experiment with various OpenGL APIs to develop applications.
7TH SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VII**
Course Name	**Web Technology And Its Applications**
Course Code	**17CS71**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Adapt HTML and CSS syntax and semantics to build web pages.
CO2	Construct and visually format tables and forms using HTML and CSS
CO3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.
CO4	Appraise the principles of object oriented development using PHP with CSS, html
CO5	Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VII**
Course Name	**Advanced Computer Architectures**

Course Code	**17CS72**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the different parallelism models, network topologies and performance of parallel architecture.
CO2	Utilize various processor technologies and supporting memory hierarchy in context of parallelism
CO3	Make use of the hardware components and Pipelining superscalar technique to improve performance.
CO4	Choose the suitable synchronization mechanism, computer organization and parallel processing architectures.
CO5	Build different parallel programming models and Instruction level Parallelism.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VII**
Course Name	**Machine Learning**
Course Code	**17CS73**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the fundamental concepts of Machine learning and implement Find-S algorithm
CO2	Make use of the fundamental concepts of Machine learning to learn decision tree representation for ID3 algorithm and Perceptrons
CO3	Utilize the neural network, Bayes Classifier and EM algorithm to solve the problems in Machine Learning.
CO4	Examine Candidate elimination algorithm, EM & K- Means algorithm and Instance based Learning for problems appear in Machine Learning

CO5	Inspect Back propagation algorithm, Estimating Hypotheses, and Reinforcement learning
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VII**
Course Name	**Information And Network Security**
Course Code	**17CS743**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the various classic symmetric primitives of cryptography.
CO2	Design cryptographic hash functions for digital signatures.
CO3	Construct cryptographic protocols for authentication.
CO4	Determine the need for key management.
CO5	Utilize cryptographic primitives for various applications
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VII**
Course Name	**Storage Area Networks**
Course Code	**17CS754**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Illustrate the concept of data center and data protection
CO2	Interpret storage networking technologies IP SAN and FC SAN
CO3	Develop BC technologies and Back up recovery and replication
CO4	Analyze cloud computing characteristics and technologies
CO5	Determine secure storage infrastructure and ILM
Semester	**VII**
Course Name	**Machine Learning Lab**
Course Code	**17CSL76**

At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Make use of relevant data sets in implementing concept learning algorithms
CO2	Utilize Baye's theorem to classify real world data
CO3	Make use of decision tree and K-nearest neighbour concept to predict the input data
CO4	Examine artificial neural network using back propagation algorithm
CO5	Evaluate regression algorithms for solving problems using machine learning.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VII**
Course Name	**Web Technology Lab With Mini Project**
Course Code	**17CSL77**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Apply the concepts of HTML and JavaScript to design and develop dynamic web pages with good aesthetic sense of designing and latest technical know-how's.
CO2	Make use of the concepts of HTML5, JavaScript and CSS to design and develop dynamic web pages.
CO3	Identify the use of Web Application Terminologies, Internet Tools other web services using the concept of XML and CSS style sheets.
CO4	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.
CO5	Inspect how to link and publish web sites using PHP, HTML5, CSS and SQL.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VII**
Course Name	**Project Phase I + Seminar**

Course Code	**17CSP78**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify prospective problems encountered in the societal world and define the problem statement accordingly
CO2	Analyze the problem statement by carrying out literature survey
CO3	Plan to accomplish the project by working individual and also as a team
CO4	Develop effective ideas to portray the proposed project with their communication skill
CO4	Identify basic requirements, cost for the proposed project
8TH SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VIII**
Course Name	**Internet of Things And Applications**
Course Code	**17CS81**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Illustrate the impact and challenges posed by IoT networks leading to new architectural models.
CO2	Identify the deployment of smart objects and the technologies required to connect them to the network.
CO3	Choose the role of IoT protocols for efficient network communication.
CO4	Identify different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.
CO5	Develop the need for Data Analytics and Security in IoT.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VIII**
Course Name	**Big Data Analytics**

Course Code	**17CS82**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the Applications of Business Intelligence, Data Warehousing, Data Mining and Data Visualization.
CO2	Apply the different Data Mining Techniques such Decision Trees, Regression, Artificial Neural Networks, Cluster Analysis and Association Rule.
CO3	Identify the Applications of Text and Web Mining and also Utilize the Machine learning Techniques such as Naïve-Bayes Analysis and Support Vector Machines
CO4	Make use of the basic concepts of Hadoop Distributed File system and Map Reduce programming.
CO5	Utilize the Essential Hadoop Tools and Hadoop administration procedures.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VIII**
Course Name	**System Modeling and Simulation**
Course Code	17CS834
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the System components and apply analytical modeling methods to simulate the activities of systems- Queuing, inventory & reliability.
CO2	Make use of the characteristics of a Discrete system and Event scheduling time advance algorithm to model the Single Queuing Simulation in Java. Identify useful statistical models, discrete and continuous distributions.
CO3	Model the behaviour of M/G/1 queue behaviour with measures of performance of queuing systems, Random number and variate generation, Tests for random numbers.

CO4	Identify the steps in Input Modelling by choosing parameters, Solve Goodness of fit tests problems.
CO5	Apply effective verification, calibration and validation of methods, Plan Optimization through Simulation.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VIII**
Course Name	**Internship / Professional Practice**
Course Code	**17CS84**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify, write down and carry out performance objective related to the internship task assigned
CO2	Develop effective management of personal behaviour and ethics.
CO3	Evaluate interest and abilities in their field of study
CO4	Develop communication inter personal and other critical skills in job internal process.
CO5	Discover record of work experience, adopt to the work habits and develop attitude necessary for job success.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VIII**
Course Name	**Project Work Phase II**
Course Code	**17CSP85**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Design of the system as per proposed specifications.

CO2	Develop and implement the system as per proposed design methodology.
CO3	Compare the findings of proposed system with competing systems using appropriate technology
CO4	Create appropriate technical documentation going in-hand with discipline
CO5	Build team work and communication skills.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VIII**
Course Name	**Seminar**
Course Code	**17CSS86**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the recent trends and technologies in the area of Computer Science & Engineering and inculcation of discipline, etiquette.
CO2	Construct the problem statement after performing the literature survey using various resources and interpret the gained knowledge
CO3	Develop skills in presentation and discussion of research topics in an open forum
CO4	Apply thinking capabilities to defend the queries through gained knowledge.
CO5	Develop skills to prepare the technical report.
PG Courses	
1st SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**Mathematical Foundations af Computer Science**
Course Code	**20SCS11**
At the end of this course, the student will be able to:	

Course Outcome #	**Course Outcome**
CO1	Understand the numerical methods to solve and find the roots of the equations.
CO2	Apply the technique of singular value decomposition for data compression, least square approximation in solving inconsistent linear systems
CO3	Understand vector spaces and related topics arising in magnification and rotation of images.
CO4	Utilize the statistical tools in multi variable distributions.
CO5	Use probability formulations for new predictions with discrete and continuous RV's
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**Artificial Intelligence and Machine Learning**
Course Code	**20SCS12**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Define Artificial intelligence and identify problems for AI.
CO2	Characterize the search techniques to solve problems and recognize the scope of classical search techniques
CO3	Define knowledge and its role in AI. Demonstrate the use of Logic in solving AI problems
CO4	Demonstrate handling of uncertain knowledge and reasoning in probability theory
CO5	Understanding of Learning methods
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**Advances In Data Base Management**

Course Code	**20SCS13**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Select the appropriate high-performance database like parallel and distributed database
CO2	Infer and represent the real-world data using object-oriented database
CO3	Interpret rule set in the database to implement data warehousing of mining
CO4	Discover database for recent applications database for better interoperability
CO5	Design database for recent applications database for better interoperability
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**Advanced Algorithms**
Course Code	**20SCS14**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Design and apply iterative algorithms.
CO2	Design and apply recursive algorithms.
CO3	Design and implement optimization algorithms in specific applications.
CO4	Design appropriate shared objects and concurrent objects for applications.
CO5	Design appropriate concurrent objects for applications.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**Internet Of Things and Applications**
Course Code	**20SCS15**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Develop schemes for the applications of IOT in real time scenarios

CO2	Manage the Internet resources
CO3	Model the Internet of things to business
CO4	Understand the practical knowledge through different case studies
CO5	Understand data sets received through IoT devices and tools used for analysis
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**Algorithms And Database Management System Laboratory**
Course Code	**20SCSL16**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Compare and pick out the right type of software testing process for any given real-world problem
CO2	Carry out the software testing process in efficient way and Establish a quality environment as specified in standards for developing quality software
CO3	Model and represent the real-world data using object-oriented database
CO4	Embed the rules set in the database to implement various features of ADBMS
CO5	Choose, design and implement recent applications database for better interoperability
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**Research Methodology And IPR**
Course Code	**20RMI17**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Discuss research methodology and the technique of defining a research problem
CO2	Explain the functions of the literature review in research, carrying out a literature search, developing theoretical and conceptual frameworks and

	writing a review.
CO3	Explain various research designs, sampling designs, measurement and scaling techniques and also different methods of data collections.
CO4	Explain several parametric tests of hypotheses, Chi-square test, art of interpretation and writing research reports
CO5	Discuss various forms of the intellectual property, its relevance and business impact in the changing global business environment and leading International Instruments concerning IPR
2nd SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Data Science**
Course Code	**20SCS21**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Define data science and its fundamentals
CO2	Demonstrate the process in data science
CO3	Explain machine learning algorithms necessary for data sciences
CO4	Illustrate the process of feature selection and analysis of data analysis algorithms
CO5	Visualize the data and follow of ethics
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Semantic Web and Social Networks**
Course Code	**20SCS22**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**

CO1	Demonstrate the semantic web technologies like RDF Ontology and others
CO2	Learn the various semantic web applications
CO3	Identify the architectures in building social networks
CO4	Identify the and challenges in building social networks
CO5	Analyse the performance of social networks using electronic sources
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Block Chain Technology**
Course Code	**20SCS23**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Understand the types, benefits and limitation of blockchain.
CO2	Explore the blockchain decentralization and cryptography concepts.
CO3	Enumerate the Bitcoin features and its alternative options.
CO4	Describe and deploy the smart contracts
CO5	Summarize the blockchain features outside of currencies.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Cloud Computing**
Course Code	**20SCS243**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Compare the strengths and limitations of cloud computing
CO2	Identify the architecture, infrastructure and delivery models of cloud computing
CO3	Apply suitable virtualization concept.

CO4	Choose the appropriate cloud player and Address the core issues of cloud computing such as security, privacy and interoperability
CO5	Design Cloud Services Set a private cloud
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Object Oriented Design**
Course Code	**20SCS252**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the heuristics of the object-oriented programming
CO2	Explain the fundamentals of OOP
CO3	Examine fine object-oriented relations
CO4	Explain the role of Physical Object-Oriented Design
CO5	Make use of Heuristics in The Use of Heuristics in Object-Oriented Design
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Data Science Laboratory**
Course Code	**20SCSL26**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Understand the usage of datasets
CO2	Demonstration of data visualization methods
CO3	Understanding and implementation of logistic regression algorithm
CO4	Understanding and implementation of decision tree algorithm
CO5	Understanding and implementation of clustering algorithm
Class	**COMPUTER SCIENCE & ENGINEERING**

Semester	**II**
Course Name	**Technical Seminar**
Course Code	**20SCS27**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the recent trends and technologies in the area of Computer Science & Engineering and inculcation of discipline, etiquette.
CO2	Construct the problem statement after performing the literature survey using various resources and interpret the gained knowledge
CO3	Develop skills in presentation and discussion of research topics in an open forum
CO4	Apply thinking capabilities to defend the queries through gained knowledge.
CO5	Develop skills to prepare the technical report.
3rd SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**III**
Course Name	**Machine Learning Techniques**
Course Code	**18SCS31**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Choose the learning techniques with this basic knowledge.
CO2	Apply effectively neural networks and genetic algorithms for appropriate applications.
CO3	Apply effectively genetic algorithms for appropriate applications.
CO4	Apply bayesian techniques and derive effectively learning rules.
CO5	Choose and differentiate reinforcement and analytical learning techniques
Class	**COMPUTER SCIENCE & ENGINEERING**

Semester	**III**
Course Name	**Information And Network Security**
Course Code	**18SCS322**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
CO2	Able to design a security solution.
CO3	Identify the security issues in the network and resolve it.
CO4	Resolve the security issues in network using suitable protocols.
CO5	Evaluate security mechanisms using rigorous approaches, including theoretical
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**III**
Course Name	**Software Project Planning & Management**
Course Code	**18SCS332**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities
CO2	Apply risk management analysis techniques that identify the factors that put a project at risk and to quantify the likely effect of risk on project timescales
CO3	Identify the resources required for a project and to produce a work plan and resource schedule and Monitor the progress of a project and to assess the risk of slippage, revising targets counteract drift
CO4	Use appropriate metrics to management the software development outcome
CO5	Develop research methods and techniques appropriate to defining, planning and carrying out a research project within your chosen specialist area within the management of software projects.

Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**III**
Course Name	**Evaluation Of Project Phase -1**
Course Code	**18SCS34**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify prospective problems encountered in the societal world and define the problem statement accordingly
CO2	Analyze the problem statement by carrying out literature survey
CO3	Plan to accomplish the project by working individual and also as a team
CO4	Develop effective ideas to portray the proposed project with their communication skill
CO5	Identify basic requirements, cost for the proposed project
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**III**
Course Name	**Internship**
Course Code	**18SCSI35**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify, write down and carry out performance objective related to the internship task assigned
CO2	Develop effective management of personal behaviour and ethics.
CO3	Evaluate interest and abilities in their field of study
CO4	Develop communication inter personal and other critical skills in job internal process.
CO5	Discover record of work experience, adopt to the work habits and develop attitude necessary for job success.

K. S. Institute of Technology
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE OUTCOMES- 2020-21 YEAR

Course code 18MAT11	Course: CALCULUS AND LINEAR ALGEBRA
18MAT11.1	**Make use** of matrix theory for solving system of linear equations and compute Eigen values and Eigen vectors required for matrix diagonalization process.
18MAT11.2	**Establish** the notation of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.
18MAT11.3	**Apply** the knowledge of calculus to solve problems related to polar curves and its applications in determining the bending of a curve.
18MAT11.4	**Solve** first order linear/nonlinear differential equations analytically using standard methods.
18MAT11.5	**Utilize t**he concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
Course code 18CHE12	**Course: ENGINEERING CHEMISTRY**
18CHE12.1	**Make use of** Electrochemical energy systems, battery by using the principles of electrochemistry and study its applications.
18CHE12.2	**Identify** the concepts of corrosion & apply their knowledge for protection of metals from using different method.

18CHE12.3	**Solve** energy crisis, knocking in IC engine and emission of toxic pollutants using alternate energy sources (Solar energy, biodiesel and power alcohol).
18CHE12.4	**Build** the knowledge of electrochemical cells, battery and fuel cells by using the principles of electrochemistry and study its applications.
18CHE12.5	**Utilize** of sewage treatment, desalination of sea water and over viewing of synthesis, properties and applications of nanomaterials.
Course code 18PCD13	**Course: C PROGRAMMING FOR PROBLEM SOLVING**
18PCD13.1	**Identify** basic data types, operators, I/O statements, pseudocode, algorithm and structure of C program and demonstrate simple C programs
18PCD13.2	**Build** the C programs by utilizing the concepts of branching, looping statements.
18PCD13.3	**Construct** the C programs by using arrays, strings, functions, illustrate the terms involved in functions and develop modular programs using functions.
18PCD13.4	**Make use of** structures, file concepts, develop and implement C programs.
18PCD13.5	**Construct** the C programs for pointer concepts. Outline the basics of data structures.
Course code 18ELN14	**Course: BASIC ELECTRONICS**
18ELN14.1	**Identify** and understand the characteristics and operation of Semiconductor Devices
18ELN14.2	**Design** electronic circuits for different applications
18ELN14.3	**Design** analog circuits using operational amplifiers
18ELN14.4	**Design** Combinational and Sequential circuits using digital electronic fundamentals
18ELN14.5	**Illustrate** the principles of communication system
Course code 18ME15	**Course: ELEMENTS OF MECHANICAL ENGINEERING**
18ME15.1	**Demonstrate** different types of sources of energy; environmental issues like global warming, Ozone depletion, Basic concepts of thermodynamics and steam.
18ME15.2	**Illustrate** the Boilers and its accessories; principle of operation of different types

	Turbines and pumps; types of IC engines, Refrigeration and air conditioning and its working principle.
18ME15.3	**Explain** the Properties, composition and application of engineering metals; Joining processes, belt drive and gear drives; Machining process like Lathe and milling process; Advanced machining processes like CNC and Robots.
18ME15.4	**Calculate** the internal energy, entropy and enthalpy of thermodynamic system; thermodynamic properties of steam; the efficiency, power and other related working parameters of IC engines.
18ME15.5	**Derive** the length of the belt in open and cross belt drive and solve the related problems of Belt drive and gear drives.
Course code 18CHEL16	**Course: ENGINEERING CHEMISTRY LAB**
18CHEL16.1	**Estimate** the amount of analytic present in the solution using the principles of electro analytical techniques (pH Meter, Condutometer, Potentiometer, Flame Photometry and Photoelectric Colorimeter)
18CHEL16.2	**Determine** the viscosity coefficient of liquid using Ostwald's Viscometer
18CHEL16.3	**Estimate** the amount of Cao in cement and Total Hardness of water by complex metric Titration
18CHEL16.4	**Estimate** the content of copper in brass by Iodometric Titration
18CHEL16.5	**Estimate** the amount of iron in hematite ore and COD in waste water by Redox Titration & Estimate the % of chlorine in bleaching powder by Iodometric Titration.
Course code 18CPL17	**Course: C PROGRAMMING LAB**
18CPL17.1	**Estimate** the amount of analytic present in the solution using the principles of electro analytical techniques (pH Meter, Conduto meter, Potentiometer, Flame Photometry and Colorimeter)

18CPL17.2	**Determine** the viscosity coefficient of liquid using Ostwald's Viscometer
18CPL17.3	**Estimate** the amount of Cao in cement and Total Hardness of water by complex metric Titration
18CPL17.4	**Estimate** the % of copper in brass by Io do metric Titration
18CPL17.5	**Estimate** the amount of iron in hematite ore and COD in waste water by Redox Titration & Estimation of alkalinity of water.

Course code 18MAT21	**Course: ADVANCED CALCULUS AND NUMERICAL METHODS**
18MAT21.1	**Apply** the knowledge of numerical methods in the modeling of various physical and engineering phenomena
18MAT21.2	**Demonstrate** various physical models through higher order differential equations and solve such linear ordinary differential equations.
18MAT21.3	**Construct** a variety of partial differential equations and solution by method of separation of variables.
18MAT21.4	**Illustrate** the applications of multivariate calculus to understand the solenoid and irrational vectors and also exhibit the inner dependence of line, surface and volume integrals.
18MAT21.5	**Explain** the application of infinite series and obtain series solutions of ordinary differential equations
Course code 18PHY22	**Course: ENGINEERING PHYSICS**
18PHY22.1	**Obtain** the knowledge of Quantum Mechanics; compute Eigen values, Eigen function, momentum of atomic and subatomic particles. Apprehend theoretical background of laser, construction and working of different types of lasers and its application in different fields.

18PHY22.2	**Make use of** different theoretical models to study the electrical and thermal properties of materials like conductors, semiconductors and dielectrics to understand its use in engineering applications.
18PHY22.3	**Build t**he concept of shock waves; discover the role of shock waves in various fields. Understand the various types of oscillations and their implications.
18PHY22.4	**Identify** the elastic properties of materials; impart the knowledge to understand its engineering applications.
18PHY22.5	**Establish** the interrelation between time varying electric and magnetic field, transverse nature of electromagnetic waves and realize their role in optical fiber communication.
Course code 18ELE23	**Course: BASIC ELECTRICAL ENGINEERING**
18ELE23.1	**Analyze** the behaviour of electrical circuits with DC sources
18ELE23.2	**analyze the** behaviour of electrical circuits with single phase and three phase AC sources.
18ELE23.3	**Analyze** the operation of single phase transformers and the concepts of electrical wiring.

18ELE23.4	**Analyze** the performance characteristics of three phase AC Generators and motors.
18ELE23.5	**Analyse** the performance of DC generators and DC motors.
Course code 18CIV24	**Course: ELEMENTS OF CIVIL ENGINEERING & MECHANICS**
18CIV24.1	**Outline**the Role of Civil Engineer in different fields of civil engineering & Infrastructure development of the country and explain free body diagrams, types of force systems and its theorems.
18CIV24.2	**Explain** the Newton's law of motion, Kinetics, Kinematics, projectiles, Trusses, Wedge and ladder friction
18CIV24.3	**Solve for**resultant force in the system and also for friction in bodiesviz; Wedge and ladder friction
18CIV24.4	**Make use of** centroid to analyze geometrical figures and solve for support reactions for various beams
18CIV24.5	**Solve for**moment of inertia and identify the parameter required for Kinematics, Kinetics & Projectiles
Course code 18EGDL25	**Course: ENGINEERING GRAPHICS**

18EGDL25.1	**Explain t**he standards and conventions followed in preparation of Engineering Drawings
18EGDL25.2	**Demonstrate** projections of Points, Lines and Plane surfaces on Horizontal and Vertical Planes
18EGDL25.3	**Construct** the orthographic view of Solids at different positions
18EGDL25.4	**Develop** the lateral surface of various solids
18EGDL25.5	**Build** isometric projections which will be helpful in representing the objects in three dimensional appearances
Course code 18PHYL26	**Course: ENGG PHYSICS LAB**
18PHYL26.1	**Analysis** the concepts of quantum mechanics to verify the Stefan's law and understand Fermi energy in metals.
18PHYL26.2	**Examine t**he chateristics of Zener diode, photo diode, transistor by utilizing the concepts of semiconductors physics.
18PHYL26.3	**Discover** the ability to use various passive electrical components,

	determine Dielectric constant and electrical resonance.
18PHYL26.4	**Analyse**the concepts of diffraction and interference of light by using diffraction grating and Newton's ring.
18PHYL26.5	**Inspect** the modulus of elasticity for various rigid bodies by setting up torsional pendulum and uniform bending.
Course code 18ELEL27	**Course: BASIC ELECTRICAL ENGINEERING LAB**
18ELEL27.1	**Analyse** the effect of open circuit and short circuit in DC circuits using KCL, KVL.
18ELEL27.2	**Compare** the power factor for different types of lamps
18ELEL27.3	**Measure** the parameters of choke coil and earth resistance
18ELEL27.4	**Measure** current and the power consumed in three phase load.
18ELEL27.5	**Examine** the truth table for two-way and three-way control of lamps.

Course code 18MAT31	**Course: TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES**
18MAT31.1	**Solve** first and second order ordinary differential equations arising in engineering

	problems using single step and multistep numerical methods.
18MAT31.2	**Use Laplace** transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
18MAT31.3	**Demonstrate F**ourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
18MAT31.4	**Determinet**heexternalsof functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.
18MAT31.5	**Make use of** Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
Course code 18EC32	**Course: NETWORK THEORY**
18EC32.1	**Analyze** ac and dc electrical networks.
18EC32.2	**Simplify** electrical circuits using network theorems.
18EC32.3	**Apply** laplace transforms and transient analysis to find response of RLC circuits.

18EC32.4	**Analyze** and inter relate two port network parameters.
18EC32.5	**Determine** the various parameters of Series and Parallel resonance circuits.
Course code 18EC33	**Course: ELECTRONIC DEVICES**
18EC33.1	**Apply the** principles of semiconductor physics to electronic devices.
18EC33.2	**Identify the** characteristics of semiconductor and Optoelectronic devices.
18EC33.3	**Analyze t**he BJTs and FETs circuits using mathematical model.
18EC33.4	**Identify the** operation of FET and its frequency limitation.
18EC33.5	**Identify** the fabrication process of semiconductor devices and CMOS process integration.
Course code 18EC34	**Course: DIGITAL SYSTEM DESIGN**
18EC34.1	**Simplify** switching equations using K-map and QuineMc-Cluskey techniques.
18EC34.2	**Design** combinational logic circuits.

18EC34.3	**Design** sequential logic circuits.
18EC34.4	**Analyze** sequential logic circuits using Mealy and Moore Finite state machine
18EC34.5	**Design** complex digital circuits for various applications.
Course code 18EC35	**Course: COMPUTER ORGANIZATION AND ARCHITECTURE**
18EC35.1	**Categorize** the operations of major subsystems of computer
18EC35.2	**Analyze** different types of semiconductor memories and secondary memories.
18EC35.3	**Analyze** ALU and control unit operations.
18EC35.4	**Analyze** the performance in terms of speed and technolgy.
18EC35.5	**Apply** the concepts of hardwired control and microprogrammed control.
Course code 18EC36	**Course: POWER ELECTRONICS AND INSTRUMENTATION**

18EC36.1	**Analyse** the SCR characteristics, turn-on and turn-off mechanisms.
18EC36.2	**Analyse** the power electronic converters and controllers.
18EC36.3	**Identify** the measurement errors and characteristics of the instruments.
18EC36.4	**Determine** the unknown value of AC Bridges.
18EC36.5	**Analyse** operations of digital measuring instruments, Transducers and PLCs.
Course code 18ECL37	**Course: ELECTRONIC DEVICES AND INSTRUMENTATION LAB**
18ECL37.1	**Design** and test rectifiers, clipping circuits, clamping circuits and voltage regulators.
18ECL37.2	**Calculate** the parameters from the characteristics of power diodes and rectifier circuits using power diodes.
18ECL37.3	**Analyse** the characteristics ofphotodiode,LDR and Temperature sensors.
18ECL37.4	**Analyse** the bridge circuits.
18ECL37.5	**Analyse** characteristics and implement circuits using transistors like BJT,MOSFET,UJT and Regulated power supply through simulation software .
Course code 18ECL38	**Course: DIGITAL SYSTEM DESIGN LAB**
18ECL38.1	**Design** the test the working of combinational circuits I.

18ECL38.2	**Analyse**the working of adders and code converter using multiplexer and decoder..
18ECL38.3	**Design** the flip flop circuits and verify its working using universal gates.
18ECL38.4	**Design** synchronous counters and asynchronous counters.
18ECL38.5	**Analyze** the working of serial adder and multiplier using tool**.**

Course code 18MAT41	**Course: COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS**
18MAT41.1	**Use the** concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
18MAT41.2	**Apply** discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
18MAT41.3	Fit a suitable curve for given data and **analyze** the relationship between two variables using statistical methods.
18MAT41.4	**Utilize** conformal transformation and complex integral arising in fluid flow visualization and image processing.

18MAT41.5	**Apply** the knowledge of joint probability distributionsin attempting engineering problems for feasible random events and also Understand the concepts of sampling theory and apply it to related real life problems.
Course code 18EC42	**Course: ANALOG CIRCUITS**
18EC42.1	**Analysethe** characteristics of BJT and MOSFET.
18EC42.2	**Analyze** the high frequency model of MOSFET and Frequency response of CS amplifier.
18EC42.3	**Derive** the expression for input and output resistance for different types of feedback amplifiers and classify different types of feedback amplifiers and classify different types of power amplifiers.
18EC42.4	**Demonstrate** the working of AC amplifier ,DC amplifier and its applications.
18EC42.5	**Demonstrate** the working of DAC,ADC, filter circuits and 555 timer**.**
Course code 18EC43	**Course: CONTROL SYSTEMS**
18EC43.1	**Develop** the mathematical model of mechanical / electrical systems and obtain its transfer function using block reduction method /Signal flow graph method

18EC43.2	Ability **to relate**transient performance parameters (overshoot, rise time, peak time and settling time) for the given system and to **evaluate** steady state error.
18EC43.3	**Identify** various stability criteria and Determine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique.
18EC43.4	**Determine** the stability of a system in the frequency domain using Nyquist and bode plots
18EC43.5	**Develop** a control system model in continuous and discrete time using state variable techniques
Course code 18EC44	**Course: ENGINEERING STATISTICS and LINEAR ALGEBRA**
18EC44.1	**Identify** Random Variables to extract quantitative statistical parameters and apply the same for special distributions.
18EC44.2	**Analyze** statistical representations and Eigen values of some special matrices and demonstrate the same using MATLAB.
18EC44.3	**Analyze** the concept of multiple Random variables to extract quantitative statistical parameters.
18EC44.4	**Analyze** Random events in typical communication events to extract

	quantitative statistical parameters.
18EC44.5	**Analyze** vectors and vector spaces using suitable transformations and basis function sets.

Course code 18EC45	**Course: SIGNALS AND SYSTEMS**
18EC45.1	**Apply** the basic operations on signals and classify elementary signals.
18EC45.2	**Identify** the various systems and analyze the concepts of convolution sum & integral on signals and
18EC45.3	**Identify** the system properties and represent periodic continuous/discrete signals in time and frequency domain using Fourier series.
18EC45.4	**Make use of** the properties of Fourier Transform on aperiodic signals to represent the signals in frequency domain.
18EC45.5	**Make use of** Z-transforms, inverse Z-transforms and transfer functions to analyze the complex LTI systems.
Course code 18EC46	**Course: MICROCONTROLLER**
18EC46.1	**Distinguish** the role of functional units in the architecture of 8051 microcontroller

18EC46.2	**Identify** various instructions of 8051 Microcontroller
18EC46.3	**Build** solutions using assembly level language and high level language
18EC46.4	**Make use of** timers/counters, serial port and interrupts to generate delay and perform serial communication
18EC46.5	**Design** interfacing of peripherals to 8051 Microcontroller
Course code 18ECL47	**Course: MICROCONTROLLER LAB**
18ECL47.1	**Develop** Assembly level program for transferring data and to perform arithmetic operations like addition, multiplication etc
18ECL47.2	**Develop** Assembly level program to act as a counter using subroutine
18ECL47.3	**Make use of** timers for generating the delay and serial communication ports for transferring the data serially
18ECL47.4	**Examine** the use of interrupts in controlling the switches connected to

	the ports
18ECL47.5	**Test for** the working of interface like ADC ,stepper motor, LCD etc
Course code 18ECL48	**Course: ANALOG CIRCUITS LAB**
18ECL48.1	**Design** and test the setup of BJT and FET amplifiers and study its frequency response.
18ECL48.2	**Design** and test oscillators bycalculating its frequency of oscillations.
18ECL48.3	**Design** and analyze the applications of Op-Amps for DACs, Filters, Schmitt Trigger, and adder, Integrator and differentiator circuits.
18ECL48.4	**Analyze** and test the Multivibrators using 555 Timer.
18ECL48.5	**Analyze** and implement the circuits of Oscillators, Filters, Rectifiers and Multivibrators using BJTs, ICs 741 and 555 through simulation software.

Course code 18ES51	**Course: TECHNOLOGICAL INNOVATION MANAGEMENT AND ENTREPRENEURSHIP**
18ES51.1	**Explain** various management functions,planning and different ways of

	decision making.
18ES51.2	**Demonstrate** characteristics of organising staffing and directing.
18ES51.3	**Explain** the functions of Managers, Entrepreneurs and their social responsibilities.
18ES51.4	**Survey** the Institutional support by various state and central government agencies
18ES51.5	**Apply** the knowledge of Project Formulation and Evaluation Techniques
Course code 18EC52	**Course: DIGITAL SIGNAL PROCESSING**
18EC52.1	**Construct** the frequency domain sampling and reconstruction of discrete time signals.
18EC52.2	**Make use of** the properties and develop efficient algorithms for the computation of DFT.
18EC52.3	**Construct** FIR and IIR filters in different structural forms.
18EC52.4	**Utilize** the procedures to design IIR filters from the analog filters using impulse invariance and bilinear transformation.
18EC52.5	**Make use** of the characteristics of DSP processors and implement FIR and

	IIR filters**.**
Course code 18EC53	**Course: PRINCIPLES OF COMMUNICATION SYSTEMS**
18EC53.1	**Apply** the time and frequency domain knowledge for the generation and demodulation of amplitude modulated signals.
18EC53.2	**Identify** the performance of different generation and detection methodologies of AM, FM and multiplexing.
18EC53.3	**Examine** analog signals in time domain as random processes and identify the types of basic Noise
18EC53.4	**Demonstrate** multiplexing and demultiplexing along with reconstruction of digital signals at the transmitter and the receiver respectively.
18EC53.5	**Distinguish** the characteristics of pulse modulation techniques
Course code 18EC54	**Course: INFORMATION THEORY AND CODING**
18EC54.1	**Apply the concept** of dependent and independent source to measure the parameters of information source.
18EC54.2	**Construct** the code word using source coding algorithms .
18EC54.3	**Model** the continuous and discrete communication channels using input, output and joint probabilities.
18EC54.4	**Inspect** the channel coding algorithms for error detection and correction.

18EC54.5	**Design** the encoding and decoding circuits for different channel coding techniques.
Course code 18EC55	**Course: ELECTROMAGNETIC WAVES**
18EC55.1	**Interpret** the problems on electric fields due to point, linear, volume charges by applying conventional methods or by Gauss law.
18EC55.2	**Analyze** potential and energy with respect to point charge and capacitance using Laplace equation.
18EC55.3	**Solve** for magnetic field, force, and potential energy of magnetic materials.
18EC55.4	**Apply** Maxwell's equation for time varying fields, EM waves in free space and conductors.
18EC55.5	**Make use of** Poynting theorem to find power associated with EM waves.
Course code 18EC56	**Course: VERILOG HDL**
18EC56.1	**Write** Verilog programs in gate, dataflow (RTL), behavioral and switch modeling levels of Abstraction & simple programs in VHDL in different styles.

18EC56.2	**Design** and verify the functionality of digital circuit/system using test benches.
18EC56.3	**Identify** the suitable abstraction level for a particular digital design.
18EC56.4	**Write** the programs effectively using verilogtasks,functions and directives.
18EC56.5	**Perform timing and delay simulation and interpret the various constructs in logic synthesis.**
Course code 18ECL57	**Course: DIGITAL SIGNAL PROCESSING LAB**
18ECL57.1	**Apply** sampling theorem and effective reconstruction of signal.
18ECL57.2	**Compute** the DFT for a discrete signal and verification of its properties using MATLAB.
18ECL57.3	**Solve** difference equations and perform different operations on discrete time signals
18ECL57.4	**Design** IIR and FIR filters for the given specifications.
18ECL57.5	**Implement** DSP computations on TMS processor and verify the result
Course	**Course: HDL LAB**

code 18ECL58	
18ECL58.1	**Develop** and write the Verilog programs to simulate combinational circuits in different styles
18ECL58.2	**Develop** and write the Verilog programs to simulate sequential circuits like flip flops and counters in Behavioral description.
18ECL58.3	**Develop,** and Synthesize Combinational and Sequential circuits on programmable ICs
18ECL58.4	**Develop** and Interface the hardware to the FPGA chips through I/O ports.
18ECL58.5	**Develop** and write test benches for performance analysis of digital designs in Hardware Descriptive Languages

Course code 18EC61	Course: DIGITAL COMMUNICATION
18EC61.1	**Develop** the concepts of Band pass sampling to well specified signals and channels.
18EC61.2	**Utilize** the performance parameters and transfer rates for low pass and bandpass symbol under ideal and corrupted non band limited channels.
18EC61.3	**Identify** valid symbol processing and performance parameters at the receiver

	under ideal and corrupted bandlimited channels.
18EC61.4	**Identify** the bandpass signals when subjected to corruption and distortion during transmission over a bandlimited channel.
18EC61.5	**Identify** the need for data security using spread spectrum technique and error rate calculation.
Course code 18EC62	**Course: EMBEDDED SYSTEMS**
18EC62.1	**Construct** the architectural features and instructions of 32 bit microcontroller ARM Cortex M3.
18EC62.2	**Make use of** the knowledge gained for Programming ARM Cortex M3 for different applications.
18EC62.3	**Identify** the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
18EC62.4	**Develop** the hardware/software co-design and firmware design using ARM Cortex M3.Instruction set.
18EC62.5	**Establish** the need of real time operating system for embedded system applications

Course code 18EC63	**Course: MICROWAVE AND ANTENNA**
18EC63.1	**Identify the working of reflex Klstron by studying the mode curves and also understand transmission lines structures along with its line equations using smith charts to calculate the reflection coefficient ,SWR,input and load impedance.**
18EC63.2	**Solve for microwave network parameters using S-matrix and also study passive microwave devices like connectors ,Adapters attenuators ,Tees and phase shifters .**
18EC63.3	**Identify the different types of strip lines and understandthe antenna basics to find various parameters like antenna gain, directivity.**
18EC63.4	**Classify the point source of n-isotropic antennas and electric dipole.**
18EC63.5	**Identify loop,horn antenna and the helical antenna by making use of the design considerations.**
Course code 18ECL66	**Course: EMBEDDED Controller LAB**

18ECL66.1	**Understand the instruction set of 32 bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language.**
18ECL66.2	**Develop assembly language programs using ARM Cortex M3 for different applications**
18ECL66.3	**Develop C language programs to interface external devices and I/O with ARM Cortex M3.**
18ECL66.4	**Develop C language programs for embedded system applications.**
18ECL66.5	**Develop C language programs which makes use of library functions for embedded system applications.**
Course code 18ECL67	**Course: COMMUNICATION LAB**
18ECL67.1	**Make use of the characteristics and response of microwave devices**
18ECL67.2	**Utilize the characteristics of micros trip antennas and measurement of**

	its parameters.
18ECL67.3	**Construct the analog and digital modulation schemes with the display of waveforms and computation of performance parameters**
18ECL67.4	**Make use of the sampling and multiplexing concepts and reconstruct.**
18ECL67.5	**Model different digital communication concepts using simulation**
Course code 18ECM68	**Course: MINI PROJECT**
18ECM68.1	**Identify the Problem statement and technology used. through Literature review in specific area of interest.**
18ECM68.2	**Formulate specific Objectives and methodology arriveat the block diagram using hardware required for the project.**
18ECM68.3	**Develop leadership qualities through effective team work & perform functionaliverifivation of the project**

18ECM68.4	**Develop technical writing , presentation, teamwork and communication skills**
18ECM68.5	**Design the project as per the specification.**

Course code 17EC71	**Course: MICROWAVE AND ANTENNA**
17EC71.1	**Apply** Smith charts to find solutions to transmission line problems.
17EC71.2	**Analyze** passive microwave devices using S-parameters
17EC71.3	**Evaluate** various parameters and characteristics of the microwave strip lines and devices.
17EC71.4	**Estimate** radiation patterns and performance parameters of n-isotropic antennas
17EC71.5	**Recommend** various antenna configurations based on application

Course code 17EC72	**Course: DIGITAL IMAGE PROCESSING**

17EC72.1	**Identify** the basic concepts and processes in digital image formation and processing.
17EC72.2	**Utilize** mathematical operations in the spatial domain to enhance images.
17EC72.3	**Model** image restoration techniques and morphological operations.
17EC72.4	**Examine**subband coding and wavelet transforms in image enhancement and multi-resolution.
17EC72.5	**Distinguish** analysis techniques to achieve image segmentation.
Course code 17EC73	**Course: POWER ELECTRONICS**
17EC73.1	**Identify** the characteristics of different power devices and its applications.
17EC73.2	**Design** the thyristor and transistor circuits with different triggering methods and commutation techniques.
17EC73.3	**Analyze** the performance of power electronic converters.
17EC73.4	**Analyze** the performance of power electronic controllers.
17EC73.5	**Identify** the behaviour of inverters and different protection devices**.**
Course code 17ECL76	**Course: ADVANCED DIGITAL COMMUNICATION LAB**
17ECL76.1	**Demonstrate** the characteristics and response of microwave devices
17ECL76.2	**Illustrate** the characteristics of micros trip antennas and measurement of its parameters.
17ECL76.3	**Design** the digital modulation schemes with the display of waveforms and computation of performance parameters

17ECL76.4	**Determine** the characteristics of Optical Fibre Communication and calculate the parameters associated with it.
17ECL76.5	**Model** different digital communication concepts using simulation
Course code 17ECL77	**Course: VLSI LAB**
17ECL77.1	**Model** basic digital circuits,simulate and synthesize using EDA Tool.
17ECL77.2	**Make use of** logic gates to realize shift registers and adders to meet desired parameters.
17ECL77.3	**Construct** and generate layout structure for basic CMOS circuits like inverter, common source amplifier and differential amplifier.
17ECL77.4	**Experiment with** the basic amplifiers to design higher level circuits like operational amplifier and analog/digital converters to meet desired parameters.
17ECL77.5	**Inspect** concepts of DC Analysis, AC Analysis and Transient Analysis in analog circuits.
Course code 17ECP78	**Course: PROJECT WORK PAHSE I**
17ECP78.1	Carry out Literature **survey** in their specific area of interest.
17ECP78.2	**Identify** the Problem statement and technology used.
17ECP78.3	**Formulate** specific Objectives and methodology.
17ECP78.4	**Develop** technical writing and presentation skills.

17ECP78.5	**Develop** leadership qualities through effective team work.

Course code 17EC81	**Course: WIRELESS CELLULAR AND LTE 4G BROADBAND**
17EC81.1	**Make use of** the system architecture and the functional standard specified in LTE 4G.
17EC81.2	**Identify** the role of the layer of LTE radio interface protocols and EPS Data convergence protocols to set up, reconfigure and release data and voice from users.
17EC81.3	**Establish** the UTRAN and EPS handling processes from set up to release including mobility management for a variety of data call scenarios.
17EC81.4	**Identify** the difference between uplink , down link and the physical layer procedures that provide the services to upper layers.
17EC81.5	**Evaluate** the Performance of resource management and packet data processing and transport algorithms.
Course code 17EC82	**Course: FIBER OPTIC NETWORKS**
17EC82.1	**Make use of** the concepts of optical fibre explain the working of optical fibre with different modes of light propagation.
17EC82.2	**Utilize** the concepts of transmission characteristics to obtain the losses in optical fiber communication.
17EC82.3	**Identify** the constructional features and the characteristics of optical sources,detectors and receivers.
17EC82.4	**Analyze** the construction and working principle of optical

	connectors,multiplexers and optical amplifiers.
17EC82.5	**Examine** the networking aspects of optical fiber and describe various standards associated with it.
Course code 17EC835	**Course: NETWORK AND CYBER SECURITY**
17EC835.1	**Analyse**Web security concerns and Transport Layer Security Protocols
17EC835.2	**Analyse**various security concerns in Email and understand the functionality of PGP and S/MIME
17EC835.3	**Analyse**various security concerns in Internet Protocol and Associations including Internet Key Exchange
17EC835.4	**Analyse**cyber network security concepts such as antipattern problems and associated solutions
17EC835.5	**Apply** concept of cyber security framework in computer system administration
Course code 17EC84	**Course: INTERNSHIP**
17EC84.1	**Examine** the knowledge and skills acquired in the classroom to a professional context
17EC84.2	**Apply** the methods for solving the complex problems
17EC84.3	**Develop** the organizational skills
17EC84.4	**Develop** the ability to write the report
17EC84.5	**Develop** the skills for communication and team working
Course code 17ECP85	**Course: PROJECT WORK PHASE II**

17ECP85.1	**Build** the block diagram using hardware required for the project.
17ECP85.2	**Develop** the software required for the project.
17ECP85.3	**Test** for functionality of the project
17ECP85.4	**Develop** team work and communication skills
17ECP85.5	**Design** the project as per the specifications
Course code 15ECS86	**Course: SEMINAR**
17ECS86.1	**Survey** the new technologies, methods, hardware and software tools associated with Electronics & Communication Engineering
17ECS86.2	**Compare** and explain the solutions for problems associated with engineering, society and environment
17ECS86.3	**Analyze** the technical details in depth.
17ECS86.4	**Develop** the ability to document the study.
17ECS86.5	**Develop** communication skills.

Course code 18MAT11	Course: CALCULUS AND LINEAR ALGEBRA
18MAT11.1	**Make use** of matrix theory for solving system of linear equations and compute Eigen values and Eigen vectors required for matrix diagonalization process.
18MAT11.2	**Establish** the notation of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.
18MAT11.3	**Apply** the knowledge of calculus to solve problems related to polar curves and its applications in determining the bending of a curve.
18MAT11.4	**Solve** first order linear/nonlinear differential equations analytically using standard methods.
18MAT11.5	**Utilize t**he concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
Course code 18CHE12	**Course: ENGINEERING CHEMISTRY**
18CHE12.1	**Make use of** Electrochemical energy systems, battery by using the principles of electrochemistry and study its applications.
18CHE12.2	**Identify** the concepts of corrosion & apply their knowledge for protection of metals from using different method.
18CHE12.3	**Solve** energy crisis, knocking in IC engine and emission of toxic pollutants using alternate energy sources (Solar energy, biodiesel and power alcohol).
18CHE12.4	**Build** the knowledge of electrochemical cells, battery and fuel cells by using the principles of electrochemistry and study its applications.
18CHE12.5	**Utilize** of sewage treatment, desalination of sea water and over viewing of synthesis, properties and applications of nanomaterials.
Course code 18PCD13	**Course: C PROGRAMMING FOR PROBLEM SOLVING**
18PCD13.1	**Identify** basic data types, operators, I/O statements, pseudocode, algorithm and

	structure of C program and demonstrate simple C programs
18PCD13.2	**Build** the C programs by utilizing the concepts of branching, looping statements.
18PCD13.3	**Construct** the C programs by using arrays, strings, functions, illustrate the terms involved in functions and develop modular programs using functions.
18PCD13.4	**Make use of** structures, file concepts, develop and implement C programs.
18PCD13.5	**Construct** the C programs for pointer concepts. Outline the basics of data structures.
Course code 18ELN14	**Course: BASIC ELECTRONICS**
18ELN14.1	**Identify** and understand the characteristics and operation of Semiconductor Devices
18ELN14.2	**Design** electronic circuits for different applications
18ELN14.3	**Design** analog circuits using operational amplifiers
18ELN14.4	**Design** Combinational and Sequential circuits using digital electronic fundamentals
18ELN14.5	**Illustrate** the principles of communication system
Course code 18ME15	**Course: ELEMENTS OF MECHANICAL ENGINEERING**
18ME15.1	**Demonstrate** different types of sources of energy; environmental issues like global warming, Ozone depletion, Basic concepts of thermodynamics and steam.
18ME15.2	**Illustrate** the Boilers and its accessories; principle of operation of different types Turbines and pumps; types of IC engines, Refrigeration and air conditioning and its working principle.
18ME15.3	**Explain** the Properties, composition and application of engineering metals; Joining processes, belt drive and gear drives; Machining process like Lathe and milling process; Advanced machining processes like CNC and Robots.
18ME15.4	**Calculate** the internal energy, entropy and enthalpy of thermodynamic system;

	thermodynamic properties of steam; the efficiency, power and other related working parameters of IC engines.
18ME15.5	**Derive** the length of the belt in open and cross belt drive and solve the related problems of Belt drive and gear drives.
Course code 18CHEL16	**Course: ENGINEERING CHEMISTRY LAB**
18CHEL16.1	**Estimate** the amount of analytic present in the solution using the principles of electro analytical techniques (pH Meter, Condutometer, Potentiometer, Flame Photometry and Photoelectric Colorimeter)
18CHEL16.2	**Determine** the viscosity coefficient of liquid using Ostwald's Viscometer
18CHEL16.3	**Estimate** the amount of Cao in cement and Total Hardness of water by complex metric Titration
18CHEL16.4	**Estimate** the content of copper in brass by Iodometric Titration
18CHEL16.5	**Estimate** the amount of iron in hematite ore and COD in waste water by Redox Titration & Estimate the % of chlorine in bleaching powder by Iodometric Titration.
Course code 18CPL17	**Course: C PROGRAMMING LAB**
18CPL17.1	**Estimate** the amount of analytic present in the solution using the principles of electro analytical techniques (pH Meter, Conduto meter, Potentiometer, Flame Photometry and Colorimeter)
18CPL17.2	**Determine** the viscosity coefficient of liquid using Ostwald's Viscometer
18CPL17.3	**Estimate** the amount of Cao in cement and Total Hardness of water by complex metric Titration
18CPL17.4	**Estimate** the % of copper in brass by Io do metric Titration
18CPL17.5	**Estimate** the amount of iron in hematite ore and COD in waste water by Redox

	Titration & Estimation of alkalinity of water.

Course code 18MAT21	**Course: ADVANCED CALCULUS AND NUMERICAL METHODS**
18MAT21.1	**Apply** the knowledge of numerical methods in the modeling of various physical and engineering phenomena
18MAT21.2	**Demonstrate** various physical models through higher order differential equations and solve such linear ordinary differential equations.
18MAT21.3	**Construct** a variety of partial differential equations and solution by method of separation of variables.
18MAT21.4	**Illustrate** the applications of multivariate calculus to understand the solenoid and irrational vectors and also exhibit the inner dependence of line, surface and volume integrals.
18MAT21.5	**Explain** the application of infinite series and obtain series solutions of ordinary differential equations
Course code 18PHY22	**Course: ENGINEERING PHYSICS**
18PHY22.1	**Obtain** the knowledge of Quantum Mechanics; compute Eigen values, Eigen function, momentum of atomic and subatomic particles. Apprehend theoretical background of laser, construction and working of different types of lasers and its application in different fields.
18PHY22.2	**Make use of** different theoretical models to study the electrical and thermal properties of materials like conductors, semiconductors and dielectrics to understand its use in engineering applications.
18PHY22.3	**Build t**he concept of shock waves; discover the role of shock waves in various fields. Understand the various types of oscillations and their

	implications.
18PHY22.4	**Identify** the elastic properties of materials; impart the knowledge to understand its engineering applications.
18PHY22.5	**Establish** the interrelation between time varying electric and magnetic field, transverse nature of electromagnetic waves and realize their role in optical fiber communication.
Course code 18ELE23	**Course: BASIC ELECTRICAL ENGINEERING**
18ELE23.1	**Analyze** the behaviour of electrical circuits with DC sources
18ELE23.2	**analyze the** behaviour of electrical circuits with single phase and three phase AC sources.
18ELE23.3	**Analyze** the operation of single phase transformers and the concepts of electrical wiring.
18ELE23.4	**Analyze** the performance characteristics of three phase AC Generators and motors.
18ELE23.5	**Analyse** the performance of DC generators and DC motors.

Course code 18CIV24	Course: ELEMENTS OF CIVIL ENGINEERING & MECHANICS
18CIV24.1	**Outline**the Role of Civil Engineer in different fields of civil engineering & Infrastructure development of the country and explain free body diagrams, types of force systems and its theorems.
18CIV24.2	**Explain** the Newton's law of motion, Kinetics, Kinematics, projectiles, Trusses, Wedge and ladder friction
18CIV24.3	**Solve for**resultant force in the system and also for friction in bodiesviz; Wedge and ladder friction
18CIV24.4	**Make use of** centroid to analyze geometrical figures and solve for support reactions for various beams
18CIV24.5	**Solve for**moment of inertia and identify the parameter required for Kinematics, Kinetics & Projectiles
Course code 18EGDL25	**Course: ENGINEERING GRAPHICS**
18EGDL25.1	**Explain t**he standards and conventions followed in preparation of Engineering Drawings
18EGDL25.2	**Demonstrate** projections of Points, Lines and Plane surfaces on Horizontal and Vertical Planes

18EGDL25.3	**Construct** the orthographic view of Solids at different positions
18EGDL25.4	**Develop** the lateral surface of various solids
18EGDL25.5	**Build** isometric projections which will be helpful in representing the objects in three dimensional appearances
Course code 18PHYL26	**Course: ENGG PHYSICS LAB**
18PHYL26.1	**Analysis** the concepts of quantum mechanics to verify the Stefan's law and understand Fermi energy in metals.
18PHYL26.2	**Examine t**he chateristics of Zener diode, photo diode, transistor by utilizing the concepts of semiconductors physics.
18PHYL26.3	**Discover** the ability to use various passive electrical components, determine Dielectric constant and electrical resonance.
18PHYL26.4	**Analyse**the concepts of diffraction and interference of light by using diffraction grating and Newton's ring.
18PHYL26.5	**Inspect** the modulus of elasticity for various rigid bodies by setting up torsional pendulum and uniform bending.
Course	**Course: BASIC ELECTRICAL ENGINEERING LAB**

code 18ELEL27	
18ELEL27.1	**Analyse** the effect of open circuit and short circuit in DC circuits using KCL, KVL.
18ELEL27.2	**Compare** the power factor for different types of lamps
18ELEL27.3	**Measure** the parameters of choke coil and earth resistance
18ELEL27.4	**Measure** current and the power consumed in three phase load.
18ELEL27.5	**Examine** the truth table for two-way and three-way control of lamps.

Engineering Mathematics III (18ME31)	
CO1	Make use of Fourier series to analyze wave forms of periodic functions
CO2	Make use of Fourier transforms and Z - transforms to analyze wave forms of non periodic functions
CO3	Identify statistical methods to find correlation and regression lines, also numerical methods to solve transcendental equations.
CO4	Utilize Numerical techniques for various finite difference technique problems
CO5	Construct Greens, divergence and Stokes theorems for various engineering applications. Solve the problems on signals and systems, heat conduction, and control; engineering by using various numerical techniques.

Mechanics of Materials (18ME32)	
CO1	Understand the basic concepts of material properties, stress, strain and their relation, principle plains & stresses, cylinders
CO2	Explain shear force & bending moment diagram of beams with stresses, theory of failure, shaft subjected to torsional loads, the concepts of columns, strain energy subjected different loading,

CO3	Calculate the stress & Deformation of bars subjected to different point loads(Uniform, stepped, Tapered), principle & shear stresses, longitudinal & circumferential stresses
CO4	Construct SFD & BMD of beams subjected to different types of loading and can solve for stresses, theories of failures, dimensions of shaft with torsional loading
CO5	Choose the structures involving Columns and Struts subjected to buckling and compressive load &Determine the strain energy subjected to different loading

Basic Thermodynamics (18ME33)	
CO1	Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.
CO2	Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics
CO3	Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers and change in properties
CO4	Interpret the behaviour of pure substances and its application in practical problems.
CO5	Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations.

Material Science (18ME34)	
CO1	Interpret the basic concepts of crystal structure, concepts of diffusion, mechanical behavior of materials and various modes of failure.
CO2	Classify solid solutions, interpret equilibrium phase diagrams of ferrous and nonferrous alloys and mechanism of solidification.
CO3	Relate suitable heat-treatment process to achieve desired properties of metals and alloys
CO4	Interpret the properties and applications of various materials like ceramics, plastics and Smart materials.
CO5	Identify various composite materials and their processing as well as applications.

METAL CUTTING AND FORMING (18ME35A)	
CO1	Identify the importance of cutting tool materials their Nomenclature and role of cutting fluids in maintaining the desired surface finish of jobs. Develop the knowledge on mechanics of machining process for Turning
CO2	Develop the knowledge on mechanics of machining process for Milling, Drilling and Milling process
CO3	Apply mechanics of machining process to evaluate machining time

CO4	Understand the concept of different metal forming processes
CO5	Understand the concept of design of sheet metal dies for simple sheet metal components

Computer Aided Machine Drawing (18ME36)	
CO1	Develop the sectional views of the solids and Draw the orthographic views of the machine components by using CAD software.
CO2	Build the 2D views and 3D drawings of simple machine parts/ Threaded fasteners/ Riveted joints.
CO3	Construct the views of machine elements including keys, Couplings and joints.
CO4	Inspect Limits, Fits, Tolerances and level of surface finish of machine elements.
CO5	Create 2D and 3D models by standard CAD software with manufacturing considerations.

Material Testing Lab (18ME37A)	
CO1	Understand& acquire experimentation skills in the field of material testing.
CO2	Understanding of the mechanical properties of materials by performing experiments.
CO3	Apply the knowledge to analyze a material failure and determine the failure inducing agent/s.
CO4	Apply the knowledge of testing methods in related areas.
CO5	Evaluate how to improve structure/behaviour of materials for various industrial applications.

Workshop ans Machine shop Practice (18ME38A)	
CO1	Perform turning , facing , knurling , thread cutting, tapering , eccentric turning and allied operations
CO2	Perform keyways / slots , grooves etc using shaper
CO3	Perform gear tooth cutting using milling machine.
CO4	Understand the formation of cutting tool parameters of single point cutting tool using bench grinder / tool and cutter grinder
CO5	Understand Surface Milling/Slot Milling.

Engineering Mathematics IV (18MAT41)	
CO1	Apply Numerical methods to obtain the solution of fist order and first degree differential equations.

CO2	Make use of probability theory on discrete and continuous random variables to obtain the solution of problems on different distributions and joint probability distribution.
CO3	Identify the problems on sampling distribution and on markov chains in attempting the engineering problems for feasible random events.
CO4	Utilize the Bessel's and Legendre functions for the problems arising in engineering fields.
CO5	Construct the analytic functions. Calculate residues and poles of complex potentials in flow problems. Solve the problems on electromagnetic theory hydrodynamics, heat conduction, optimization of digital circuits, coding theory and stability analysis of the systems

Applied Thermodynamics (18ME42)	
CO1	Identify the basic thermodynamic cycles like Otto, Diesel, Dual and brayton cycles applied in IC engine and gas turbine applications
CO2	Apply thermodynamic cycles like rankine cycle, for steam power plants to evaluate their performance
CO3	Identify the suitable combustion parameters for complete combustion for given air fuel ratio which enhances the combustion efficiency
CO4	Evaluate the performance of refrigeration systems based on various refrigeration cycles along with air conditioning systems.
CO5	Make use of inlet properties of air or steam to study the behaviour of reciprocating compressors and steam nozzles

FLUID MECHANICS (18ME43)	
CO1	Identify the need of the fluid properties used for the analysis of fluid behavior.
CO2	Utilize the knowledge of kinematics and dynamics while addressing problems of fluid flow. Make use of the principles of bernoulli's theorem to derive an expression for discharge of different flow measuring devices
CO3	Derive an expression for loss of head due to friction in pipes and also an equation of hagen poiseille's for laminar flow through pipe and parallel plates.

CO4	Analyze the development of boundary layer due to the flow over a flat plate and further identify the difference between lift and drag forces for both compressible and incompressible fluid flow and also apply the dimensional analysis..
CO5	Analyze the development of boundary layer due to the flow over a flat plate and further identify the difference between lift and drag forces for both compressible and incompressible fluid flow and also identify the applications of CFD .

KINEMATICS OF MACHINES (18ME44)	
CO1	Understanding the basic terminology of planar mechanisms and their motion study.
CO2	Construct velocity and acceleration diagrams for planar mechanisms by Graphical method
CO3	Apply complex algebra method for velocity and acceleration analysis for planar mechanisms
CO4	Analyze the transmission of power by application of various gears and gear trains.
CO5	Model displacement diagrams for followers with various types of motions and Cam profile drawing for various followers

MECHANICAL MEASUREMENTS AND METROLOGY (18ME46B)	
CO1	Outline the features of metrology, standards of measurement for linear and angular measurement, system of limits, fits and tolerances and functioning of comparators.
CO2	Solve the numericals on limits of size, fits and tolerances, gauges and their design and calibration of End Bars using slip gauges.
CO3	Interpret the nomenclature and measuring methods of screw threads and gears.
CO4	Illustrate the basic concepts of measurement systems, transducers, intermediate modifying devices and terminating devices.
CO5	Summarize the measurement of force, torque, pressure, strain and temperature using certain measuring devices.

MECHANICAL MEASUREMENTS AND METROLOGY LAB (18ME47B)	
CO1	Explain calibration of pressure gauge, thermocouple, LVDT, load cell and micrometer
CO2	Find angle using Sine Center/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.
CO3	Obtain measurements using Optical Projector/Tool maker microscope, Optical flats.
CO4	Determine cutting tool forces using Lathe/Drill tool dynamometer.

CO5	Find Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth vernier/Gear tooth micrometer.

FOUNDRY, FORGING AND WELDING LAB (18MEL48B)	
CO1	Analyze and optimize foundry sand, core sand to a particular application.
CO2	Build moulds with or without patterns.
CO3	Understand casting of ferrous and non ferrous objects.
CO4	Develop skills in making forging models manually and also with the use of power hammers.

Finite Element Method (18ME61)	
CO1	Identify the basic procedures implemented in FEM along with reduction of execution time and memory requirements for given engineering problem
CO2	Construct the basic algorithms or numerical procedures to solve simple bar and truss problems subjected to axial loading
CO3	Make use of finite element matrix to solve lateral and torsional loaded members confined to regular shapes
CO4	Construct the fundamental numerical procedures required to solve thermal and fluid flow problems confined to simple loading conditions
CO5	Establish a relation between mass and stiffness matrix to solve dynamic problems along with axisymmetric ring elements

DESIGN OF MACHINE ELEMENTS II (18ME62)	
CO1	Discuss the different types of springs and its corresponding stress induced in them.
CO2	Design spur and helical gears using beam strength or Lewis equation and also analysis gear teeth to dynamic and wear loads.
CO3	Design of bevel and worm gears, the significance of formative number of teeth, efficiency of the worm gears.
CO4	Design of different types of clutches like single and multi plate clutches. Self locking and heat generated in different types of brakes.

CO5	Design of journal bearings using Petroff's equation and Mckee equation, concept of hydrodynamic theory of lubrications. Stress in curved beams.

HEAT TRANSFER (18ME63)	
CO1	Identify the three modes of heat transfer and construct conduction heat transfer equations for composite bodies make use of both sizing and rating methods
CO2	Construct the fins to enhance heat transfer from a surface and solve for unsteady heat conduction rate
CO3	Select the type of correlation to be used suitably so as to experiment with convection heat transfer coefficient for various applications
CO4	Utilize the methods, to find the exit temperature of fluid and size of heat exchangers, also identify the effect of cavitation and fouling due to boiling and condensation of fluid
CO5	Analyze two-dimensional heat conduction equations and examine the radiation heat transfer rate from black bodies, real surfaces and thermal shield.

NON TRADITIONAL MACHINING (18ME641)	
CO1	Explain the needs, advantages, limitations and applications of non-traditional machining process viz; USM, AJM, WJM, ECM, CHM, EDM, PAM, LBM, and EBM.
CO2	Compare the various traditional and non-traditional machining processes and Classify and select the various non-traditional machining processes based on nature of energy employed.
CO3	Explain the constructional features of USM, AJM, WJM, ECM, CHM, EDM, PAM, LBM, and EBM.
CO4	Explain the working principle of USM, AJM, WJM, ECM, CHM, EDM, PAM, LBM, and EBM.
CO5	Make use of process characteristics and parameters to analyze the performance of USM, AJM, WJM, ECM, CHM, EDM, PAM, LBM, and EBM.

COMPUTER AIDED MODELING AND ANALYSIS LAB (18MEL66)	
CO1	Understand the basic concepts of representation of engineering problems in to one dimensional modeling and analysis.
CO2	Solve truss problems using one dimensional concept

CO3	Solve bending moment and shear force representation for various loading cases. Solve rectangular plate with a circular hole problem under uni-axial loading.
CO4	Solve thermal problems using one dimensional and two dimensional FEA concepts
CO5	Solve Dynamic problems through one dimensional FEA concept.

HEAT TRANSFER LAB (18MEL67)	
CO1	Perform experiments to determine the thermal conductivity of a metal rod
CO2	Estimate the effective thermal resistance in composite slabs and efficiency in pin-fin
CO3	Conduct experiments to determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values
CO4	Determine surface emissivity of a test plate and Steffan Boltzman Constant
CO5	Determine LMDT and Effectiveness in a Parallel Flow and Counter Flow Heat Exchangers & Estimate performance of a Vapour Compression Refrigeration.

Energy Engineering (17ME71)	
CO1	Summarize the basic concepts of thermal energy systems and renewable energy sources and their utilization.
CO2	Differentiate the Diesel and Hydel power plant
CO3	Understand the basic concepts of solar radiation and the working of solar PV and thermal systems.
CO4	Apply principles of energy conversion from alternate sources including wind, geothermal, ocean.
CO5	Identify the concepts and applications of Bio mass energy and fuel cells, thermoelectric convertor and MHD generator, Identify methods of energy storage for specific applications.

Fluid Power System (17ME72)	
CO1	Illustrate the basic principles of fluid transmission to explain various components of fluid power systems.
CO2	Interpret the various functionalities of hydraulic and pneumatic valves and basics of circuit design
CO3	Select suitable Pumps and actuators considering various functional parameters for each application
CO4	Build appropriate hydraulic & pneumatic circuit for a given application
CO5	Make use of Signal Processing Elements to solve the Multi- Cylinder and Electro- Pneumatic Control application

CONTROL ENGINEERING (17ME73)	
CO1	Explain concepts of loop systems and different types of controllers.
CO2	Construct mathematical models to understand transfer function of mechanical, electrical and hydraulic control systems with block diagrams and SFG.
CO3	Build the concept of transient and steady state system and solve frequency response analysis.
CO4	Solve Bode plots and Root locus plots for frequency response analysis.
CO5	Develop state equation of linear continuous data for controllability and observability.

TRIBOLOGY (17ME742)	
CO1	Understand fundamentals and applications of Tribology with Lubrication.
CO2	Explain the theories of Friction & Wear phenomenon in real time applications
CO3	Apply the concepts of Tribology for the performance analysis and design of components experiencing relative motion.
CO4	Analyze the requirements and design of hydrodynamic journal and plane slider bearings for a given application.
CO5	Summarize proper bearing materials and lubricants for a given tribological application & Apply the principles of surface engineering for different applications of Tribology.

MECHATRONICS (17ME754)	
CO1	Explain the concepts of Mechatronics, Transducers, Microprocessor and Microcontrollers.
CO2	Illustrate the architecture of the Microprocessor, Operation of PLC's and Mechanical, Electrical, Pneumatic and Hydraulic Actuation systems.
CO3	Interpret the working principle and application of sensors and Explain the different parts of Industrial Robot components & its functional requirements.
CO4	Outline the concept of ladder diagram and latching for the selection of a PLC.
CO5	Illustrate the working of different types of Pneumatic and Hydraulic actuators and control valves.

DESIGN LAB (17MEL76)	
CO1	To determine the natural frequency, logarithmic decrement, damping ratio and damping coefficient in a SDOF systems subjected to longitudinal and torsional vibrations.
CO2	To construct force and couple polygons to balance the rotating masses.
CO3	To utilize the principles of photo elasticity and determine the fringe constant and stress concentration of photo elastic materials subject to different loads.

CO4	To calculate equilibrium speed, sensitiveness, power and effort of Porter and Hartnell Governor.
CO5	To obtain Pressure distribution in Journal bearing and find the critical speed of a rotating shaft.

CIM LAB (17MEL77)	
CO1	Explain the concepts of Computer Integrated manufacturing and Classify NC,CNC and DNC systems.
CO2	Develop manual part programs to perform milling, drilling and turning operations in design, simulation and manufacturing.
CO3	Analyze the Simulation of Tool Path for different Machining operations of small components using CNC Lathe & CNC Milling Machine.
CO4	Identify the concepts of flexible manufacturing systems like Automatic storage and Retrieval system and utilize Robot programming language for simple operations such as pick and place, stacking objects using teach pendent and off line programming.
CO5	Apply the knowledge of pneumatics and hydraulics to demonstrate the related experiments

PROJECT PHASE (17MEP78)	
CO1	Interact with various industries and identify real world problem statement/identify problems in engineering and technology in selected field of interest
CO2	Synthesize and apply the mechanical knowledge of engineering to design and implement solution to open ended problems
CO3	Design and develop the concept with mechanical engnieering practices and standards
CO4	Use different tools for communication, design, implementation, testing and report writing
CO5	Analyzing professional issues, including ethical, legal, environmental and safety issues, related to project

OPERATION RESEARCH (17ME81)	
CO1	Understand the concepts of operations research modelling approaches.
CO2	Develop mathematical skills to analyse and solve network models arising from a wide range of applications.
CO3	Solve engineering and managerial situations as Transportation and Assignment problems.

CO4	Analyze and Solve problems of sequencing of production runs , use Game theory to identify the optimal strategies for players and solve problems on queuing theory
CO5	Analyze and solve engineering and managerial situations as LPP

ADDITIVE MANUFACTURING (17ME82)	
CO1	Understand the different processes of Additive Manufacturing
CO2	Explain system drives and devices and actuators
CO3	Explain the additive manufacturing process by polymerization and powder metallurgy
CO4	Classify nonmaterial and its characterization techniques
CO5	list various NC, CNC machine programming and automation techniques

Product Life Cycle Management (17ME835)	
CO1	Introduction to PLM, Need for PLM, opportunities and benefits of PLM, different views of PLM, components of PLM, phases of PLM, PLM feasibility study. PLM Strategies, strategy elements, its identification, selection and implementation. Product Data Management, implementation of PDM systems
CO2	Engineering design, organization and decomposition in product design, product design process, methodical evolution in product design, concurrent engineering, design for 'X' and design central development model. Strategies for recovery at end of life, recycling, human factors in product design. Modelling and simulation in product
CO3	New Product Development, Structuring new product development, building decision support system, Estimating market opportunities for new product, new product financial control, implementing new product development, market entry decision, launching and tracking new product program. Concept of redesign of product
CO4	Technological change, methods of technology forecasting, relevance trees, morphological methods, flow diagram and combining forecast of technologies Integration of technological product innovation and product development in business processes within enterprises, methods and tools in the innovation process according to the situation, methods and tools in the innovation process according to the situation

CO5	Virtual product development tools for components, machines, and manufacturing plants: 3D CAD systems, digital mock-up, model building, model analysis, production (process) planning, and product data technology, Product structures: Variant management, product configuration, material master data, product description data, Data models, Life cycles of individual items, status of items.

INTERNSHIP (17ME84)	
CO1	Take part in activities\Process happening in industry to familiarise the industry culture.
CO2	Involve in building the relationship between the industry and institute positively
CO3	Inspect the permitted departments in the industry to examine the advanced technology.
CO4	Analyze the complex engineering problems pertaining in that industry and suggest suitable solutions.
CO5	List the various activities involved in the industry and documents the same as per the university guidelines.

PROJECT PHASE II (17ME85)	
CO1	Interact with various industries and identify real world problem statement / identify problems in engineering and technology in selected field of interest.
CO2	Synthesize and apply the mechanical knowledge of engineering to design and implement solutions to open-ended problems
CO3	Design and Develop the concept with mechanical Engineering practices and standards.
CO4	Use different tools for communication, design, implementation, testing and report writing.
CO5	Analyzing professional issues, including ethical, legal, environmental and safety issues, related to project.

TECHNICAL SEMINAR (17MES86)

CO1	**Survey** the new technologies, methods, software tools associated with Mechanical Engineering
CO2	**Compare** and explain the solutions for problems associated with engineering, society and environment
CO3	**Analyze** the technical details in depth.
CO4	**Develop** the ability to document the study.
CO5	**Develop** communication skills.

DEPARTMENT OF TELECOMMUNICATION ENGINEERING

Digital Image Processing(17EC733)	
CO1	**Identify** the basic concepts and processes in digital image formation and processing.
CO2	**Utilize** mathematical operations in the spatial domain to enhance images
CO3	**Model** image restoration techniques and morphological operations
CO4	**Examine** sub band coding and wavelet transforms imageenhancement and multi-resolution
CO5	**Distinguish** analysis techniques to achieve image segmentation

IoT and Wireless Sensor Network (17EC752)	
CO1	Explain the architecture of WSN and IOT
CO2	Identify the communication protocols which best suits in WSN &IOT
CO3	Design the software for IOT application
CO4	Evaluate the design principles for WSN &IOT.
CO5	Design the cloud computing and prototyping

Optical communication (17TE71)	
CO1	**Choose** different types of optical fibers, fiber materials, and apply basic optical laws with necessary mathematical equations.
CO2	**Identify** various losses and connectors used in optical fibers
CO3	**Choose** different optical sources and detectors used in fiber optic communication along with various noise sources
CO4	**Apply** the concept of WDM and discuss different types of active and passive optical components and optical amplifiers with their characteristics.
CO5	**Identify** different transmission modes and protocols, Optical switching networks and Long haul networks.

WIRELESS COMMUNICATIONS (17TE72)	
CO1	Develop the concepts of Propagation Mechanisms and Models in wireless channels
CO2	Identify the concepts of Propagation Models in wireless channels And describe the fundamentals of Cellular Architecture
CO3	Analyze the different Multiple Access Techniques
CO4	Examine the overview of GSM system.
CO5	Analyse the concept of IS-95 and CDMA 2000