K S INSTITUTE OF TECHNOLOGY

PROGRAM OUTCOMES (POs)	
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 modelling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects 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.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

PROGRAM SPECIFIC OUTCOMES

PSO1: Ability to understand, analyse problems and implement solutions in Programming languages, as well to apply concepts in core areas of Computer Science in association with professional bodies and clubs.

PSO2: Ability to use computational skills and apply software knowledge to develop effective solutions and data to address real world challenges.

Course Outcomes for 2019-20 Courses	
1st SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**C Programming for Problem Solving**
Course Code	**18CPS13/23**
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**
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	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	**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	**17CS51**
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**
Course Code	**17CS52**

At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Able to analyze working of internet protocols at application level communication
CO2	Able to differentiate between reliable and unreliable communication and apply this knowledge to build robust applications
CO3	Understand IP subnetting and routing protocols
CO4	Apply networking knowledge to diagnose network communication and performance issues and understand wireless networking and mobile communications
CO5	Design and implement Network Systems and multimedia applications to meet desired performance needs
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**Database Management System**
Course Code	**17CS53**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS.
CO2	Use Structured Query Language (SQL) for database manipulation.
CO3	Design and build simple database systems
CO4	Develop application to interact with databases.
CO5	Use Transaction processing concepts to handle concurrency control
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**Automata Theory And Computability**
Course Code	**17CS54**
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	**Advanced JAVA And J2EE**
Course Code	**17CS553**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Interpret the need for advanced Java concepts like enumerations, auto boxing-unboxing and annotations, in developing concise and efficient programs
CO2	Make use of Java Collection framework to manipulates the group of objects, to build concise and efficient programs
CO3	Make use of String, StringBuffer and StringBuilder Classes to handle mutable and modifiable strings
CO4	Make use of servlets and Java Server Pages (JSP) to generate static and dynamic web pages, to store client information using cookies and sessions.
CO5	Demonstrate the use of JDBC to access database through Java applications and servlets.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**Atrificial Intelligence**
Course Code	**17CS562**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Summarize key components of AI field and its relation and role in Computer Science.
CO2	Utilize given AI technique to solve concrete problem and also to implement nontrivial AI technique.
CO3	Design various symbolic knowledge representations to specify domain and reasoning agent.
CO4	Identify AI problem based on characteristics ,constraints and compare various learning techniques.
CO5	Make use of different logic formalism and decision taking in planning problem.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**Dot Net Framework For Application Development**

Course Code	**17CS564**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Build the applications on Visual Studio .NET platform by understanding the syntax and semantics of C#
CO2	Utilize the concepts of classes and objects and also create value types with enumerations and structures.
CO3	Apply the concepts of inheritance, interfaces and garbage collection.
CO4	Build custom collections and generics in C#
CO5	Construct events and query data using query expressions
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**V**
Course Name	**Computer Network Laboratory**
Course Code	**17CSL57**
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	**17CSL58**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Construct tables with different data types and without constraints.
CO2	Experiment with SQL DML/DDL commands querying a table once it is populated.
CO3	Build SQL queries to extract the data from more than 1 table.
CO4	Create multiple tables by properly specifying the primary keys and the foreign keys to demonstrate on-delete-cascade and on-update-cascade concepts.
CO5	Develop database management real-world application for the societal need.

6TH SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**
Course Name	**Cryptograhy Network Scurity and Cyber Law**
Course Code	**17CS61**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Utilize the basics of Cryptography techniques for enhancing the security
CO2	Experiment with Cryptography algorithms and its need to various applications
CO3	Apply different Authentication mechanisms and make use of Security protocols
CO4	
CO5	Build different security technologies to secure WLAN
	Identify cyber security and need for cyber Law
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**
Course Name	**Computer Graphics and Visualization**
Course Code	**17CS62**
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	Illustrate 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	Decide suitable hardware and software for developing graphics packages using OpenGL.
CO5	Infer the representation of curves, surfaces, Color and Illumination models
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**
Course Name	**System Software and Compiler Design**
Course Code	**17CS63**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the working of System Software such as Assemblers and macroprocessors
CO2	Determine the functions and features of loaders and linkers
CO3	Make use of the Lexical analysis phase of the compiler to generate tokens
CO4	Utilize different parsers to parse the given input string

CO5	Construct the syntax directed definition, intermediate code and target code for any given program
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**
Course Name	**Operating Systems**
Course Code	**17CS64**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the need and various types of Operating Systems.
CO2	Apply suitable techniques for process scheduling, synchronization and thread management.
CO3	Make use of deadlock and memory management schemes for managing the operating system.
CO4	Determine the need of demand paging, file and directory management.
CO5	Apply suitable technique for disk scheduling and protection in operating system.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**
Course Name	**Operation Research**
Course Code	**17CS653**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	**Model** the given problem as transportation and assignment problem and solve.
CO2	**Apply** game theory for decision support system.
CO3	**Make use of** the concepts of operation Research and **Apply** them to solve the linear Programming problems.
CO4	**Select** and **apply** optimization techniques for various problems.
CO5	**Solve** Linear Programming problems using another optimization technique (using dual simplex method)
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VI**
Course Name	**Python Application Programming**
Course Code	**17CS664**
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	**VI**
Course Name	**System Software and Compiler Design Laboratory**
Course Code	**17CSL67**
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	**17CSL68**
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	**15CS71**
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	**15CS72**
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	**15CS73**
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	**Natural Language Processing**
Course Code	**15CS741**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Apply grammar based and statistical language modelling to analyze natural language text.
CO2	Evaluate regular expression, finite state automata, context free grammar and parsing
CO3	Examine concepts of Text mining and importance of natural language.
CO4	Survey on various approaches to analyze text and generate natural language.
CO5	Design various models of information retrieval.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VII**
Course Name	**Information And Network Security**
Course Code	**15CS743**
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	**15CS754**
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	**15CSL76**
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	**15CSL77**
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	**15CSP78**
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	**15CS81**
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	**VIII**
Course Name	Big Data Analytics
Course Code	**15CS82**
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 Software and Compiler Design
Course Code	15CS834

At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify characteristics of human, graphical, web user interface and various obstacles in user interface design process.
CO2	Determine the problems in menu creation, window design with colour, text and graphics.
CO3	Make use of the menus and window with its controls in the design process
CO4	Make use of UID principles, feedback and multimedia in design process.
CO5	Utilize control combination and user interfaces over all aspects of technology by various testing methods
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**VIII**
Course Name	Internship / Professional Practice
Course Code	**15CS84**
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	**15CSP85**
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	**15CSS86**
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	**Mathematics**
Course Code	**18SCS11**
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	Utilize the statistical tools in multi variable distributions.
CO3	Use probability formulations for new predictions with discrete and continuous RV's.
CO4	To understand various graphs in different geometries related to edges.
CO5	Understand vector spaces and related topics arising in magnification and rotation of images.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**Advances In Operating Systems**
Course Code	**18SCS12**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify Operating system responsibilities, modern types and process management.
CO2	Make use of threads and virtual memory management concepts.
CO3	Utilize multiprocessor and real time scheduling to improve operating system performance.

CO4	List embedded operating system characteristics, types of security threats and attacks.
CO5	Examine general operating system and windows NT/2000/XP kernel organization aspects.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**Advances In Data Base Management**
Course Code	**18SCS13**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the fundamental concepts of Databases and parallel, distributed databases and its applications
CO2	Make use of the Object oriented Databases and Implementation of related issues for extended type systems.
CO3	Develop the Distributed DBMS architectures and Storing data in a Distributed DBMS
CO4	Obtain effective Implementation techniques for OLAP and Clustering Similarity search over sequences.
CO5	Inspect various Active database concepts, triggers and Deductive Databases
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**Internet Of Things**
Course Code	**18SCS14**
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	Identify IoT Mechanism and Key Technologies.
CO3	Examine the Layered Connectivity and IPV6 Technologies.
CO4	Discover the practical knowledge through different case studies.
CO5	Inspect the data sets received through IoT devices and tools used for analysis.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**Advances In Computer Networks**
Course Code	**18SCS151**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Build the network services, protocols and architectures.

CO2	Choose key Internet applications and their protocols to develop their own applications using the sockets API.
CO3	Develop effective communication mechanisms using techniques like connection establishment, queuing theory and recovery.
CO4	Examine various congestion control techniques.
CO5	Inspect the concept of resource allocation.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**IoT And ADBMS Lab**
Course Code	**18SCSL16**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Develop practical knowledge on advance database systems.
CO2	Identify several features of ADBMS to implement its applications.
CO3	Examine the applications of Internet of Things.
CO4	Discover the practical knowledge of communication of motes.
CO5	Inspect the data received through IoT devices to solve real-time issues.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**I**
Course Name	**Research Methodology And IPR**
Course Code	**18RMI17**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Understand the overview of the research methodology and explain the technique of defining a research and the functions of the literature review in research.
CO2	Infer from the literature search, its review, Interpret theoretical and conceptual frameworks and writing a review.
CO3	Outline the various research designs and explain the details of sampling designs, and also different methods of data collections.
CO4	Summarize the art of interpretation and the art of writing research reports
CO5	Illustrate the various forms of the intellectual property, its relevance and business impact in the changing global business environment.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Managing Big Data**
Course Code	**18SCS21**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**

CO1	Determine big data and its use cases from selected business domains
CO2	Make Use of NoSQL big data management
CO3	Experiment with Hadoop and HDFS by Installing and configuring.
CO4	Contrast the performance of map-reduce analytics using Hadoop
CO5	Inspect Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data Analytics
2nd SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Advanced Algorithms**
Course Code	**18SCS22**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Compare the growth functions of different recurrence equations.
CO2	Utilize the different graph algorithms like Bellman – Ford, Johnson's,etc.
CO3	Make use of the Number theoretic algorithms such as Chinese remainder theorem, RSA cryptosystem , etc.
CO4	Apply String-Matching Algorithms such as Naïve string Matching, Knuth-Morris-Pratt algorithm, Boyer – Moore algorithm.
CO5	Choose Probabilistic and Randomized Algorithms like Monte Carlo and Las Vegas algorithms.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Cloud Computing**
Course Code	**18SCS23**
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, Choose the appropriate cloud player
CO4	Identify the core issues of cloud computing such as security, privacy and interoperability
CO5	Design Cloud Services and set a private cloud
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Advances In Storage Area Network**
Course Code	**18SCS241**

At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Identify the need for performance evaluation and the metrics used for it
CO2	Apply the techniques used for data maintenance.
CO3	Realize strong virtualization concepts.
CO4	Develop techniques for evaluating policies for LUN masking, file systems
CO5	Develop techniques with the use of SNMP, CIM and WBEM .
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Object Oriented Software Engineering**
Course Code	**18SCS251**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Discuss and implement images and objects using 3D representation
CO2	Identify the and openGL methodologies.
CO3	Design and develop surface detection using various detection methods.
CO4	Choose various illumination models for provides effective standards of objects.
CO5	Design of develop effective computer animations.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Mini Project**
Course Code	**18SCSL26**
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	
CO3	Develop and implement the system as per proposed design methodology.
CO4	Compare the findings of proposed system with competing systems using appropriate technology
CO5	Create appropriate technical documentation going in-hand with discipline
	Build team work and communication skills.
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**II**
Course Name	**Technical Seminar**
Course Code	**18SCSL27**
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.

4th SEMESTER	
Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**IV**
Course Name	**Machine Learning Techniques**
Course Code	**17SCS41**
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 and Bayes Classifier to solve the problems in Machine Learning
CO4	CExamine Candidate elimination algorithm, and EM algorithm for problems appear in Machine Learning
CO5	Inspect Back propagation algorithm, Estimating Hypotheses, Instance based Learning and Reinforcement learning

Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**IV**
Course Name	**Wireless Network And Mobile Computing**
Course Code	**17SCS424**
At the end of this course, the student will be able to:	
Course Outcome #	**Course Outcome**
CO1	Explain, Analyze and applt therole of SSM, GPRS, 3G and WiMax technologies in wireless networks.
CO2	Apply the principles of mobile computing technologies.
CO3	Identify and learn about traditional and modern network technologies and mobile computing. (Understand Mobile OS, Mobile Computing Environment

CO4	Explain CDMA, GSM, Mobile IP, WiMax and differene Mobile OS.
CO5	Demonstrate program for CDLC, MIDP let model and security concerns.

Class	**COMPUTER SCIENCE & ENGINEERING**
Semester	**IV**
Course Name	**Evaluation Of Project Phase -2**
Course Code	**17SCS43**
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.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

PROGRAM SPECIFIC OUTCOMES

PSO1: Graduate should be able to understand the fundamentals in the field of Electronics and Communication and apply the same to various areas like Signal processing, embedded systems, Communication & Semiconductor technology.
PSO2: Graduate will demonstrate the ability to design, develop solutions for Problems in Electronics and Communication Engineering using hardware and software tools with social concerns.

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 Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
18MAT31.4	Determine the externals of 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 transient behavior and initial conditions to find response of RLC circuits.
18EC32.4	Apply Laplace transforms and transient analysis to find response of RLC circuits.
18EC32.5	Determine the various parameters of Series and Parallel resonance circuits and analyze two port network parameters.

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 the 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 Quine Mc-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 working of stacks, queues, subroutines and handling different types of interrupts.
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	**Compute** the parameters from the characteristics of power diodes and rectifier circuits using power diodes.
18ECL37.3	**Analyse** the characteristics of photodiode,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	**Identify** the truth table of various expressions and combinational circuits using logic gates.
18ECL38.2	**Design** and test various combinational circuits such as adders, subtractors, comparators, multiplexers.
18ECL38.3	**Develop** Boolean expressions using decoders.
18ECL38.4	**Construct** flips-flops, counters and shift registers
18ECL38.5	**Simulate** Serial Binary Adder and Binary Multiplier

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	**Identify** the performance characteristics and parameters of BJT and FET amplifier using small signal model.
18EC42.2	**Design and Analyze** the MOSFET amplifier and Oscillator circuits.
18EC42.3	**Design and Analyze** the BJT power amplifier.
18EC42.4	**Identify** the functioning and application of linear ICs.
18EC42.5	**Design of** Linear IC based circuits Like DAC, ADC ,Rectifier and Filters.

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 Random events in typical communication events to extract quantitative statistical parameters.
18EC44.4	Analyze vectors and vector spaces using suitable transformations and basis function sets.
18EC44.5	Analyze the concept of Multiple Random variables to extract quantitative statistical parameters.

Course code 18EC45	Course: SIGNALS AND SYSTEMS
18EC45.1	**Apply** the basic operations on signals and classify elementary signals.
18EC45.2	**Classify** the various systems and analyze the concepts of convolution sum & integral on signals and
18EC45.3	**Examine** 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 by calculating 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 17ES51	**Course: MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT**
17ES51.1	**Identify** the different fundamental concepts of Management and Entrepreneurship.
17ES51.2	**Select** the best Entrepreneurship model for the required domain of establishment.
17ES51.3	**Explain** the functions of Managers, Entrepreneurs and their social responsibilities.
17ES51.4	**Survey** the Institutional support by various state and central government agencies
17ES51.5	**Apply** the knowledge of Project Formulation and Evaluation Techniques

Course code 17EC52	**Course: DIGITAL SIGNAL PROCESSING**

17EC52.1	**Construct** the frequency domain sampling and reconstruction of discrete time signals.
17EC52.2	**Make use of** the properties and develop efficient algorithms for the computation of DFT.
17EC52.3	**Construct** FIR and IIR filters in different structural forms.
17EC52.4	**Utilize** the procedures to design IIR filters from the analog filters using impulse invariance and bilinear transformation.
17EC52.5	**Identify** the different windows used in the design of FIR filters and design appropriate filters based on the specifications.

Course code 17EC53	**Course: VERILOG HDL**
17EC53.1	**Identify** the history and programming basci's of verilog hdl
17EC53.2	**Design** digital circuit/system and test benches
17EC53.3	**Identify** the suitable abstraction level for a particular digital design
17EC53.4	**Apply** the timing controls through Verilog HDL
17EC53.5	**Develop** simple programs in VHDL using different styles

Course code 17EC54	**Course: INFORMATION THEORY AND CODING**
17EC54.1	**Make use of** the concepts of dependent & independent source to measure the information, entropy, rate of information and order of a source.

17EC54.2	**Construct** the information codes using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding Algorithms.
17EC54.3	**Model** the continuous and discrete communication channels using input, output and joint probabilities.
17EC54.4	**Develop** a codeword comprising of the check bits computed using Linear Block codes, cyclic codes & convolution codes
17EC54.5	**Examine** the encoding and decoding circuits for Linear Block codes, cyclic codes, convolution codes, BCH and Golay codes.

Course code 17EC553	**Course: OPERATING SYSTEMS**
17EC553.1	**Identify** the role of operating system
17EC553.2	**Analyze** scheduling policies and deadlock situations
17EC553.3	**Apply** file organization and IOCS techniques
17EC553.4	**Analyze** memory management techniques for efficient storage
17EC553.5	**Identify** message passing techniques

Course code 17EC562	**Course: Object Oriented Programming Using C++**
17EC562.1	**Apply** Encapsulation, Inheritance and Polymorphism.
17EC562.2	**Utilize** Object Oriented approach to solve problems
17EC562.3	Examine problem statements and build object oriented models to solve the problems after **analysing** the objects that constitute the system.
17EC562.4	**Build** solutions using function overloading, operator overloading and virtual functions.

17EC562.5	**Identify** advantages of object oriented programming over procedure oriented programming.

Course code 17EC563	**Course: 8051 Microcontroller**
17EC563.1	**Distinguish** the role of functional units in the architecture of 8051 microcontroller
17EC563.2	**Identify** various instructions of 8051 Microcontroller
17EC563.3	**Build** solutions using assembly level language and high level language
17EC563.4	**Make use of** timers/counters, serial port and interrupts to generate delay and perform serial communication
17EC563.5	**Design** interfacing of peripherals to 8051 Microcontroller

Course code 17ECL57	**Course: DSP LAB**
17ECL57.1	**Apply** sampling theorem and effective reconstruction of signal.
17ECL57.2	**Compute** the DFT for a discrete signal and verification of its properties using MATLAB.
17ECL57.3	**Solve** difference equations and perform different operations on discrete time signals

17ECL57.4	**Design** IIR and FIR filters for the given specifications.
17ECL57.5	**Build** DSP computations on TMS processor and verify the result

Course code 17ECL58	**Course: HDL LAB**
17ECL58.1	**DEVELOP** AND Write the Verilog/VHDL programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions
17ECL58.2	**DEVELOP** AND Describe sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms
17ECL58.3	**DEVELOP** AND Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware
17ECL58.4	**DEVELOP** AND Interface the hardware to the programmable chips and obtain the required output
17ECL58.5	**DEVELOP** HARDWARE DESCRIPTIVE PROGRAMMES USING Verilog or VHDL for a given Abstraction level

Course code 17EC61	**Course: DIGITAL COMMUNICATION**
17EC61.1	**Develop** the concepts of Band pass sampling to well specified signals and channels.
17EC61.2	**Utilize** the performance parameters and transfer rates for low pass and bandpass symbol under ideal and corrupted non band limited channels.
17EC61.3	**Identify** valid symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.
17EC61.4	**Identify** the bandpass signals when subjected to corruption and distortion during transmission over a bandlimited channel.
17EC61.5	**Identify** the need for data security using spread spectrum technique and error rate calculation.

Course code 17EC62	Course: ARM MICROCONTROLLER AND EMBEDDED SYSTEM
17EC62.1	**Construct** the architectural features and instructions of 32 bit microcontroller ARM Cortex M3.
17EC62.2	**Make use of** the knowledge gained for Programming ARM Cortex M3 for different applications.
17EC62.3	**Identify** the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
17EC62.4	**Develop** the hardware/software co-design and firmware design using ARM Cortex M3.Instruction set.
17EC62.5	**Analyze** the need of real time operating system for embedded system applications

Course code 17EC63	Course: VLSI DESIGN
17EC63.1	**Utilize** the concept of basic MOS transistor, CMOS fabrication flow and technology scaling.
17EC63.2	**Make use of** the knowledge of physical design aspects to make stick and layout diagrams for various gates.
17EC63.3	**Identify** the concept of Memory elements along with timing considerations with scaling fundamentals
17EC63.4	**Experiment with** the basic knowledge of FPGA based system design and testability issues in VLSI Design
17EC63.5	**Analyze** the various CMOS subsystems and architectural issues with the design constraints.

Course code 17EC64	Course: COMPUTER COMMUNICATION NETWORK

17EC64.1	**Make use of** the layering architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite.
17EC64.2	**Identify** the protocols and services of Data link layer and Media access control.
17EC64.3	**Distinguish** wired and wireless LANS architectures, protocols and the associated connecting devices.
17EC64.4	**Analyse** the packetizing, routing and forwarding services and associated protocols of Network layer.
17EC64.5	**Analyse** the protocols and functions associated with the transport layer services.

Course code 17EC651	**Course: CELLULAR MOBILE COMMUNICATION**
17EC651.1	**Identify** the statistical characterization of urban mobile channels to compute the performance for simple modulation schemes. **Identify different modulation Schemes**
17EC651.2	**Identify** the functionalities of GSM, GPRS and CDMA to meet high data rate requirements and limited improvements that are needed
17EC651.3	**Analyse** the call process procedure between a calling number and called number for all scenarios in GSM or CDMA based systems .**Identify different standards**
17EC651.4	**List** and validate voice / data call handling for various scenarios in GSM and CDMA systems for national and international interworking situations
17EC651.5	**Examine** voice and data call handling for various scenarios CDMA systems for national and international interworking situations

Course code 17EC654	**Course: DIGITAL SWITCHING SYSTEM**

17EC654.1	**Identify** the basic concepts and parameters of telecommunication networks and services.
17EC654.2	**Identify** the basic concepts and parameters of telecommunication networks and services.
17EC654.3	**Model** the traffic flow in lost call systems and queuing systems.
17EC654.4	**Organize** the digital switching software architecture for various levels of control.
17EC654.5	**Identify** the software aspects of switching systems and its maintenance.

Course code 17EC661	**Course: DATA STRUCTURES USING C++**
17EC661.1	**Apply** data structure concepts to simple real life examples and understand the underlying concepts.
17EC661.2	**Build** solutions that use Linear Data Structures meaningfully.
17EC661.3	**Analyze** different Data Structures.
17EC661.4	**Compare** different Data Structures for time and memory complexity.
17EC661.5	**Choose** appropriate Data Structures and use them to build a system that requires two or more Data Structures.

Course code 17EC663	**Course: DIGITAL SYSTEM DESIGN USING VERILOG**
17EC663.1	**Construct** the combinational circuits, using discrete gates and programmable logic devices

17EC663.2	**Build** Verilog model for sequential circuits and test pattern generation
17EC663.3	**Design** a semiconductor memory for specific chip design
17EC663.4	**Design** embedded systems using small microcontrollers, larger CPUs/DSPs, or hard or soft processor cores
17EC663.5	**Analyse** different types of processor and I/O controllers that are used in embedded system

Course code 17ECL67	**Course: EMBEDDED CONTROLLER LAB**
17ECL67.1	**Apply** the instruction set of 32 bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language.
17ECL67.2	**Develop** assembly language programs using ARM Cortex M3 for different applications
17ECL67.3	**Develop** C language programs to interface external devices and I/O with ARM Cortex M3.
17ECL67.4	**Develop** C language programs for embedded system applications.
17ECL67.5	**Develop** C language programs which makes use of library functions for embedded system applications.

Course code 17ECL68	**Course: COMPUTER NETWORKS LAB**
17ECL68.1	**Illustrate** the operations of network protocols and algorithms using C programming.
17ECL68.2	**Utilize** the network simulator for learning and practice of networking algorithms.

17ECL68.3	**Build** the network with different configurations to measure the performance parameters.
17ECL68.4	**Develop** the data link and routing protocols using C programming.
17ECL68.5	**Develop** wired and wireless LAN protocol using network simulator

Course code 15EC71	**Course: MICROWAVE AND ANTENNA**
15EC71.1	**Identify** the working of Reflex Klystron by studying the mode curves and also understand transmission lines structure along with its line equations using smiths charts to calculate the reflection coefficient, SWR, input and load impedance
15EC71.2	**Solve** for Microwave network parameters using S –Matrix also study Passive microwave devices like Connectors, Adapters Attenuators, Tees and phase shifters
15EC71.3	**Identify** the different types of Strip lines and understand the antenna basics to find various parameters like antenna gain, directivity.
15EC71.4	**Classify** the point source Isotropic antenna and Electric dipole
15EC71.5	**Identify** loop, Horn antenna and the Helical antenna by making use of the design considerations

Course code 15EC72	**Course: DIGITAL IMAGE PROCESSING**
15EC72.1	**Identify** the elements, components, steps, applications, and basic operations in digital image formation and processing.
15EC72.2	**Utilize** basic mathematical operations for (Gray/Colour) image enhancement in spatial domain
15EC72.3	**Model** image restoration techniques and make use of morphological

	operations in image processing
15EC72.4	**Examine** application of Fourier Transforms and wavelets in image enhancement and multi-resolution
15EC72.5	**Distinguish** image analysis techniques for image segmentation, representation and description.

Course code 15EC73	**Course: POWER ELECTRONICS**
15EC73.1	**Identify** the basic operation of various power semiconductor devices and their applications.
15EC73.2	**Identify** the characteristics of SCR and construct commutation and gate triggering circuits for SCR
15EC73.3	**Make use of** firing circuits model to analyse the AC Voltage controller and rectifier Circuits.
15EC73.4	**Analyze** applications of Power electronics in Chopper and Static Switching Operation
15EC73.5	**Analyze** applications of Power electronics for generating PWM in Inverter Circuits.

Course code 15EC744	**Course: CRYPTOGRAPHY**
15EC744.1	**Explain** the fundamental concepts, principles and theories of cryptography.
15EC744.2	**Make use of** the concepts of generating pseudo random numbers required for cryptographic applications.
15EC744.3	**Utilize** the various concepts of number theory in cryptography.
15EC744.4	**Discover** the prominent techniques used for public-key cryptosystems and digital signature schemes.

15EC744.5	**Assess** one way hash functions for data encryption.

Course code 15EC755	**Course: SATELLITE COMMUNICATION**
15EC755.1	**Identify** the various applications of satellite orbits and its trajectories and subsystem parameters associated with it.
15EC755.2	**Utilize** the electronic hardware requirements associated with the satellite subsystem and earth station.
15EC755.3	**Make use of** the satellite link parameters under various propagation conditions and applications with the different multiple access techniques.
15EC755.4	**Develop** the knowledge of communication satellite and focus on national satellite system.
15EC755.5	**Distinguish** applications of satellite in different domains such as remote sensing, weather forecasting and navigation.

Course code 15ECL76	**Course: ADVANCED COMMUNICATION LAB**
15ECL76.1	**Make use of** the characteristics and response of microwave devices
15ECL76.2	**Utilize** the characteristics of micros trip antennas and measurement of its parameters.
15ECL76.3	**Construct** the digital modulation schemes with the display of waveforms and computation of performance parameters

15ECL76.4	**Make use of** the characteristics of Optical Fibre Communication and calculate the parameters associated with it.
15ECL76.5	**Model** different digital communication concepts using simulation

Course code 15ECL77	**Course: VLSI LAB**
15ECL77.1	**Model** basic digital circuits,simulate and synthesize using EDA Tool.
15ECL77.2	**Make use of** logic gates to realize shift registers and adders to meet desired parameters.
15ECL77.3	**Construct** and generate layout structure for basic CMOS circuits like inverter, common source amplifier and differential amplifier.
15ECL77.4	**Experiment with** the basic amplifiers to design higher level circuits like operational amplifier and analog/digital converters to meet desired parameters.
15ECL77.5	**Inspect** concepts of DC Analysis, AC Analysis and Transient Analysis in analog circuits.

Course code 15ECP78	**Course: PROJECT WORK PAHSE I**
15ECP78.1	Carry out Literature **survey** in their specific area of interest.
15ECP78.2	**Identify** the Problem statement and technology used.
15ECP78.3	**Formulate** specific Objectives and methodology.
15ECP78.4	**Develop** technical writing and presentation skills.
15ECP78.5	**Develop** leadership qualities through effective team work.

Course code 15EC81	Course: WIRELESS CELLULAR AND LTE 4G BROADBAND
15EC81.1	**Make use of** the system architecture and the functional standard specified in LTE 4G.
15EC81.2	**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.
15EC81.3	**Utilize** the UTRAN and EPS handling processes from set up to release including mobility management for a variety of data call scenarios.
15EC81.4	**Identify** the difference between uplink , down link and the physical layer procedures that provide the services to upper layers.
15EC81.5	**Utilize** the Performance of resource management and packet data processing and transport algorithms.

Course code 15EC82	Course: FIBER OPTIC NETWORKS
15EC82.1	**Classify and explain** the working of optical fiber with different modes of signal propagation.
15EC82.2	**Utilize** the concepts of transmission characteristics to obtain the losses in optical fiber communication.
15EC82.3	**Identify** the construction and working principle of optical connectors, multiplexers and amplifiers.
15EC82.4	**Analyze** the constructional features and the characteristics of optical sources and detectors.
15EC82.5	**Examine** the networking aspects of optical fiber and describe various standards associated with it.

Course code 15EC833	Course: RADAR ENGINEERING

15EC833.1	**Identify** the fundamentals of radar, tracking and antennas
15EC833.2	**Make use of** the radar equation and process digital MTI with its applications
15EC833.3	**Utilize** principle of doppler frequency shift and explain tracking radar antennas
15EC833.4	**Develop** tracking radar and sequential lobbing
15EC833.5	**Analyze** radar antenna parameters and tracking range

Course code 15EC834	**Course: MACHINE LEARNING**
15EC834.1	**Build** the fundamental concepts of Machine learning.
15EC834.2	**Make use of** the underlying mathematical relationships within and across Machine Learning algorithms.
15EC834.3	**Identify** the paradigms of supervised and un-supervised learning.
15EC834.4	**Develop** a real-world problem and apply the learned techniques of Machine Learning to solve the problem.
15EC834.5	**Inspect** Perfect Domain Theories, Inductive-Analytical Approaches and Reinforcement Learning.

Course code 15EC84	**Course: INTERNSHIP**
15EC84.1	**Examine** the *knowledge* and skills acquired in the classroom to a professional context
15EC84.2	**Apply** the methods for solving the complex problems
15EC84.3	**Develop** the organizational skills
15EC84.4	**Develop** the ability to write the report

15EC84.5	**Develop** the skills for communication and team working

Course code 15ECP85	**Course: PROJECT WORK PHASE II**
15ECP85.1	**Build** the block diagram using hardware required for the project.
15ECP85.2	**Develop** the software required for the project.
15ECP85.3	**Test** for functionality of the project
15ECP85.4	**Develop** team work and communication skills
15ECP85.5	**Design** the project as per the specifications

Course code 15ECS86	**Course: SEMINAR**
15ECS86.1	**Survey** the new technologies, methods, hardware and software tools associated with Electronics & Communication Engineering
15ECS86.2	**Compare** and explain the solutions for problems associated with engineering, society and environment
15ECS86.3	**Analyze** the study material in depth.
15ECS86.4	**Develop** the ability to document the study.
15ECS86.5	**Develop** communication skills.

DEPARTMENT OF MECHANICAL ENGINEERING

PROGRAM SPECIFIC OUTCOMES

PSO1: Ability to apply concept of mechanical engineering to design a system, a component or a process/system to address a real world challenges

PSO2: Ability to develop effective communication, team work, entrepreneurial and computational skills

COURSE: ENGG. MATHEMATICS – III	**COURSE CODE: 18MAT31**
18MAT31.1	Make use of Fourier series to analyze wave forms of periodic functions
18MAT31.2	Make use of Fourier transforms and Z - transforms to analyze wave forms of non-periodic functions
18MAT31.3	Identify statistical methods to find correlation and regression lines, also numerical methods to solve transcendental equations.
18MAT31.4	Utilize Numerical techniques for various finite difference technique problems
18MAT31.5	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.

Course: Mechanics Of Materials	
18ME32.1	Utilize the concept of mechanics to solve the art of state problems on stress & strain
18ME32.2	Make use of the concept of stress and strain to solve compound stress and cylinder problems.
18ME32.3	Construct Shear Force and Bending Moment model of beam application and solve for its stresses
18ME32.4	Utilization of pure torsion & column equations in structural application
18ME32.5	Select theory of failure & strain energy equation for solving engineering problems

Course :Basic Thermodynamics	
18ME33.1	**Identify** thermodynamic systems, properties, Zeroth law of thermodynamics, temperature scales , work and heat interactions
18ME33.2	**Determine** heat, work, internal energy, enthalpy for flow & non flow process using First and Second Law of Thermodynamics
18ME33.3	**Calculate** change in internal energy, change in enthalpy, change in entropy, efficiency and COP for reversible and irreversible process

18ME33.4	**Make use of** the behaviour of pure substances and its applications to practical problems and also compare the availability and Irreversibility.
18ME33.5	**Evaluate** the properties of ideal, real gases and air- water mixture.

Course: Material Science	
18ME34.1	**Interpret** the basic concepts of crystal structure, concepts of diffusion, mechanical behaviour of materials and various modes of failure.
18ME34.2	**Classify** solid solutions, interpret equilibrium phase diagrams of ferrous and nonferrous alloys and mechanism of solidification.
18ME34.3	**Relate** suitable heat-treatment process to achieve desired properties of metals and alloys
18ME34.4	**Interpret** the properties and applications of various materials like ceramics, plastics and Smart materials.
18ME34.5	**Identify** various composite materials and their processing as well as applications.

Course: COMPUTER AIDED MACHINE DRAWING	
18ME36.1	Develop the sectional views of the solids and Draw the orthographic views of the machine components by using CAD software.
18ME36.2	Build the 2D views and 3D drawings of simple machine parts/ Threaded fasteners/ Riveted joints.

18ME36.3	Construct the views of machine elements including keys, Couplings and joints.
18ME36.4	Inspect Limits, Fits, Tolerances and level of surface finish of machine elements.
18ME36.5	Create 2D and 3D models by standard CAD software with manufacturing considerations.

Course: MATERIALS TESTING LAB	
18MEL37.1	**Understand** & acquire experimentation skills in the field of material testing.
18MEL37.2	**Understanding** of the mechanical properties of materials by performing experiments.
18MEL37.3	Apply the knowledge to analyze a material failure and determine the failure inducing agent/s.
18MEL37.4	Apply the knowledge of testing methods in related areas.
18MEL37.5	Evaluate how to improve structure/behaviour of materials for various industrial applications.

Course: Machine Shop Lab	
18MEL38A.1	Perform turning , facing , knurling , thread cutting, tapering , eccentric turning and allied operations, Perform keyways / slots , grooves etc using shaper
18MEL38A.2	Perform gear tooth cutting using milling machine.
18MEL38A.3	Understand the formation of cutting tool parameters of single point cutting tool using bench grinder / tool and cutter grinder
18MEL38A.4	Understand Surface Milling/Slot Milling.
18MEL38A.5	Exhibit interpersonal skills towards working in a team.

COURSE: ENGG. MATHEMATICS – IV	**COURSE CODE: 18MAT41**
18MAT41.1	Apply Numerical methods to obtain the solution of fist order and first degree differential equations.
18MAT41.2	Make use of probability theory on discrete and continuous random variables to obtain the solution of problems on different distributions and joint probability distribution.

18MAT41.3	Identify the problems on sampling distribution and on markov chains in attempting the engineering problems for feasible random events.
18MAT41.4	Utilize the Bessel's and Legendre functions for the problems arising in engineering fields.
18MAT41.5	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

Course: Applied Thermodynamics	
18ME42.1	**Identify** the basic thermodynamic cycles like otto,Diesel, Dual and gas turbine cycles applied in IC engine and gas turbine Applications .
18ME42.2	**Apply** Basic thermo dynamic cycles used in the steam power plants for power productions based on Rankine cycle .
18ME42.3	**Build** combustion parameters for correct heat combustion for given air fuel ratio, efficiency calculations along with performance and testing of IC Engines.
18ME42.4	**Construct** refrigeration systems based on various refrigeration cycles along with air conditioning systems.
18ME42.5	**Make use of** the basic formulations for reciprocating compressors and steam nozzles for efficiency and effect of friction

Course: Fluid Mechanics	
18ME43.1	Identify the need of the fluid properties used for the analysis of fluid behavior.
18ME43.2	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
18ME43.3	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.
18ME43.4	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.
18ME43.5	Solve the industrial related gas turbine and engines problems using the basic concept of compressible flow and CFD.

Course: KINEMATICS OF MACHINERY	
18ME44.1	**Understanding** the basic terminology of planar mechanisms and their motion study.

18ME44.2	**Model** displacement diagrams for followers with various types of motions and Cam profile drawing for various followers.
18ME44.3	**Evaluating** the transmission of power by application of various gears and gear trains.
18ME44.4	**Constructing** velocity and acceleration diagrams for planar mechanisms by Graphical method
18ME44.5	**Inspect** velocity and acceleration of planar mechanisms by complex algebra method and kinematic synthesis of four bar and slider crank kinematic chain

Course: Metal Casting and Welding	
18ME45 .1	Classify the casting process, different moulding techniques, pattern, Core, and Gating, Riser system and Molding Machines.
18ME45 .2	Explain working and parameters of different furnaces and the different casting Techniques.
18ME45 .3	Illustrate about the Solidification process in and Casting of ferrous and Non-Ferrous Metals.
18ME45 .4	Make use of the knowledge of the welding process used in manufacturing.
18ME45 .5	Make use of the Metallurgical aspects in Welding and inspection Methods for the quality assurance of components made of casting and joining process in the manufacturing industry

Course: Mechanical Measurements and Metrology	
18ME46B.1	**Explain** the basic concepts of metrology, standards of measurement and working principles of different comparators.
18ME46B.2	**Select** the limits of size, fits, geometric and position tolerances, gauges and their design and calibration process of instruments such as slip gauges, sine bar, sine center and Autocollimator.
18ME46B.3	**Interpret** the nomenclature and measuring methods of screw threads and gears.
18ME46B.4	**Illustrate** the measurement systems, transducers, intermediate modifying devices and terminating devices.
18ME46B.5	**Summarize** the functioning of force, torque, pressure, strain and temperature measuring devices.

Course: Mechanical Measurements and Metrology lab	
18MEL47B.1	**Explain** calibration of pressure gauge, thermocouple, LVDT, load cell and micrometer
18MEL47B.2	**Find** angle using Sine Center/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.

18MEL47B.3	**Obtain** measurements using Optical Projector/Tool maker microscope, Optical flats.
18MEL47B.4	Determine cutting tool forces using Lathe/Drill tool dynamometer.
18MEL47B.5	Find Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth Vernier/Gear tooth micrometer.

Course: FOUNDRY AND FORGING LAB	
18MEL48B.1	**Analyze** and optimize foundry sand, core sand to a particular application.
18MEL48B.2	**Build** moulds with or without patterns.
18MEL48B.3	**Understand** casting of ferrous and nonferrous objects.
18MEL48B.4	**Develop** skills in making forging models manually and also with the use of power hammers.

MANAGEMENT AND ENGINEERING ECONOMICS(17ME51)	
17ME51.1	**Explain** the concepts of management and understand the importance of planning, organizing, staffing, directing and controlling in the development of organization.
17ME51.2	**Understand** comprehensive concepts of engineering and economics and identify the alternative uses of limited resources to select the prefered course of action for decision makers.
17ME51.3	**Apply** suitable organizational structure, motivation theories with sound communication tools.
17ME51.4	**Solve** compound interest factors, different economic models such as PWC, FWC, AEC & Rate of return in the process of decision making.
17ME51.5	**Calculate** the total cost of the products and depreciation of assets using different methods.

DYNAMICS OF MACHINERY(17ME52)	
17ME52.1	**Design** centrifugal governors and understand the gyroscopic effect on ships, aeroplanes & vehicles
17ME52.2	**Build** the concept of balancing rotating and reciprocating parts in machinery.
17ME52.3	**Identify** the effect of static and dynamic equilibrium of forces in planar mechanisms.
17ME52.4	**Examine** the concept of SHM and interpret natural frequencies of Undamped free vibrations.
17ME52.5	**Inspect** the nature of damped free vibrations, Forced vibration of single degree freedom systems.

TURBOMACHINES(17ME53)	
17ME53.1	**Identify** the difference between power generating and power absorbing Turbo machines and utilize this concept to develop and understand the concepts of Hydraulic Turbines
17ME53.2	**Make use of** the Bucking Ham's Pi theorem method to develop the non-dimensional numbers of Turbo machines and understand the concept of model similarity.
17ME53.3	**Organize** the steam turbines as impulse and reaction turbines and compare the performance of single and compounded stage steam turbine
17ME53.4	**Identify** the difference between single and multi-stage centrifugal pumps and compressors
17ME53.5	**Utilize** the concept of utilization factor and Degree of reaction for the analysis of axial and radial flow turbines

DESIGN OF MACHINE ELEMENTS-I(17ME54)	
17ME54.1	Identify codes and standards in design process to solve problems on static loading.
17ME54.2	Solve problems on machine components under impact, fatigue loading using failure theories.
17ME54.3	Choose suitable equation to solve the art of state problems on joints and couplings
17ME54.4	Select equation for solving problems on fasteners and riveted joints
17ME54.5	Make use of codes and standards for designing keys, Shafts and welding joints

ENERGY AND ENVIRONMENT(17ME562)	
17ME562.1	Understand the basic concepts of energy, sources of energy, its distribution, world energy production & distribution and key energy trends in India.
17ME562.2	Understand the role of environment, eco system and need for environmental awareness.
17ME562.3	Interpret the various types of environment pollution and their effects on human beings
17ME562.4	Discuss the social issues of the environment with associated acts.
17ME562.5	Interpret different energy storage systems, energy management, perform energy audit and economic analysis

NON TRADITIONAL MACHINING(17ME554)	
17ME554.1	**Explain** the needs, advantages, limitations and applications of non-traditional machining process viz; USM, AJM, WJM, ECM, CHM, EDM, PAM, LBM, and EBM.
17ME554.2	**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.
17ME554.3	**Explain** the constructional features of USM, AJM, WJM, ECM, CHM, EDM, PAM, LBM, and EBM.
17ME554.4	**Explain** the working principle of USM, AJM, WJM, ECM, CHM, EDM, PAM, LBM, and EBM.
17ME554.5	**Make use of** process characteristics and parameters to **analyze** the performance of USM, AJM, WJM, ECM, CHM, EDM, PAM, LBM, and EBM.

FINITE ELEMENT METHOD(17ME61)	
17ME61.1	Identify the basic procedures implemented in FEM along with reduction of execution time and memory requirements for given engineering problem
17ME61.2	Construct the basic algorithms or numerical procedures to solve simple bar and truss problems subjected to axial loading
17ME61.3	Make use of finite element matrix to solve lateral and torsional loaded members confined to regular shapes
17ME61.4	Construct the fundamental numerical procedures required to solve thermal and fluid flow problems confined to simple loading conditions
17ME61.5	Establish a relation between mass and stiffness matrix to solve dynamic problems along with axisymmetric ring elements

COMPUTER INTEGRATED MANUFACTURING(17ME62)	
17ME62.1	Interpret the concept of mathematical models of automation in production systems and automated flow lines, to optimize the process of CAD/CAM/CIM.
17ME62.2	Outline the different transformation methods for entities in computer graphics and process planning of material requirement, quality and shop floor control.
17ME62.3	Explain the applications of Flexible Manufacturing Systems, AS/RS and interpret the automated flow lines to reduce down time and enhance productivity
17ME62.4	Illustrate the part programs for simple jobs on CNC machine tools and robot programming.
17ME62.5	Interpret the concept of mathematical models of automation in production systems and automated flow lines, to optimize the process of CAD/CAM/CIM.

Heat Transfer(17ME63)	
17ME63.1	Identify the three modes of heat transfer and construct conduction heat transfer equations for composite bodies make use of both sizing and rating methods
17ME63.2	Construct the fins to enhance heat transfer from a surface and solve for unsteady heat conduction rate
17ME63.3	Select the type of correlation to be used suitably so as to experiment with convection heat transfer coefficient for various applications
17ME63.4	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
17ME63.5	Analyze two-dimensional heat conduction equations and examine the radiation heat transfer rate from black bodies, real surfaces and thermal shield.

DESIGN OF MACHINE ELEMENTS –II(15ME64)	
15ME64.1	**Discuss** the different types of springs and its corresponding stress induced in them.
15ME64.2	**Design** spur and helical gears using beam strength or Lewis equation and also analysis gear teeth to dynamic and wear loads.
15ME64.3	**Design** of bevel and worm gears, the significance of formative number of teeth, efficiency of the worm gears.
15ME64.4	**Design** of different types of clutches like single and multi plate clutches. Self locking and heat generated in different types of brakes.
15ME64.5	**Design** of journal bearings using Petroff's equation and Mckee equation, concept of hydrodynamic theory of lubrications. Stress in curved beams.

AUTOMOBILE ENGINEERING (17ME665)	
17ME665.1	Able to demonstrate the different parts of automobile , cooling & lubrication system
17ME665.2	Can you able to explain the various types of super chargers, Turbocharging & different ignition system with its application.
17ME665.3	Can you able to explain the steering geometry, suspension & braking system
17ME665.4	Can you interpret the cause of automobile emission & its effect on environment and methods to reduce the emission.
17ME665.5	Can you able to outline the working of transmission & fuel supply system.

INDUSTRIAL SAFETY (17ME662)	
17ME662.1	Did you understand thebasic safety terminologies including Class A, B, C, D and E type of fire classification, Fire triangle, and Fire extinguishers.

17ME662.2	Are you able to Identify unsafe acts, reason for accidents, MSDS (material safety data sheet), OSHA, WHO,Lockout and tag out procedures, Safe material handling and storage,Fire hazard and analysis prevention of fire.
17ME662.3	Are you able to Understand & Identify an effective fire safety systems and fire fighting systems.
17ME662.4	Are you able toUnderstand & explain the concept of mechanical, electrical and chemical safety procedures, PPE's and protocols in the industries
17ME662.5	Are you able toMake use of safety protocols to suggest or design a safe working environment in the field of mechanical industries, fire safety, electrical industries and chemical laboratories.

HEAT TRANSFER LAB(17MEL67)	
17MEL67.1	Perform experiments to **determine** the thermal conductivity of a metal rod
17MEL67.2	**Estimate** the effective thermal resistance in composite slabs and efficiency in pin-fin
17MEL67.3	Conduct experiments to **determine** convective heat transfer coefficient for free and forced convection and correlate with theoretical values
17MEL67.4	**Determine** surface emissivity of a test plate and Steffan Boltzman Constant
17MEL67.5	**Determine** LMDT and Effectiveness in a Parallel Flow and Counter Flow Heat Exchangers **Estimate** performance of a Vapour Compression Refrigeration.

Modelling and Analysis Laboratory(17MEL68)	
17MEL68.1	Understand the basic concepts of representation of engineering problems in to one dimensional modeling and analysis.
17MEL68.2	Solve truss problems using one dimensional concept
17MEL68.3	Solve bending moment and shear force representation for various loading cases. Solve rectangular plate with a circular hole problem under uni-axial loading.
17MEL68.4	Solve thermal problems using one dimensional and two dimensional FEA concepts
17MEL68.5	Solve Dynamic problems through one dimensional FEA concept.

MECHATRONICS(15ME753)	
15ME753.1	Explain the concepts of Mechatronics, Transducers, Microprocessor and Microcontrollers.
15ME753.2	Illustrate the architecture of the Microprocessor, Operation of PLC's and Mechanical, Electrical, Pneumatic and Hydraulic Actuation systems.
15ME753.3	Interpret the working principle and application of sensors and Explain the different parts of Industrial Robot components & its functional requirements.
15ME753.4	Apply the concept of ladder diagram and latching for the selection of a PLC.
15ME753.5	Illustrate the working of different types of Pneumatic and Hydraulic actuators and control valves.
DESIGN LABORATORY(15MEL76)	
15MEL76.1	To determine the natural frequency, logarithmic decrement, damping ratio and damping coefficient in a SDOF systems subjected to longitudinal and torsional vibrations.
15MEL76.2	To construct force and couple polygons to balance the rotating masses.
15MEL76.3	To utilize the principles of photo elasticity and determine the fringe constant and stress concentration of photo elastic materials subject to different loads.
15MEL76.4	To calculate equilibrium speed, sensitiveness, power and effort of Porter and Hartnell Governor.
15MEL76.5	To obtain Pressure distribution in Journal bearing and find the critical speed of a rotating shaft.
CIM and Automation LAB(15MEL77)	
15MEL77.1	**Explain** the concepts of Computer Integrated manufacturing and Classify NC,CNC and DNC systems.
15MEL77.2	**Develop** manual part programs to perform milling, drilling and turning operations in design, simulation and manufacturing.
15MEL77.3	**Analyze** the Simulation of Tool Path for different Machining operations of small components using CNC Lathe & CNC Milling Machine.
15MEL77.4	**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.
15MEL77.5	**Apply** the knowledge of pneumatics and hydraulics to demonstrate the related experiments

Energy Engineering(15ME71)	
15ME71.1	Summarize the basic concepts of Thermal energy systems, Diesel power plant, Hydel power plant, renewable energy sources and their utilization.
15ME71.2	Understand the basic concepts of solar energy, Green energy, zero energy and energy from alternate sources.
15ME71.3	Apply the basic concepts for Thermal and Hydel power plant.
15ME71.4	Make use of the basic concepts solar and wind energy to analyse it.
15ME71.5	Identify the concepts and applications of Bio mass energy, Green energy and zero energy.

Fluid Power System(15ME72)	
15ME72.1	Identify the components of fluid power system (Hydraulic & Pneumatic) with different types of fluids for industrial applications
15ME72.2	Select the types of pumps and actuators for various applications
15ME72.3	Distinguish the types of control valves used in fluid power system with circuit design
15ME72.4	Compare the pneumatic control valves with the hydraulic system
15ME72.5	Examine an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro-pneumatics for a given application
Control Engineering(15ME73)	
15ME73.1	Explain concepts of loop systems and different types of controllers.
15ME73.2	Construct mathematical models to understand transfer function of mechanical, electrical and hydraulic control systems with block diagrams and SFG.
15ME73.3	Build the concept of transient and steady state system and solve frequency response analysis.
15ME73.4	Solve Bode plots and Root locus plots for frequency response analysis.
15ME73.5	Develop state equation of linear continuous data for controllability and observability.

OPERATION RESEARCH(15MEL81)	
15ME81.1	Understand the concepts of operations research modelling approaches.
15ME81.2	Develop mathematical skills to analyse and solve network models arising from a wide range of applications.
15ME81.3	Solve engineering and managerial situations as Transportation and Assignment problems.
15ME81.4	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

15ME81.5	Analyze and solve engineering and managerial situations as LPP

ADDITIVE MANUFACTURING(15MEL82)	
15ME82.1	Understand the different processes of Additive Manufacturing
15ME82.2	Explain system drives and devices and actuators
15ME82.3	Explain the additive manufacturing process by polymerization and powder metallurgy
15ME82.4	Classify nanomaterial and its characterization techniques
15ME82.5	list various NC, CNC machine programming and automation techniques

Product Life Cycle Management(15MEL835)	
15ME835.1	Explain Product Life Cycle Management(PLM) and Product Design Management(PDM) processes, also recognize various views, components, strategies and implementation methods of PLM and PDM
15ME835.2	Understand the concept of Product Design in detail understand the product design process and strategies. Explain modeling and simulation in product
15ME835.3	Recognize the steps involved in new product development, explain how a decision support system is built and illustrate new product financial control measures. Also understand the concept of redesign of product
15ME835.4	Explain the concept of technology forecasting, integration of technological product innovation and product development in business processes within enterprises. Also recognize morphological methods and flow diagram
15ME835.5	Understand Product building and structures. Explain the use of virtual product development tools like 3D CAD systems, digital mock up, model building and model analysis

PROJECT WORK(15MEL85)	
15ME85.1	Interact with various industries and identify real world problem statement / identify problems in engineering and technology in selected field of interest.
15ME85.2	Synthesize and apply the mechanical knowledge of engineering to design and implement solutions to open-ended problems
15ME85.3	Design and Develop the concept with mechanical Engineering practices and standards.
15ME85.4	Use different tools for communication, design, implementation, testing and report writing.
15ME85.5	Analyzing professional issues, including ethical, legal, environmental and safety issues, related to project.
15ME85.6	Develop better interpersonal communication skills, presentation skills, team work and leadership qualities.

DEPARTMENT OF TELECOMMUNICATION ENGINEERING
PROGRAM SPECIFIC OUTCOMES
PSO1: Ability to understand basic concepts, analyze subsystems/modules and apply them in various fields like signal processing, networking and communication. **PSO2:** Should be able to associate the learning, understand the published literature and project work effectively

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 Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
18MAT31.4	Determine the externals of 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 transient behavior and initial conditions to find response of RLC circuits.
18EC32.4	Apply Laplace transforms and transient analysis to find response of RLC circuits.
18EC32.5	Determine the various parameters of Series and Parallel resonance circuits and analyze two port network parameters.
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	Identify the operation of BJT. FET and its frequency limitation.
18EC33.4	Obtain the Equivalent circuits, Characteristics and structure with operations of semiconductor such as FETs and MOSFETs circuits

18EC33.5	Identify the fabrication process of semiconductor devices and CMOS process integration.
Course code 18EC34	**Course: DIGITAL SYSTEM DESIGN**
18EC34.1	Illustrate simplification of switching equations using various methods
18EC34.2	Design of various combinational and sequential circuits
18EC34.3	Design of counters and registers using Flip-flops
18EC34.4	Develop state diagram using mealy moore model
18EC34.5	Design complex digital circuits for various applications of digital system.
Course code 18EC35	**Course: COMPUTER ORGANIZATION AND ARCHITECTURE**
18EC35.1	**Outline** basic structure of computer and machine instructions
18EC35.2	**Illustrate** different types of memories
18EC35.3	**Discuss** different ways of accessing an I/O device including interrupts
18EC35.4	**Illustrate** simple processor organization based on hardwired control and micro programmed control
18EC35.5	**Show that** addressing modes are used in assembly language
Course code 18EC36	**Course: POWER ELECTRONICS AND INSTRUMENTATION**
18EC36.1	Describe the Principle of operation of digital instruments
18EC36.2	Understanding basic principles of converters, SMPS and power devices.
18EC36.3	Describe instrumentation amplifier and PLC's
18EC36.4	: Develop Circuits for multi range ammeter, voltmeter and bridges.
18EC36.5	Build and test circuits using power electronic devices
Course code 18ECL37	**Course: ELECTRONIC DEVICES AND INSTRUMENTATION LAB**
18ECL37.1	**Design** and test rectifiers, clipping circuits, clamping circuits and voltage regulators.
18ECL37.2	**Compute** the parameters from the characteristics of power diodes and rectifier circuits using power diodes.
18ECL37.3	**Analyse** the characteristics of photodiode,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	**Identify** the truth table of various expressions and combinational circuits using logic gates.
18ECL38.2	**Design** and test various combinational circuits such as adders, subtractors, comparators, multiplexers.
18ECL38.3	**Develop** Boolean expressions using decoders.
18ECL38.4	**Construct** flips-flops, counters and shift registers
18ECL38.5	**Simulate** Serial Binary Adder and Binary Multiplier
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	**Identify** the performance characteristics and parameters of BJT and FET amplifier using small signal model.
18EC42.2	**Design and Analyze** the MOSFET amplifier and Oscillator circuits.
18EC42.3	**Design and Analyze** the BJT power amplifier.
18EC42.4	**Identify** the functioning and application of linear ICs.
18EC42.5	**Design of** Linear IC based circuits Like DAC, ADC ,Rectifier and Filters.
Course code 18EC43	**Course: CONTROL SYSTEMS**
18EC43.1	Develop the mathematical model of mechanical and electrical systems.

18EC43.2	Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method.
18EC43.3	Identify the time domain specifications for first and second order systems.
18EC43.4	Solve to determine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique and in the frequency domain using Nyquist and bode plots
18EC43.5	Identify state variables and model state models for electrical systems with Solution of state equations and understand the compensating networks.
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 Random events in typical communication events to extract quantitative statistical parameters.
18EC44.4	Analyze vectors and vector spaces using suitable transformations and basis function sets.
18EC44.5	Analyze the concept of Multiple Random variables to extract quantitative statistical parameters
Course code 18EC45	**Course: SIGNALS AND SYSTEMS**
18EC45.1	Classify the signals as continuous /discrete,periodic/aperiodic,even/odd,energy/power and deterministic/random signals
18EC45.2	Identify the linearity,casuality,time-invariance and stability properties of continuous and discrete time systems
18EC45.3	Utilize the response of a continuous and discrete LTI system using convolution integral and convolution sum
18EC45.4	Solve the spectral charecterestics of continuous and discrete time signal using fourier analysis.
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	Evaluate the Architecture of 8051, its external and internal memory organisation.
18EC46.2	Identify different types of addressing modes, instructions and assembler directives.
18EC46.3	Make use of instructions and assembler directives to develop simple programs.

18EC46.4	Model Timers and counters to generate different types of waveforms
18EC46.5	Make use of 8051 controller to interface different external devices like ADC, DAC and Stepper motor.
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 by calculating 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 Multi vibrators using 555 Timer.
18ECL48.5	**Analyze** and implement the circuits of Oscillators, Filters, Rectifiers and Multi vibrators using BJTs, ICs 741 and 555 through simulation software.

Course code 17ES51	**Course: MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT**
17ES51.1	**Explain** the fundamental concepts of Management and Entrepreneurship
17ES51.2	**Develop** the components in developing a business plan
17ES51.3	**Identify** the functions of Managers, Entrepreneurs and their social responsibilities

17ES51.4	**Determine** a best Entrepreneurship model for the required domain of establishment
17ES51.5	**Survey** the Institutional support by various state and central government agencies

Course code 17EC52	**Course: DIGITAL SIGNAL PROCESSING**
17EC52.1	Develop knowledge on Discrete Fourier transform and its properties
17EC52.2	Analyze Fast Fourier transform (decimation in time and decimation in frequency) algorithms for efficient computation of DFT
17EC52.3	Construct analog IIR filters (butterworth and chebyshev filter) for various specifications
17EC52.4	Develop methods of converting analog filters to digital filters
17EC52.5	**Analyze** FIR filter using window technique and frequency sampling technique and realization of filter structure using different methods(DF-I, DF-II, Cascade, Parallel etc.

Course code 17EC53	**Course: VERILOG HDL**
17EC53.1	**Utilize** the concept of Hierarchical Modeling and understand the fundamentals of Verilog HDL in designing Digital circuits.
17EC53.2	**Identify** different types of data types, system tasks, compiler directives in Verilog and utilize them in modeling Verilog code.
17EC53.3	**Plan** a digital design using gate level modeling and data flow modeling.
17EC53.4	**Model** Verilog module using behavioral modeling in Verilog and Make use of VHDL concepts in designing Digital circuits.
17EC53.5	**Model** test benches to Verify the functionality of digital design.

Course code 17EC54	**Course: INFORMATION THEORY AND CODING**

17EC54.1	Organize the concept of Dependent & Independent Sources to measure information content of messages, Entropy, and Rate of Information.
17EC54.2	Construct the source encoder using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding Algorithms.
17EC54.3	Model the continuous and discrete communication channels using input, output and joint probabilities.
17EC54.4	Construct codeword comprising of the check bits computed using Linear Block codes , cyclic codes & construction of second extension of code words
17EC54.5	Construct the encoding and decoding circuits for convolutional codes, BCH and Golay codes.

Course code 17EC553	**Course: OPERATING SYSTEMS**
17EC553.1	Identify the services provided by an operating system.
17EC553.2	Analyze how processes are synchronized and scheduled
17EC553.3	Identify different approaches of memory management and virtual memory management.
17EC553.4	Infer the structure and organization of the file system
17EC553.5	Analyze the inter process communication and deadlock situations.
Course code 17EC562	**Course: Object Oriented Programming Using C++**
17EC562.1	Identify basics of OOP concepts used in problem solving
17EC562.2	Solve simple mathematical problems using OOP concepts like class and functions
17EC562.3	Apply the concepts of overloading, Constructors and Destructors in problem solving
17EC562.4	Examine virtual functions, encapsulation, Polymorphism and Inheritance used in problem solving
17EC562.5	Analyze problems and simulate system models that work with streams and files.
Course code 17ECL57	**Course: DSP LAB**

17ECL57.1	**Analyze** the concepts of analog to digital conversion of signals and frequency domain sampling and computation of DFT and IDFT of the signals
17ECL57.2	**Develop** correlation and convolution between signals.
17ECL57.3	**Construct** Impulse response, Step response and steady state response of any system
17ECL57.4	**Analyze** filter specifications(IIR and FIR) and design the same using Matlab
17ECL57.5	**Develop** knowledge on TMS320C6713 processor and acquire ability to program.
Course code 17ECL58	**Course: HDL LAB**
17ECL58.1	**Apply** Verilog /VHDL programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions.
17ECL58.2	**Analyze** sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms.
17ECL58.3	**Analyze** Combinational and Sequential circuits on programmable ICs and test the hardware.
17ECL58.4	**Utilize** the hardware to the programmable chips and obtain the required outputs.
17ECL58.5	**Test** an ALU that checks for all the operations through simulation waveforms.
Course code 17EC61	**Course: DIGITAL COMMUNICATION**
17EC61.1	Inspect the various bandpasssignals and analyze its characteristics with detail study of lines codes.
17EC61.2	Apply Gram Schmidt procedure and utilize optimum receivers using coherent detection
17EC61.3	Build the various Digital Modulation and demodulation techniques and to study its various parameters.
17EC61.4	Organize Communication through Band limited channels to model the correlative coding
17EC61.5	Illustrate the principles of spread spectrum techniques
Course code 17EC62	**Course: ARM MICROCONTROLLER AND EMBEDDED SYSTEM**
17EC62.1	**Develop** the architectural features and instruction set of 32 bit microcontroller

17EC62.2	**Analyze** ARM cortex M3 using various instructions and C language
17EC62.3	**Identify** the basic hardware components
17EC62.4	**Build** the software hardware design approaches
17EC62.5	**Analyze** the need of RTOS for embedded system applications
Course code 17EC63	**Course: Microwave Theory and Antennas**
17EC63.1	Develop the characteristic features of Microwave Tubes. Also analyze the transmission line characteristics
17EC63.2	Analyze the Multiport Network in terms of S Parameters and their properties also analyze the working and properties of Microwave Passive Devices
17EC63.3	Organize the design concept of Strip lines and antenna basics
17EC63.4	Analyze the basic working and parameter effects of Microwave sources, Point Sources arrays and Electric dipoles
17EC63.5	Analyze the features/parameters of Antennas & Antenna Arrays. Recommend suitable Antennas for various applications.
Course code 17EC64	**Course: COMPUTER COMMUNICATION NETWORK**
17EC64.1	Identify different network models and different Layer services
17EC64.2	Identify various protocols and LANs
17EC64.3	Identify various connecting devices and services in network
17EC64.4	Analyze various network layer protocols and algorithms
17EC64.5	Compare services and applications of various protocols
Course code 17TE655	**Course: IMAGE PROCESSING**
17TE655.1	Identify image formation and the role human visual system plays in perception of gray and color image data.
17TE655.2	Make use of image processing techniques in spatial domain
17TE655.3	Make use of image processing techniques in frequency (Fourier) domain and identify various noise models & filtering of noise

17TE655.4	Identify the concepts of morphological image processing & image segmentation
17TE655.5	Identify image analysis techniques in the form of image segmentation and to evaluate the Methodologies for segmentation.
Course code 17EC654	**Course: DIGITAL SWITCHING SYSTEM**
17EC654.1	**Make use of** different digital transmission techniques, four wire system, and PSTN architecture for telecommunication system.
17EC654.2	**Identify** different switching systems and understand the concept of the digital switching systems.
17EC654.3	**Construct** two stage and three stage switching networks and grading. Also develop a mathematical model for telecommunication traffic
17EC654.4	**Develop** time and space switching networks and Describe the basic switching system software.
17EC654.5	**Build** the hardware architecture of a generic DSS model. Also explain hardware/software requirements and their maintainability metrics .
Course code 17EC661	**Course: DATA STRUCTURES USING C++**
17EC661.1	Build fundamentals of data structures and their applications essential for programming. Write C++ code for Linear list data structures using array and vector representations.
17EC661.2	Develop singly linked lists and chains using C++. Array Representation and Linked Representation of Stacks. Apply the concepts for writing application programs.
17EC661.3	Identify Array and Linked Representation of Queues, Dictionaries, Linear representation, Hash table representation. Apply the concept for writing the application programs.
17EC661.4	Analyze Arrays, Matrices, Special matrices, Sparse matrices and write the abstract data type. ExplainTrees, Binary trees, Properties and representation of binary trees, Common binary tree operations, Binary tree traversal the ADT binary tree and the class linked binary tree.
17EC661.5	Examine Priority Queues, Linear lists, Heaps, Binary search trees operations and implementation. Apply the concept for writing application programs
Course code 17EC663	**Course: DIGITAL SYSTEM DESIGN USING VERILOG**
17EC663.1	Construct Combinational and Sequential digital circuits by utilizing the concept of assumptions behind the digital abstraction and its constraints.

17EC663.2	Identify different types of memories and errors; make use of error correcting and detecting algorithms to model a Verilog module.
17EC663.3	Make use of the implementation of fabrics and select suitable fabric for the digital design.
17EC663.4	Model a Verilog module for input and output devices for an embedded system design.
17EC663.5	Make use of the design flow and optimization techniques to design test conceptual Verilog module.
Course code 17ECL67	**Course: EMBEDDED CONTROLLER LAB**
17ECL67.1	**Analyze** the software tool required for programming in Assembly and C language.
17ECL67.2	**Analyze** the instruction set of 32 bit microcontroller ARM Cortex M3, for programming in Assembly and C language.
17ECL67.3	**Develop** assembly language programs using ARM Cortex M3 for different applications.
17ECL67.4	**Function** external devices and I/O with ARM Cortex M3.
17ECL67.5	**Develop** C language programs and library functions for embedded system applications.
Course code 17TEL68	**Course: Microwave & Antennas Lab**
17TEL68.1	Analyzing and measuring multiple characteristics of reflex klystron
17TEL68.2	Make use of Microwave sources to understand the behavior of the various microwave components using S-Parameters
17TEL68.3	Test the dielectric constant, impedance of the device etc
17TEL68.4	Measure the field intensity and Radiation Patterns of different Antennas
17TEL68.5	Reciprocity Theorem proof of an Antennas.
Course code 15TE71	**Course: Cryptography and Network Security**
15TE71.1	Identify foundations of cryptographic algorithms

15TE71.2	Choose the difference between various cryptographic algorithms
15TE71.3	Analyze the concepts of integrity and authentication in data security
15TE71.4	Categorize the basic foundations of network security at various layers
15TE71.5	Inspect use of the basic concept of ciphers in email, IP and network security

Course code 15TE72	**Course: Satellite Communication and Remote sensing**
15TE72.1	Analyse the basics of satellite communication and remote sensing.
15TE72.2	Inspect the fundamentals of remote sensing components, signals and system.
15TE72.3	Analyse the theory behind various remote sensors and their signal processing requirements.
15TE72.4	Analyse remote sensing concepts and interpret the satellite data for drawing inferences and conclusions towards the events I space and planet system.
15TE72.5	Analyse the characteristic of photographic images and remote sensing principles

Course code 15TE73	**Course: CMOS VLSI**
15TE73.1	**Demonstrate** a clear understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.
15TE73.2	**Construct** Stick and Layout Diagrams for various circuits using physical design aspects and Identify its area capacitance and delay
15TE73.3	**Choose** different scaling models, scaling factors for device parameters and general considerations in design process
15TE73.4	**Identify** the CMOS subsystems and architectural issues with the design constraints in FPGA based systems
15TE73.5	**Design** ALU subsystems, different types of Memory elements along with area considerations

Course code 15EC744	Course: MULTIMEDIA COMMUNICATION
15EC741.1	**Explain** the basics of different multimedia networks and applications.
15EC741.2	**Make use of** digitization principles for representation of different media types
15EC741.3	**Explain** the concept of DMS and Multimedia Communication across different networks
15EC741.4	**Identify** compression techniques required to compress text and image
15EC741.5	**Identify** compression techniques required to compress audio and video

Course code 15EC752	Course: IoT AND WIRELESS SENSOR NETWORK
15EC752.1	Model the architecture of WSN and IOT
15EC752.2	Compare the communication protocols which best suits in WSN &IOT
15EC752.3	Design the software for IOT application
15EC752.4	Analyze the design principles for WSN &IOT.
15EC752.5	Design and analyze the cloud computing and prototyping
Course code 15TEL76	**Course: DIIGTAL COMMUNICATION LAB**
15TEL76.1	Identify Time Division Multiplexing.
15TEL76.2	Design the Digital Modulation Techniques.
15TEL76.3	Generate Line codes for Signal Transmission and Analyze
15TEL76.4	Analyze the characteristics of an optical communication system.
15TEL76.5	Analyze the Digital Communication concepts, Compute and Display various parameters along with Plots/Figures.

Course code 15TEL77	**Course: CCN LAB**
15ECL77.1	Make use of Network Simulator for learning & practice of networking concepts.
15ECL77.2	Model network with different configuration to measure performance parameters & analyze the results.
15ECL77.3	Design a network & animate it, to understand the working of various protocols and analyze the results.
15ECL77.4	Design data-link layer protocols using C/C++ programs.
15ECL77.5	Design networking security concepts, algorithms & protocols using C/C++ programs.
Course code 15ECP78	**Course: PROJECT WORK PAHSE I**
15ECP78.1	Carry out Literature **survey** in their specific area of interest.
15ECP78.2	**Identify** the Problem statement and technology used.
15ECP78.3	**Formulate** specific Objectives and methodology.
15ECP78.4	**Develop** technical writing and presentation skills.
15ECP78.5	**Develop** leadership qualities through effective team work.
Course code 15EC81	**Course: WIRELESS CELLULAR AND LTE 4G BROADBAND**
15EC81.1	**Analyze** the system architecture and the functional standard specified in LTE 4G.
15EC81.2	**Inspect** 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.
15EC81.3	**Examine** the UTRAN and EPS handling processes from set up to release including mobility management for a variety of data call scenarios.
15EC81.4	**Compare** the difference between uplink , down link and the physical layer procedures that provide the services to upper layers.
15EC81.5	**Analyze** the Performance of resource management and packet data processing and transport algorithms.
Course code 15EC82	**Course: FIBER OPTIC NETWORKS**

15EC82.1	**Choose** different types of optical fibers, fiber materials, and apply basic optical laws with necessary mathematical equations.
15EC82.2	**Identify** various losses and connectors used in optical fibers
15EC82.3	**Choose** different optical sources and detectors used in fiber optic communication along with various noise sources
15EC82.4	**Apply** the concept of WDM and discuss different types of active and passive optical components and optical amplifiers with their characteristics.
15EC82.5	**Identify** different transmission modes and protocols, Optical switching networks and Long haul networks.

Course code 15EC835	**Course: Adhoc Wireless Network**
15EC835.1	Analyze the unique issues in ad-hoc networks.
15EC835.2	Aanalyze current technology trends for implementation of ad-hoc wireless networks.
15EC835.3	Classify the challenges in designing MAC,routing and transport protocols for ad-hoc wireless networks.
15EC835.4	Inspect the challenges in designing routing and transport protocols for ad-hoc wireless networks.
15EC835.5	Compare the security and quality of service for ad-hoc networks.
Course code 15EC834	**Course: MACHINE LEARNING**
15EC834.1	Identify the fundamental concepts of Machine learning and implement Find-S algorithm and Candidate elimination algorithm
15EC834.2	Categorize the fundamental concepts of Machine learning to learn decision tree representation and neural network
15EC834.3	Compare the Bayes Classifier and EM algorithm to solve the problems in Machine Learning.
15EC834.4	Examine K- Means algorithm and Instance based Learning for problems appear in Machine Learning and learn about inductive bias
15EC834.5	Inspect Back propagation algorithm, Gibbs Algorithms ,Estimating Hypothesis, and Reinforcement learning

Course code 15EC84	Course: INTERNSHIP
15EC84.1	**Examine**the *knowledge* and skills acquired in the classroom to a professional context
15EC84.2	**Apply** the methods for solving the complex problems
15EC84.3	**Develop** the organizational skills
15EC84.4	**Develop** the ability to write the report
15EC84.5	**Develop** the skills for communication and team working
Course code 15ECP85	**Course: PROJECT WORK PHASE II**
15ECP85.1	Plan the course of action and hypothesize the project work using literature survey.
15ECP85.2	Formulate the problem statement &invent possible solutions.
15ECP85.3	Prioritize solutions, select best solution &design the working model.
15ECP85.4	Demonstrate the working model and create the report.
15ECP85.5	Organize and coordinate in a team through effective communication.

Course code 15ECS86	Course: SEMINAR
15ECS86.1	Compare and select seminar topic using literature survey.
15ECS86.2	Compile &compare the literature & generate report.
15ECS86.3	Explain the topic and defend the panel question.
15ECS86.4	Communicate orally and in written format.
15ECS86.5	Organize and coordinate through effective communication.