

## Course Outcomes of Department of Computer Science and Engineering

Course Name	Engineering Mathematics – III
Course Code	17MAT31
CO1	Know the use of periodic signals and Fourier series to analyze circuits and system communications
CO2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform.
CO3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
CO4	Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems.
CO5	Determine the extremals of functionals and solve the simple problems of the calculus of variations
Course Name	Analysis & Digital Electronics
Course Code	17CS32
CO1	Explain the operation of JFETs and MOSFETs , Operational Amplifier circuits and their application
CO2	Explain Combinational Logic, Simplification Techniques using Karnaugh Maps, Quine McClusky technique.
CO3	Demonstrate Operation of Decoders, Encoders, Multiplexers, Adders and Subtractors, working of Latches, Flip-Flops, Designing Registers, Counters, A/D and D/A Converters
CO4	Design of Counters, Registers and A/D & D/A converters
Course Name	Data Structures & Applications
Course Code	17CS33
CO1	Explain different types of data structures, operations and algorithms
CO2	Apply searching and sorting operations on files
CO3	Make use of stack, Queue, Lists, Trees and Graphs in problem solving.
CO4	Develop all data structures in a high-level language for problem solving.
Course Name	Computer Organization
Course Code	17CS34
CO1	Explain the basic organization of a computer system.
CO2	Demonstrate functioning of different sub systems, such as processor, Input/output, and memory.
CO3	Illustrate hardwired control and micro programmed control. pipelining, embedded and other computing
CO4	Build simple arithmetic and logical units.
Course Name	UNIX and Shell Programming
Course Code	17CS35
CO1	Explain UNIX system and use different commands.
CO2	Compile Shell scripts for certain functions on different subsystems.
CO3	Demonstrate use of editors and Perl script writing
Course Name	Discrete Mathematics Structures
Course Code	17CS36
CO1	Make use of propositional and predicate logic in knowledge representation and truth verification.
CO2	Demonstrate the application of discrete structures in different fields of computer science
CO3	Solve problems using recurrence relations and generating functions.

CO4 Apply different mathematical proofs, techniques in proving theorems.

CO5 Compare graphs, trees and their applications

Course Name Analog & Digital Electronics Lab

Course Code 17CSL37

CO1 Demonstrate various Electronic Devices like Cathode ray Oscilloscope, Signal generators, Digital Trainer Kit, Multimeters and components like Resistors, Capacitors, Op amp and Integrated Circuit.

CO2 Design and demonstrate various combinational logic circuits.

CO3 Design and demonstrate various types of counters and Registers using Flip-flops

CO4 Make use of simulation package to design circuits.

CO5 Infer the working and implementation of ALU.

Course Name DATA STRUCTURES LABORATORY

Course Code 17CSL38

CO1 Analyze and Compare various linear and non-linear data structures

CO2 Demonstrate the working nature of different types of data structures and their applications

CO3 Develop, analyze and evaluate the searching and sorting algorithms

CO4 Choose the appropriate data structure for solving real world problems

Course Name Engineering Mathematics – IV

Course Code 17MAT41

CO1 Solve first and second order ordinary differential equation arising in flow problems using single step and multistep numerical methods.

CO2 Illustrate problems of potential theory, quantum mechanics and heat conduction by employing notions and properties of Bessel's functions and Legendre's polynomials.

CO3 Explain the concepts of analytic functions, residues, poles of complex potentials and describe conformal and Bilinear transformation arising in field theory and signal processing

CO4 Develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, information theory and design engineering.

CO5 Demonstrate testing of hypothesis of sampling distributions and illustrate examples of Markov chains related to discrete parameter stochastic process.

Course Name Object Oriented Concepts

Course Code 17CS42

CO1 Explain the object-oriented concepts and JAVA.

CO2 Develop computer programs to solve real world problems in Java.

CO3 Develop simple GUI interfaces for a computer program to interact with users, and to comprehend the event-based GUI handling principles using Applets and swings.

Course Name Design and Analysis of Algorithms

Course Code 17CS43

CO1 Describe computational solution to well known problems like searching, sorting etc.

CO2 Estimate the computational complexity of different algorithms.

CO3 Develop an algorithm using appropriate design strategies for problem solving.

Course Name Micrprocessors and Microcontrollers

Course Code 17CS44

- CO1 Differentiate between microprocessors and microcontrollers
- CO2 Develop assembly language code to solve problems
- CO3 Explain interfacing of various devices to x86 family and ARM processor
- CO4 Demonstrate interrupt routines for interfacing devices

Course Name Software Engineering

Course Code 17CS45

- CO1 Design a software system, component, or process to meet desired needs within realistic constraints
- CO2 Assess professional and ethical responsibility
- CO3 Function on multi-disciplinary teams
- CO4 Make use of techniques, skills, and modern engineering tools necessary for engineering
- CO5 Comprehend software systems or parts of software systems

Course Name Data Communication

Course Code 17CS46

- CO1 Illustrate basic computer network technology
- CO2 Identify the different types of network topologies and protocols.
- CO3 List and explain the layers of the OSI model and TCP/IP model.
- CO4 Comprehend the different types of network devices and their functions within a network
- CO5 Demonstrate subnetting and routing mechanisms.

Course Name Design and Analysis of Algorithms Laboratory

Course Code 17CSL47

- CO1 Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.)
- CO2 Develop variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language.
- CO3 Analyze and compare the performance of algorithms using language features.
- CO4 Apply and implement learned algorithm design techniques and data structures to solve realworld problems.

Course Name Micrprocessors and Microcontrollers Laboratory

Course Code 17CSL48

- CO1 Summarize 80x86 instruction sets and comprehend the knowledge of how assembly language works.
- CO2 Design and develop assembly programs using 80x86 assembly language instructions
- CO3 Infer functioning of hardware devices and interfacing them to x86 family
- CO4 Choose processors for various kinds of applications.

Course Name Management & Entrepreneurship for IT Industry

Course Code 17CS51

- CO1 Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship
- CO2 Utilize the resources available effectively through ERP
- CO3 Make use of IPRs and institutional support in entrepreneurship

Course Name Computer Networks

Course Code 17CS52

- CO1 Explain principles of application layer protocols
- CO2 Outline transport layer services and infer UDP and TCP protocols
- CO3 Classify routers, IP and Routing Algorithms in network layer
- CO4 Explain the Wireless and Mobile Networks covering IEEE 802.11 Standard
- CO5 Define Multimedia Networking and Network Management

Course Name Database Management System

Course Code 17CS53

- CO1 Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS.
- CO2 Use Structured Query Language (SQL) for database manipulation.
- CO3 Design simple database systems
- CO4 Design code for some application to interact with databases.

Course Name Automata Theory Computability

Course Code 17CS54

- CO1 Tell the core concepts in automata theory and Theory of Computation
- CO2 Explain how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models).
- CO3 Interpret Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.
- CO4 Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness
- CO5 Classify a problem with respect to different models of Computation

Course Name OBJECT ORIENTED MODELING AND DESIGN

Course Code 17CS551

- CO1 Describe the concepts of object-oriented and basic class modelling.
- CO2 Draw class diagrams, sequence diagrams and interaction diagrams to solve problems.
- CO3 Choose and apply a befitting design pattern for the given problem.

Course Name DOT NET FRAMEWORK FOR APPLICATION DEVELOPMENT

Course Code 17CS564

- CO1 Build applications on Visual Studio .NET platform by understanding the syntax and semantics of C#
- CO2 Demonstrate Object Oriented Programming concepts in C# programming language
- CO3 Design custom interfaces for applications and leverage the available built-in interfaces in building complex applications.
- CO4 Illustrate the use of generics and collections in C#
- CO5 Compose queries to query in-memory data and define own operator behaviour

Course Name Computer Networks Laboratory

Course Code 17CSL57

- CO1 Analyze and Compare various networking protocols.
- CO2 Demonstrate the working of different concepts of networking.

CO3 Implement and analyze networking protocols in NS2 / NS3

Course Name Database Management System Laboratory

Course Code 17CSL58

CO1 Use Structured Query Language (SQL) for database Creation and manipulation.

CO2 Demonstrate the working of different concepts of DBMS

CO3 Implement and test the project developed for an application

Course Name WEB TECHNOLOGY AND ITS APPLICATIONS

Course Code 15CS71

CO1 Construct and visually format tables and forms using HTML and CSS

CO2 Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.

CO3 Appraise the principles of object oriented development using PHP

CO4 Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features.

Course Name ADVANCED COMPUTER ARCHITECTURES

Course Code 15CS72

CO1 Explain the concepts of parallel computing and hardware technologies

CO2 Compare and contrast the parallel architectures

CO3 Illustrate parallel programming concepts

Course Name MACHINE LEARNING

Course Code 15CS73

CO1 Identify the problems for machine learning. And select the either supervised unsupervised or reinforcement learning

CO2 Explain theory of probability and statistics related to machine learning

CO3 Investigate concept learning, ANN, Bayes classifier, k nearest neighbor

Course Name UNIX SYSTEM PROGRAMMING

Course Code 15CS744

CO1 Ability to understand and reason out the working of Unix Systems

CO2 Build an application/service over a Unix system.

Course Name STORAGE AREA NETWORKS

Course Code 15CS754

CO1 Identify key challenges in managing information and analyze different storage networking technologies and virtualization

CO2 Explain components and the implementation of NAS

CO3 Describe CAS architecture and types of archives and forms of virtualization

CO4 Illustrate the storage infrastructure and management activities

Course Name MACHINE LEARNING LABORATORY

Course Code 15CSL76

CO1 Understand the implementation procedures for the machine learning algorithms.

CO2 Design Java/Python programs for various Learning algorithms

- CO3 Apply appropriate data sets to the Machine Learning algorithms
- CO4 Identify and apply Machine Learning algorithms to solve real world problems.

Course Name WEB TECHNOLOGY LABORATORY WITH MINI PROJECT

Course Code 15CSL78

- CO1 Design and develop dynamic web pages with good aesthetic sense of designing and latest technical know-how's.
- CO2 Have a good understanding of Web Application Terminologies, Internet Tools other web services.
- CO3 Learn how to link and publish web sites

Course Name INTERNET OF THINGS TECHNOLOGY

Course Code 15CS81

- CO1 Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- CO2 Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- CO3 Appraise the role of IoT protocols for efficient network communication
- CO4 Elaborate the need for Data Analytics and Security in IoT.
- CO5 Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

Course Name BIG DATA ANALYTICS

Course Code 15CS82

- CO1 Master the concepts of HDFS and MapReduce framework
- CO2 Master the concepts of HDFS and MapReduce framework
- CO3 Recognize the role of Business Intelligence, Data warehousing and Visualization in decision making
- CO4 Infer the importance of core data mining techniques for data analytics
- CO5 Compare and contrast different Text Mining Techniques

Course Name SYSTEM MODELLING AND SIMULATION

Course Code 15CS834

- CO1 Explain the basic system concept and definitions of system
- CO2 Discuss techniques to model and to simulate various systems
- CO3 Analyze a system and to make use of the information to improve the performance

Course Name Engineering Mathematics – III

Course Code 18MAT31

- CO1 Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
- CO2 Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory
- CO3 Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems
- CO4 Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
- CO5 Determine the external of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis

Course Name DATA STRUCTURES AND APPLICATIONS

Course Code 18CS32

- CO1 Use different types of data structures, operations and algorithms
- CO2 Apply searching and sorting operations on files
- CO3 Use stack, Queue, Lists, Trees and Graphs in problem solving
- CO4 Implement all data structures in a high-level language for problem solving

Course Name ANALOG AND DIGITAL ELECTRONICS

Course Code 18CS33

- CO1 Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.
- CO2 Explain the basic principles of A/D and D/A conversion circuits and develop the same
- CO3 Simplify digital circuits using Karnaugh Map , and Quine-McClusky Methods
- CO4 Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types.
- CO5 Develop simple HDL programs

Course Name Computer Organization

Course Code 18CS34

- CO1 Explain the basic organization of a computer system.
- CO2 Demonstrate functioning of different sub systems, such as processor, Input/output, and memory.
- CO3 Illustrate hardwired control and micro programmed control. pipelining, embedded and other computing
- CO4 Design and analyse simple arithmetic and logical units.

Course Name SOFTWARE ENGINEERING

Course Code 18CS35

- CO1 Design a software system, component, or process to meet desired needs within realistic constraints.
- CO2 Assess professional and ethical responsibility
- CO3 Function on multi-disciplinary teams
- CO4 Use the techniques, skills, and modern engineering tools necessary for engineering practice
- CO5 Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems

Course Name Discrete Mathematics Structures

Course Code 18CS36

- CO1 Demonstrate the application of discrete structures in different fields of computer science.
- CO2 Solve problems using recurrence relations and generating functions
- CO3 Application of different mathematical proofs techniques in proving theorems in the courses
- CO4 Compare graphs, trees and their applications.

Course Name ANALOG AND DIGITAL ELECTRONICS LABORATORY

Course Code 18CSL37

- CO1 Use appropriate design equations / methods to design the given circuit.
- CO2 Examine and verify the design of both analog and digital circuits using simulators.
- CO3 Make us of electronic components, ICs, instruments and tools for design and testing of circuits

Course Name DATA STRUCTURES LABORATORY

Course Code 18CSL38

- CO1 Analyze and Compare various linear and non-linear data structures
- CO2 Code, debug and demonstrate the working nature of different types of data structures and their applications
- CO3 Implement, analyze and evaluate the searching and sorting algorithms
- CO4 Choose the appropriate data structure for solving real world problems

Course Name Engineering Mathematics – III

Course Code 15MAT31

- CO1 Make use of Fourier series to analyze wave forms of periodic functions
- CO2 Make use of Fourier transforms and Z - transforms to analyze wave forms of non periodic functions
- CO3 Identify statistical methods to find correlation and regression lines, also numerical methods to solve transcendental equations.
- CO4 Utilize Numerical techniques for various finite difference technique problems
- CO5 Construct Greens, divergence and Stokes theorems for various engineering applications

Course Name Analysis & Digital Electronics

Course Code 15CS32

- CO1 Utilize JFETs and MOSFETs , Operational Amplifier circuits for different applications
- CO2 Construct Combinational Logic, Simplification Techniques using Karnaugh Maps, Quine McClusky Technique.
- CO3 Apply knowledge of Operation of Decoders, Encoders, Multiplexers, Adders , Subtractors for constructing different circuits
- CO4 Make use of latches, Flip-Flops, Designing Registers, Counters for constructing sequential circuits
- CO5 Identify the applications of Synchronous and Asynchronous counters, A/D and D/A Converters

Course Name Data Structures & Applications

Course Code 15CS33

- CO1 Summarize the basic data structures concepts such as arrays, structures, unions, pointers, strings and dynamic memory allocation functions.
- 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.

Course Name Computer Organization

Course Code 15CS34

- CO1 Infer the basics of computer organization structure, its operations, machine instructions and addressing modes.
- CO2 Illustrate the different ways of communication with I/O devices, concept of interrupts, Direct Memory access.
- CO3 Identify the needs of interface circuits, Buses in computers and different types of memories.
- CO4 Make use of different types of memories based on its speed, size and cost.
- CO5 Apply various arithmetic and logical operations on integer and floating point numbers, hard wired control, microcontroller's instructions and embedded systems.

Course Name UNIX and Shell Programming

Course Code 15CS35

- CO1 Identify the commands such as echo, printf, ls, date, passwd cal etc with options. Experimenting with user terminal, displaying characteristics and setting them.
- CO2 Organize the unix files by creating a parent child relationship, manipulating PATH, constructing directories, making use of cat, mv, rm, cp, wc and od commands, Changing file permissions
- CO3 Utilize vi editor with mode commands, navigation and pattern searching, wild cards, regular expressions
- CO4 Compare ordinary and environment variables, read and read only commands, control statements like if while for and case, hard and soft links of a file.
- CO5 Examine Perl scripts, parent and child processes, applying kill command, arrays with key value functions, simple and multiple search patterns.

Course Name Discrete Mathematics Structures

Course Code 15CS36

- 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

Course Name Analysis & Digital Electronics Laboratory

Course Code 15CSL37

- CO1 Utilize Electronic Devices like Cathode ray Oscilloscope, Signal generators, Digital Trainer Kit, Multimeters
- CO2 Make use of various components like Resistors, Capacitors, Op amp and Integrated Circuit
- CO3 Construct various combinational logic circuits.
- CO4 Identify various types of counters and Registers using Flip-flops
- CO5 Make use of simulation package to design circuits.

Course Name Data Structures & Applications Laboratory

Course Code 15CSL38

- CO1 Demonstrate 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.

Course Name Engineering Mathematics – IV

Course Code 15MAT41

- CO1 Apply Numerical methods to obtain the solution of fist order and first degree differential equations.
- CO2 Make use of probability theory on discrete and continuous random variables to obtain the solution of problems on different distributions and joint probability distribution.
- CO3 Identify the problems on sampling distribution and on markov chains in attempting the engineering problems for feasible random events.
- CO4 Utilize the Bessel's and Legendre functions for the problems arising in engineering fields.

CO5 Construct the analytic functions. Calculate residues and poles of complex potentials in flow problems.

Course Name Software Engineering

Course Code 15CS42

CO1 Outline the software engineering principles and illustrate the activities involved in building large software and also illustrating the process of requirements, requirements classification.

CO2 Analyze system models, Develop and construct UML diagrams and make use of design patterns to come with solutions for open source development.

CO3 Choose the appropriate testing type, also identifying the importance of software maintenance.

CO4 Identify the right software pricing and measurements of software metrics. Also to identify the software quality parameters

CO5 Illustrate the need for agile software development and to show the agile practices.

Course Name Design and Analysis of Algorithms

Course Code 15CS43

CO1 Infer the Performance Analysis of various Algorithms, Fundamentals of Data Structures and their applications.

CO2 Utilize the Divide and Conquer Algorithm techniques to provide a solutions for well known problems like searching, Sorting etc.

CO3 Make use of the Algorithms using Greedy method to find Minimum Cost of a Spanning Trees and also use Transforms and Conquer Approach for Heap sort.

CO4 Apply Dynamic Programming method to provide solutions for the problems like Transitive Closure, All Pairs Shortest paths and Travelling Sales Person(TSP)

CO5 Choose the Backtracking Algorithms for N-Queens, Sum of subsets Problems and also apply Branch and Bound Techniques for 0/1 Knapsack problem.

Course Name Microprocessors and Microcontrollers

Course Code 15CS44

CO1 Explain the evolution of Intel microprocessor and illustrate the architecture of 8088/86 microprocessor

CO2 Apply basic knowledge to perform arithmetic, logic, string operations and develop assembly language code to solve problems.

CO3 Build interfaces for x86 Microprocessor

CO4 Explain the RISC philosophy and ARM processor fundamentals

CO5 Apply the ARM instruction set to construct assembly code for ARM microcontroller

Course Name Object Oriented Concepts

Course Code 15CS45

CO1 Explain fundamental features of object oriented language

CO2 Explain Java Runtime Environment, Java Language building Blocks and illustrate to run simple Java programs

CO3 Construct Java programs by making use of 3 principles of OOPS with run time error handling mechanisms

CO4 Make Use of multithreading concepts, and event handling mechanism to build Java programs

CO5 Develop event driven Graphical User Interface (GUI) programming using applets and swings

Course Name Data Communication

Course Code 15CS46

- CO1 Infer the basic computer networks and demonstrate the working of physical layer.
- CO2 Make use of the different types of transmission and construct the switching model.
- CO3 Solve the various error detection and correction techniques.
- CO4 Apply Media access control and utilize wired and wireless networks
- CO5 Identify the different network layer protocols.

Course Name Design and Analysis of Algorithms Laboratory

Course Code 15CSL47

- CO1 Demonstrate the 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 the Algorithms using Greedy method to develop the JAVA program such as Knapsack and finding the minimum cost of a spanning tree.
- CO4 Apply Dynamic Programming technique to build the JAVA program such as All pairs shortest path and Travelling sales person (TSP) problem.
- CO5 Choose the Backtracking Algorithms to model JAVA program such as Sum of subset problem and Hamiltonian cycles.

Course Name Micrprocessors and Microcontrollers Laboratory

Course Code 15CSL48

- CO1 Demonstrate the use of 8086 instructions set and the directives.
- CO2 Apply knowledge of 8086 instructions set and the directives to do Assembly Language Programs.
- CO3 Build interfaces for x86 Microprocessors.
- CO4 Make use of the knowledge of ARM Processor instructions set to do ALP code.
- CO5 Construct interfaces for ARM Microcontrollers.