Course Outcome (COs) of CSE Department | Year of study: 2021-22	
Department of Computer Science & Engineering	
1FY104	**Communication Skills Year of study: 2020-21**
CO11FY104.1	Students will be able to understand and develop communication skills and techniques which will felicitate their ability to work collaboratively with others.
CO11FY104.2	Students will be able to use English grammar accurately that will increase their confidence in English writing and speaking.
CO11FY104.3	Students will be able to invent, draft, organize, abstract, elaborate and synthesize their own and other's ideas in formatted way.
CO11FY104.4	Students will be able to understand literary devices after reading poems and stories and also apprecaite art in all forms.
1FY201	**Engineering Mathematics-I Year of study: 2020-21**
CO11FY201.1	Students will be able to evaluate volume and surface area of the solid formed by revolution of different curves. Also calculate definite integral through Beta and Gamma functions.
CO11FY201.2	Students will be able to classify the concept of sequence, monotonic sequence, Cauchy's sequence and infinite series. Also apply various methods to test convergence and divergence of sequence and infinite series.
CO11FY201.3	Learner will be able to identify to express a function in term of a series of sine and cosine.
CO11FY201.4	Students will be able to evaluate maxima and minima of multivariable functions using the concept of partial differentiation. Also understand the concept of limit, continuity and differentiability of two variable function
CO11FY201.5	Students will be able to evaluate double and triple integration and to apply the knowledge to determine area, volume, centre of mass and centre of gravity. Further understand vector differentiation and vector integration.
1FY203	**Engineering Chemistry Year of study: 2020-21**
CO11FY203.1	Differentiation between hard and soft water, solve the related numerical problems on water treatment; and its application in industries and daily life
CO11FY203.2	Comprehension of various types of fuel, instrumental techniques for analysis and solve the numerical problems related to it
CO11FY203.3	Identification of corrosion and application of its knowledge to protect the metal
CO11FY203.4	Developing basic knowledge of Inorganic Engineering materials viz. cement, glass, lubricants .
CO11FY203.5	basic knowledge of organic reaction mechanism and introduction of drugs
1FY306	**Programming for Problem Solving Year of study: 2020-21**
CO12FY306.1	Students will be able to write algorithms and draw flowcharts for various problems, using components of flowcharts.
CO12FY306.2	Students will be able to describe architecture of computer and solve number system problems.
CO12FY306.3	Students will be able to memorize different data types and operators in C and to write ,compile and debug programs in C language, using the compiler.
CO12FY306.4	Students will be able to design flow charts and write programs with multiple instructions, involving decision structures and loops in C on any 64 bit compiler.
CO12FY306.5	Students will be able to design flow chart and write programs involving functions and to handle file reading writing operations using any 64 bit compiler.
1FY309	**Basic Civil Engineering Year of study: 2020-21**
CO11FY309.1	Students will be able to describe and write the Role of civil engineer and impact of infrastructure on society.
CO11FY309.2	Students will be able to write & outline the Principles of surveying and leveling will be known to student.
CO11FY309.3	Student will be able to diffrentiate between types of building
CO11FY309.4	Students will be able to classify the Importance of traffic engineering will be known to students.
CO11FY309.5	Students will be able to express and review about problem related to environment.
2FY202	**Engineering Physics Year of study: 2020-21**
CO12FY202.1	Apply and operate on the concept of interference and diffraction to explain various wave optical phenomena
CO12FY202.2	To describe the concept of quantum mechanics and apply the knowledge to 1D and 3D potential box problem
CO12FY202.3	Application of coherence in the source of light and basics of optical fiber: employment of working principle and construction of lasers: demonstration of optical waveguides
CO12FY202.4	Application of physics of semiconductors material and their classifications
CO12FY202.5	Breakdown of electromagnetism with the help of Maxwell's equations and formulate the electromagnetic energy transformation theorem
2FY307	**Basic Mechanical Engineering Year of study: 2020-21**
CO11FY307.1	Students will be able to understand introduction of mechanical engineering and devlop knowledge about steam boilers, steam turbines and power plants.
CO11FY307.2	Students will be able to conclude basics of centrifugal, reciprocation pumps and Internal Combustion Engine. Students will be able to create knowledge of various types of refrigeration and air conditioning system with their applications.
CO11FY307.3	Students will be able to analyze basics of different types power tranmission systems such as belt, rope, gears and gear trains
CO11FY307.4	Students will be able to illustrate working of different manufacturing processes

CO11FY307.5	Students will be able to identify different engineering materials their, properties and various types of heat treatment processes
2FY308	**Basic Electrical Engineering Year of study: 2020-21**
CO12FY308.1	Arragne and reconstruct for solving circuit with different kind of methods and theorems.
CO12FY308.2	Summarize and explain the behaviors of basic electrical elements like resistor, inductor and capacitor.
CO12FY308.3	Categorize and formulate the behaviors of transformer.
CO12FY308.4	Explain behaviors, Categorize and relate the concept of AC and DC machines.
CO12FY308.5	Assemble electronics components in the circuit after formulate its properties. Summarize and relate the behavior of LT switchgear, earthing and electrical power measurement
2FY201	**Engineering Mathematics-II Year of study: 2020-21**
CO12FY201.1	Students will be able to understand the concept of rank of matrix, characteristic equation & characteristic roots & use the applicability of Caylay Hamilton Theorem to find inverse of matrix which is very important in many engineering application.
CO12FY201.2	Students understand various methods to solve ordinary differential equation of first and Higher order. Which place important role in all branches of Engineering
CO12FY201.3	Students will be able to know various methods to solve ordinary differential equation of second order with variable coefficient which is useful for solving the practical problems which arise in the industry.
CO12FY201.4	Students identify the concept of PDE, including formation and solution of linear and non linear PDE. Also understand about Lagrange's method, standard forms of PDE to solve PDE.
CO12FY201.5	Students will be able to classify second order PDE including the solution of one dimensional equation by method of separation of variables with boundary condition.
2FY105	**Human Values Year of study: 2020-21**
CO12FY105.1	Students will understand the importance of happiness through identification of human values and skills.
CO12FY105.2	Students will understand the role of basic human aspirations in self and people around them.
CO12FY105.3	Students will understand about the harmony in family, in society and practically understand the importance of trust and respect as foundational value of relationship
CO12FY105.4	Students will understand the interconnectedness among the four orders of nature, recyclability, coexistance and harmony at all level of existence
CO12FY105.5	Students will undertand to be prepared for humanistic education, professional competence with ethics and humanistic universal order.
3CS201	**Advanced Engineering Mathematics Year of study: 2020-21**
CO23201.1	To learn the concepts and principles of Random variable and Probability distribution
CO23201.2	Students are able to apply different probability distribution to identify and solve real life problem.
CO23201.3	To learn the formulation of different mathematical problems into optimization Problems and application in Engineering field.
CO23201.4	Apply the principles of optimization using differential calculus
CO23201.5	Student able to formulate real life problem into linear programming problem , transportation and assignment problem. Get the best solution which helps them in many areas.
3CS102	**Technical Communication Year of study: 2020-21**
CO23102.1	Students will understand and know how to follow the stages of the writing process (prewriting/writing/rewriting) and apply them to technical and workplace writing task
CO23102.2	Students will understand the basic components of definitions, descriptions, process explanations, and other common forms of technical writing.
CO23102.3	Students will be able to read, understand, and interpret material on technology. They will have an appreciation for some of the ideas, issues, and problems involved in writing about technology and in workplace writing.
CO23102.4	Students will be able to get an in depth knowledge of technical communication used in professional life by getting to know all the forms and aspects of Technical Communication.
CO23102.5	Students will be able to express themselves better in technical writing by understanding the concept, style and methodology used in Technical communication.
3CS304	**Digital Electronics Year of study: 2020-21**
CO23304.1	Develop the understanding of number system and its application in digital electronics.
CO23304.2	Development and analysis of K-map to solve the Boolean function to the simplest form for the implementation of compact digital circuits.
CO23304.3	Acquire knowledge about various logic gates and logic families and analyze basic circuits of these families.
CO23304.4	Develop ability to identify, analyze and design combinational circuits like half adder full adder, MUX, DEMUX encoder, decoder.
CO23304.5	Develop ability to design various synchronous and asynchronous sequential circuits like registers FLIP FLOP, and counters.
3CS405	**Data Structure and Algorithm Year of study: 2020-21**
CO23405.1	Student will be able to design algorithms and convert those algorithms into a C language code to perform push and pop operation on stack data structure. Student also develop an ability to perform recursion and apply them to the tower of Hanoi problem.

CO23405.2	Student will be able to design algorithms and convert those algorithms into a C language code to perform enqueu, dequeue and traversing operation on queue and Linked list data structure. Student will also able to list the advantages and disadvantages of Linked List.
CO23405.3	Students will be able to write C code to implement Linear search, Binary Search, bubble sort, Insertion sort, selection sort, quick sort, heap sort, merge sort, radix sort and counting sort.
CO23405.4	Students will be able to write C programming code to create binary tree and implement pre, post and in order traversing on the tree data structure.
CO23405.5	Students will be able to write C programming code to implement Hashing. He should be able to perform breadth and depth first search operations on Graph data structure
3CS406	**Object Oriented Programming Year of study: 2020-21**
CO23406.1	Student should be able to write programs using different programming paradigm such as top down and bottom up.
CO23406.2	Students shoud be able to write programs using OOPs concept, they should be abble to create classes and to call the properties of classes using objects. They should be able to apply access specifiers on the members of the class.
CO23406.3	Students should be able to write C++ code to inherit properties of one class into another. They should be able to apply the concept of virtual functions with espect to multiple inheritance.
CO23406.4	Students should be able to write the C++ code for the operator overloading function and can perform overriding of functions.
CO23406.5	Student should be able to create dynamic arrays using template programming. Also he will be able to define generic functions who can perform operations on different datatypes.
3CS407	**Software Engineering Year of study: 2020-21**
CO23407.1	Student will understand fundamental concepts in software engineering, SDLC, software requirements specification, formal requirements specification and verification
CO23407.2	Student will learn about Software Project Management and able to calculate the cost based on line of code.
CO23407.3	Student will be able to prepare various documents such as requirement analysis (SRS) and Structured analysis.
CO23407.4	Student will learn fundamental software design and Effective modular design.
CO23407.5	Student will be able to design UML diagrams for a given requirement specifications.
4CS201	**Discrete Mathematical Structure Year of study: 2020-21**
CO24201.1	Fundamental concepts of mathematics sets, functions, relations.
CO24201.2	Write an argument using logical notation and determine if the argument is or is not valid.
CO24201.3	Demonstrate the ability to find permutation, combination & lattice.
CO24201.4	Fundamental concepts of groups & rings
CO24201.5	Demonstrate different traversal methods for trees and graphs.
4CS103	**Managerial Economics and Financial Accounting Year of study: 2020-21**
CO24103.1	Students will able to know abot national income and its calculation, and will also able to know basic concepts of M.E.F.A.
CO24103.2	Students will able to know about law of demand, dmand forecasting , law of supply and elasticity of demand and supply.
CO24103.3	Students will able to know about theory of production, law of variable proportion and various types of cost and production optimization.
CO24103.4	Students will learn about market structure and its types and pricing theory of market.
CO24103.5	Students will learn about cash flow analysis, balance sheet, profit - loss statement , financial ration analysis , capital budgetiing techniques.
4CS304	**Microprocessor & Interfaces Year of study: 2020-21**
CO24304.1	Understand the 8085 microprocessor's architecture, pin description and its functionality in depth. Student will get an idea about microprocessor based system by designing logical circuitry in order to interface processor with memory and I/O devices.
CO24304.2	Students will learn instructions of 8085 microprocessor, their classification and different programming techniques. Student will be able to identify the addressing modes and length in bytes of instructions.
CO24304.3	Students will learn additional 16 bit instructions and arithmetic operations. Student will be able to design, write, and analyze assembly language programs of 8085 microprocessor. Student will be able to learn about various interrupts available in 8085 microprocessor. Interrupt structure, interrupt vector table and interrupt service routines etc. as well as how serial communication takes place.
CO24304.4	Students are able to design and develope the circuit for memory and I/O interfacing with 8085 processor .
CO24304.5	To design and develop I2C module for data transmission between processor and LCD module.
4CS405	**Data Base Management System Year of study: 2020-21**
CO24405.1	Students will be able to list the applications of database systems.
CO24405.2	Students will be familiar with a commercial relational database system (Oracle) and able to write SQL queries on the system.
CO24405.3	Students will be able to understand the relational database theory, and able to write relational algebra expressions for queries and normalization approach.
CO24405.4	Students will be familiar with basic database transaction processing and transaction states.
CO24405.5	Students will be able to address the basic issues of database failure, recovery and concurrency control.

4CS406	Theory of Computation Year of study: 2020-21
CO24406.1	Students will be able to analyze and design finite automata and apply formal mathematical methods to prove properties of languages; grammars also analyze and design regular expression
CO24406.2	Students will be able to develop the ability to apply the ideas about context free grammars, Derivation and ambiguity. They will also be able to solve Greibach and Chomsky Normal form related problems including membership problems.
CO24406.3	Student will understand the concept of PDA and able to analyze and design push down automata.
CO24406.4	Students will be able to construct Turing machine for different problems and argue formally about correctness on different restricted machine models of computation. They can distinguish different computing languages and classify their respective types
CO24406.5	Students will be able to understand the key notions, such as computability, decidability, and complexity through problem solving.
4CS407	**Data Communication & Computer Netwoks Year of study: 2020-21**
CO24407.1	Students will learn how networked computing devices pass data to each other along data connections
CO24407.2	Students will learn about types of errors, and error detection & correction methods such as stop and weight, Go-Back-N. They will also study about ALOHA and Slotted ALOHA.
CO24407.3	Students will study different routing algorithms. The will be able to apply the concept of sub-netting and derived IPs for subnets.
CO24407.4	Student should learn and apply the leaky and token bucket algorithms for traffic shaping.
CO24407.5	Student will study different application level protocols such as FTP, SMTP and, HTTP.
5CS301	**Information Theory & Coding Year of study: 2020-21**
CO35301.1	Students will get the concepts of entropy & Source coding.
CO35301.2	Students will learn the classify various source coding schemes for encode the transmit the message.
CO35301.3	Students will compute the linear block code and idetify number of errors in trnamiting data and correct it at reciver side.
CO35301.4	Students will be able to design and develope syndrom calculator for cyclic ecoder and decoder.
CO35301.5	Students will be able to design and develope vertbi decoder for convolutional coding .
5CS402	**Compiler Design Year of study: 2020-21**
CO35402.1	Students will be able to learn major concepts in areas of language translation and compiler design.
CO35402.2	Students will be able to ability to identify, formulate, and solve computer engineering problems with proper systematic & semantic approach.
CO35402.3	Students will be able to Develop possible program constructs for further code generation with Type checking.
CO35402.4	Students will be able to learn various concepts of symbol tables, Run time environments, memory management strategy.
CO35402.5	Students will get the concepts of Intermediate code generation, Code optimization and Code generations.
5CS403	**Operating System Year of study: 2020-21**
CO35403.1	Students will be able to understand principles of operating systems ,design and implementations, Understand the various components and functions of an operating system.
CO35403.2	Students will be able to analyzeand apply suitable Process Scheduling Algorithm and Memory Partition Techniques, Apply appropriate techniques to avoid control problems such as mutual exclusion and deadlocks
CO35403.3	Students will be able to memorize deadlock, Methods for handling deadlocks and memory management strategies
CO35403.4	Students will be able to gain the knowledge of memory management algorithm and CPU scheduling techniques. Implement and evaluate operating system components in Windows and Unix environments
CO35403.5	Students will be able to understand and memorize various file and disk management strategies.
5CS404	**Computer Graphics & Multimedia Year of study: 2020-21**
CO35404.1	Students will be able to define the basics of computer graphics, different graphics systems, application of computer graphics and rasterisation of line, circle and ellipse.
CO35404.2	Students will be able to apply geometric transformations on graphics objects, their application in composite form, different color filling algorithm and clipping algorithm.
CO35404.3	Students will be able to identify visible surface detection techniques & curves.
CO35404.4	Students will be able to render projected objects to naturalize the scene in 2D view and use of illumination models & color models.
CO35404.5	Students will be able to identify multimedia components and animation techniques.
5CS405	**Analysis of Algorithms Year of study: 2020-21**
CO35405.1	Students will be able to understand various asymptotic notations, its properties and use in measuring algorithm behavior, learn about various sorting, greedy and divide and conquer approach.
CO35405.2	Students will able to apply various algorithms for different computing problems using dynamic programming and branch and bound techniques.
CO35405.3	Students will be able to design and evaluate algorithms using various algorithm design techniques for pattern matching algorithms.
CO35405.4	Students will be able to analyze randomized algorithms, Recite algorithms that employ randomization.
CO35405.5	Relate the concepts of NP Completeness for analyze and solving the complexity of real life problems.

5CS512	Human-Computer Interaction Year of study: 2020-21
CO3512.1	Student will be able to list the capabilities of both humans and computers from the viewpoint of human information processing.
C03512.2	Student will be able to describe typical human–computer interaction (HCI) models and styles, as well as various historic HCI paradigms.
CO3512.2	Students will be able to apply an interactive design process and universal design principles to designing HCI systems.
C03512.3	Students will analyze and identify user models& support, socio-organizational issues, and stakeholder requirements of HCIs.
CO3512.3	Students will be able to discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.
6CS301	**Digital Image Processing Year of study: 2020-21**
CO36301.1	Students will be able to understand the fundamental steps involve in image processing, how image is acquired using different sensors and different color model used to represent image.
CO36301.2	Students will be able to apply different types of transform function on image for sharpening and smoothing in spatial as well as in frequency domain.
CO36301.3	Students will be able to analyze different types of noise occurs in image during transmission and able to restore the image using inverse and homomorphism algorithm.
CO36301.4	Students will be able to develop encoder and decoder for compression of image using diffrent coding techniques .
CO36301.5	Students will be able to differentiate between line point and edge detection, how edges and boundaries are linked and segment the image during detection process.
6CS402	**Machine Learning Year of study: 2020-21**
CO36402.1	Student able to understanding Supervised learning Through Decision Tree, KNN, SVM etc
CO36402.2	Student can knowledge about Unsupervised Learning Algorithm such as Clustering, Association rule mining, Gaussian Mixture Model.
CO36402.3	Student would be understand Feature Extraction and Feature Selection.
CO36402.4	Student get basic knowledge of Semi-Supervised Learning and Reinforcement Learning.
CO36402.5	Student can be learn about basic of Recommended System.
6CS403	**Information Security System Year of study: 2020-21**
CO36403.1	Develop a basic understanding of cryptography, how it has evolved and some key encryption techniques used today, Develop an understanding of security policies.
CO36403.2	To master and implement different encryption algorithms
CO36403.3	To master fundamentals of secret and public cryptography
CO36403.4	Students will be able to understand message authentication protocols and hash functions.
CO36403.5	To master protocols for security services
6CS404	**Computer Architecture and Organization Year of study: 2020-21**
CO36404.1	Students will be able to understand basic structure of computer.
CO36404.2	Students will be able to understand control unit operations, will able to conceptualize instruction level parallelism.
CO36404.3	Students will be able to perform computer arithmetic operations.
CO36404.4	Students will be able to design memory organization that uses banks for different word size operations, understand the concept of cache mapping techniques.
CO36404.5	Students will be able to understand the concept of I/O organization.
6CS405	**Artificial Intelligence Year of study: 2020-21**
CO36405.1	Student able to understanding production system, searching algorithms, control strategies.
CO36405.2	Student can know about knowledge representing, propositional and predicate logic and solve fact using resolution using refutation and learn of Montonic and non monotonic concepts.
CO36405.3	Student can create semantic net, frames and conceptual dependency and learn basic fuzzy logic.
CO36405.4	Student can analyze game playing applying minmax procedure, alpha-beta pruning on problems and basic about NL
CO36405.5	Learn about learning concepts, neural network, and architecture of expert system.
6CS406	**Cloud Computing Year of study: 2020-21**
CO36406.1	Students will be able to understand the fundamentals of cloud computing along with cloud computing design and challenges.
CO36406.2	Students will be able to use relevant software tools used in cloud computing. Student will also differentiate between Parallel and Distributed Paradigms.
CO36406.3	Students will be able to gain the knowledge about virtualization and its needs in cloud computing. Students will be able to use the tools available for virtualization.
CO36406.4	Students will be able to understand the security issues and recovery methods associated with cloud computing
CO36406.5	Students will be able to write case studies on the tools available for industrial purpose to deploy clouds. Students will also develop understanding about cloud computing application areas.

6CS511	Distributed System Year of study: 2020-21
CO36511.1	Understanding the basics of distributed systems along with associated applications and research issues
CO36511.2	Understanding the features, models,design issues, logical clock and event precedence
CO36511.3	Understanding of concurrent process,interprocess communication and its characteristics, RPC and RMI
CO36511.4	Understanding of system performance model, static process scheduling, dynamic load balancing, DFS
CO36511.5	Understanding of distributed shared memory , faults, recovery and replicated distributed agreement
7CS401	**Internet of Things Year of study: 2020-21**
7CS401.1	Explain the definition and usage of the term “Internet of Things” in different contexts understand the key components that make up an IoT system
7CS401.2	Differentiate between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack
7CS401.3	Understand famous IoT relevant Operating systems and hardware.
7CS401.4	Appreciate the role of big data, cloud computing and data analytics in a typical IoT system
7CS401.5	Design and Develop IOT based applications such as Lake Monitioring System, Air Quality System and Smart Energy Meter.
7CE660	**Disaster Management Year of study: 2020-21**
7CE660.1	Student will be able to categorze the different types of disaster and their characteristics
7CE660.2	Students will be able to make an Evaluation of hazard and vulnerability
7CE660.3	Students will be able to outline the concept of capacity building and strengthening capacity to reduce disaster risk
7CE660.4	Students will be able to write Disaster coping strategies, industrial safety plan, safety norms, mass media and disaster management
7CE660.5	Students will be able to describe Planning in disaster management, formulating risk reduction plan and to understand act and polices in India
8CS41	**Big Data Analytics Year of study: 2020-21**
8CS41.1	Undersatand how business decisions can be optimized and competitive advantage created with Big Data
8CS41.2	Understanding the fundamentals fo Data Analytics
8CS41.3	Imparting the architectural concept of hadoop and introducing map reduce paradigm
8CS41.4	Ability to work with Hadoop
8CS41.5	Introduce programming tools PIG & HIVE in Hadoop echo system
8AN6-602	**Factor of human Interaction Year of study: 2020-21**
8AN6-602.1	Students will learn Murphy's Law and factors affecting human performancre and limitations
8AN6-602.2	Student will learn the effects of social phychology on the employees at work place
8AN6-602.3	To identify the various factors affecting the performance of an employee
8AN6-602.4	To identify role of work place environment and the nature of the task allocated to the employee
8AN6-602.5	Student will learn indistrial communication techniques to reduce the errors and hazards of the work place.