Course Outcomes of Computer Engineering Department Academic Year 2022-23

Subject Code	Subject Name	CO-ID	CO-Statement
		SEMESTER – III	
CSC301	APPLIED MATHEMATICS-III	CO1	Learner will be able to apply the concepts of Laplace Transform & inverse Laplace transform to solve differential Equations.

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		CO2	Learner will be able to apply the concepts of Fourier series to write the function in terms of sine and cosine terms.
		CO3	Learner will be able to apply the concept of complex variable to find orthogonal trajectory.
		CO4	Learner will be able to apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science.
		CO5	Learner will be able to apply the concepts of probability and expectation for getting the spread of the data and distribution of probabilities
		CO6	Learner will be able to use the concept of higher Mathematics to solve Engineering Problems
CSC302	DISCRETE STRUCTURES AND GRAPH THEORY	CO1	Learner will be able to illustrate the basic concepts of logical thinking.
		CO2	Learner will be able to illustrate the basic principles of set theory, relation and functions
		CO3	Learner will be able to learn the concepts of posets and lattice
		CO4	Learner will be able to illustrate the concepts of counting and recurrence relations
		CO5	Learner will be able to identify whether the binary operation belongs to semi-group, monoid, groups, subgroups, abelian group, cyclic group, isomorphic based on binary operation and properties.
		CO6	Learner will be able to perform operation of graph theory and identify types of graphs
CSC303	DATA STRUCTURE	CO1	Students will be able to identify and compare various data structures.
		CO2	Students will be able to use the concept of stack, queue and implement them to solve real world problems.
		CO3	Students will be able to compare linked list with other data structures and implement it to solve the real world problems.
		CO4	Students will be able to select the appropriate tree data structure and implement it in real world problems.
		CO5	Students will be able to select the appropriate graph data structure and implement it in real world problems.
		CO6	Students will be able to implement and apply appropriate searching techniques and resolve collision in Hashing.
CSC304	DIGITAL LOGIC & COMPUTER ARCHITECTURE	CO1	Learners will be able to use basic concepts of number systems and able to perform mathematical operations in digital systems.
		CO2	Learners will be able to summarize the basic structure of a computer and apply the algorithms for solving ALU operations.
		CO3	Learners will be able to develop various combinational circuits, sequential circuits and analyze the concepts of processor organization.
		CO4	Learners will be able to differentiate hardwired and micro-programmed control unit and perform micro-operations.
		CO5	Learners will be able to compare different types of memories and

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			solve problems based on mapping techniques.
		CO6	Learners will be able to measure the performance of pipeline, identify different pipeline hazards and buses.
CSC305	COMPUTER GRAPHICS	CO1	Students will be able to summarize the basic concepts of Computer Graphics
		CO2	Students will be able to apply various algorithms for generating basic graphics primitives
		CO3	Students will be able to apply & Analyze 2D geometric transformations on graphical objects
		CO4	Students will be able to apply & Analyze various clipping operations on graphical objects
		CO5	Students will be able to apply 3D geometric transformations, curve representation techniques and projections methods
		CO6	Students will be able to illustrate the visible surface detection and Animations techniques
CSL301	DATA STRUCTURE LAB	CO1	Students will be able to implement Linear data structures to demonstrate various operations like create, insert, delete, search and traversal.
		CO2	Students will be able to implement Non-linear data structures to demonstrate various operations like create, insert, delete, search and traversal.
		CO3	Students will be able to choose and apply a suitable data structure to implement diverse problems.
		CO4	Students will be able to analyze and implement several searching techniques.
CSL302	DIGITAL LOGIC & COMPUTER ARCHITECTURE LAB	CO1	Learners will be able to analyze and verify the operations of various logic gates
		CO2	Learners will be able to design and analyze the combinational circuits
		CO3	Learners will be able to design and analyze the sequential circuits
		CO4	Learners will be able to implement various algorithms for arithmetic operations.
CSL303	COMPUTER GRAPHICS LAB	CO1	Implement various output and filled area primitive algorithms.
		CO2	Implement Transformation, Projection and clipping algorithms on graphical objects.
		CO3	Implement Curve and Fractal Generation methods.
		CO4	Develop a graphical application/ Animation based on learned concept.
CSL304	SKILL BASE LAB COURSE:OBJECT ORIENTED PROGRAMMING WITH JAVA	CO1	Apply fundamental programming constructs.
		CO2	Implement the fundamental features of an object-oriented programming language.
		CO3	Learner will be able to implement the concepts of arrays, strings and vectors.
		CO4	The learner will be able to implement a graphical interface using an applet, swing, etc
		CO5	The learner will be able to develop a GUI based application using

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			OO concepts.
CSM301	MINI PROJECT – 1 A	CO1	Identify and formulate a problem statement for an engineering problem.
		CO2	Apply Knowledge and skill to solve the identified problem
		CO3	Develop interpersonal skills to work as member of a group or leader
		CO4	Use standard norms of engineering practices
		CO5	Excel in written and oral communication
		CO6	Demonstrate capabilities of self-learning which leads to lifelong learning.
SEMESTER – IV			
CSC401	APPLIED MATHEMATICS-IV	CO1	Learner will be able to apply concepts of Matrix operations to solve Engineering problems.
		CO2	Learner will be able to use the concepts of Complex Integration for evaluating integrals.
		CO3	Learner will be able to apply the concept of Z- transformation and its inverse in engineering problems.
		CO4	Learner will be able to apply the concept of probability distribution and sampling theory to Engineering Problems.
		CO5	Learner will be able to apply the concept of Linear Programming to solve the optimization problems
		CO6	Learner will be able to use the Non-Linear Programming techniques to solve the optimization problems
CSC402	ANALYSIS OF ALGORITHMS	CO1	Students will be able to summarize the basic concepts and analyze the time and space complexity of algorithms
		CO2	Students will be able to apply and analyze the complexity of divide and conquer strategy
		CO3	Students will be able to apply and analyze the complexity of greedy strategy.
		CO4	Students will be able to apply and analyze dynamic approach for the given problem
		CO5	Students will be able to apply and analyse backtracking & branch and bound techniques for the given problem
		CO6	Students will be able to apply and analyze the string-matching techniques
CSC403	DATABASE MANAGEMENT SYSTEM	CO1	The learner will be able to differentiate between file systems and databases and know the role of the Database administrator
		CO2	The Learner will be able to Design ER and EER diagrams for real-life applications.
		CO3	The learner will be able to derive a relational model and formulate relational algebra queries
		CO4	The learner will be able to Analyze the query statement and formulate SQL queries
		CO5	The learner will be able to Apply the concept of normalization to relational database design

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		CO6	The learner will be able to use the concept of transaction management for concurrency
CSC404	OPERATING SYSTEM	CO1	The students will be able to summaries the objectives, functions and structure of OS.
		CO2	Students will be able to use the concept of process management and evaluate the performance of process scheduling algorithms.
		CO3	Students will be able to apply the concept of mutual exclusion, deadlock detection and avoidance technique to create solution of real time problems.
		CO4	Students will be able to design strategy for memory management and analyze the performance of Memory allocation and replacement strategies.
		CO5	Students will be able to know organization and Access of File System.
		CO6	Students will be able to know I/O management and Disk Scheduling.
CSC405	MICROPROCESSOR	CO1	Learners will be able to summarize core concepts of 8086 microprocessor.
		CO2	Learners will be able to use the 8086 instructions to write program in assembly language
		CO3	Learners will be able to design 8086 based systems by selecting appropriate memory and peripheral chips for a given specification
		CO4	Learners will be able to summarize the concepts of Advance Processor Architectures
		CO5	Learners will be able to restate basic concepts of advanced processor such as Pentium 4
CSL401	ANALYSIS OF ALGORITHM LAB	CO1	Implement the algorithms using different approaches
		CO2	Analyze the complexities of various algorithms
		CO3	Compare the complexity of the algorithms for specific problem
CSL402	DATABASE MANAGEMENT SYSTEM LAB	CO1	Design ER /EER diagram and convert to relational model for the real world application.
		CO2	Apply various SQL sublanguage commands and formulate simple/complex queries to demonstrate database operations
		CO3	Implement stored procedure/function for specific task
		CO4	Demonstrate database connectivity
CSL403	OPERATING SYSTEM LAB	CO1	Leaners will be able to execute basic operating system commands and implement various system calls.
		CO2	Learners will be able to understand the shell commands and write shell script programs using kernel APIs.
		CO3	Learners will be able to implement various process scheduling algorithms.
		CO4	Learners will be able to implement page replacement algorithms and deadlock avoidance techniques.
CSL404	MICROPROCESSOR LAB	CO1	Learners will able to write Assembly Program to perform various tasks.

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		CO2	Learners will able to develop the program in Assembly/Mixed language for Intel 8086
		CO3	Learners will able to implement Interfacing programs using Assembly Language Programming.
CSL405	SKILL BASE LAB COURSE: PYTHON PROGRAMMING	CO1	Learner will be able to explore and implement the basic concepts of Python.
		CO2	Learner will be able to explore and implement file handling, data structures using built in functions in python.
		CO3	Learner will be able to explore and implement advanced features of python.
		CO4	Learner will be able to develop Python based web applications.
CSM401	MINI PROJECT 1-B	CO1	Identify and formulate a problem statement for an engineering problem
		CO2	Apply Knowledge and skill to solve the identified problem
		CO3	Draw proper inferences from the obtained results
		CO4	Analyze the impact of solutions in societal and environmental context
		CO5	Develop interpersonal skills to work as member of a group or leader
		CO6	Use standard norms of engineering practices
		CO7	Excel in written and oral communication
		CO8	Demonstrate project management principles during project work
		CO9	Demonstrate capabilities of self-learning which leads to lifelong learning.
SEMESTER – V			
CSC501	THEORETICAL COMPUTER SCIENCE	CO1	Students will be able to summarize fundamentals of Theoretical Computer Science.
		CO2	Students will be able to recognize the language and accordingly construct, simplify appropriate computational models like FA, PDA and Turing machine.
		CO3	Students will be able to simplify, convert the grammar in various normal forms like CNF and GNF.
		CO4	Students will be able to prove the closure properties and apply pumping lemma therom to prove whether the given grammar is regular or context free
		CO5	Students will be able to distinguish and analyse decidable and undecidable problems with the help of various case studies like PCP, Halting problem and Rice's Theorem.
CSC502	SOFTWARE ENGINEERING	CO1	Able to select appropriate model of software process using basic fundamentals of software engineering
		CO2	Design and analyze the requirement models.
		CO3	Identify the size of the project, schedule, estimate the cost and track the progress of the software project.
		CO4	Develop software architecture using various design principles.
		CO5	Able to test software using various testing principles.
		CO6	Analyze the risks for mitigation for quality management of

Subject Code	Subject Name	CO-ID	CO-Statement
			software.
CSC503	COMPUTER NETWORK	CO1	Use the concepts of layered approach along with required hardware and software components to build various topologies of computer networks.
		CO2	Analyse different design issues and elementary protocols used at the data link layer.
		CO3	Apply the concepts of subnetting to design the logical sub-address blocks with a given address block.
		CO4	Apply the various routing algorithms to find the optimal path and Analyse the Internet layers protocols.
		CO5	Analyse the transport layer protocols with their real-life applications.
		CO6	Analyse the features and operations of various application layer protocols.
CSC504	DATA WAREHOUSING & MINING	CO1	Learner will be able to use the concepts of Data Warehouse for dimensional modelling and perform OLAP operations.
		CO2	Learner will be able to apply the concepts of Data mining principles to perform data exploration and pre processing
		CO3	Learner will be able to use the concepts of data mining to perform classification task using mathematical principles.
		CO4	Learner will be able to use the concepts of data mining to perform clustering using mathematical principles.
		CO5	Learner will be able to apply the concepts of data mining to perform association rule mining task.
		CO6	Learner will be able to Summarize the advanced concepts of data mining.
CSDLO 5012	INTERNET PROGRAMMING	CO1	Design Interactive web page(s) using HTML, HTML5 and CSS3.
		CO2	Design Dynamic web pages using JavaScript with DHTML.
		CO3	Demonstrate database connectivity using JDBC and design an Interactive website.
		CO4	Demonstrate Rich Internet Application using Ajax and demonstrate jQuery Framework with AJAX.
		CO5	Demonstrate the web application using Web Extensions:XML and PHP.
		CO6	Demonstrate Web Application using Reactive JS.
CSL501	SOFTWARE ENGINEERING LABORATORY	CO1	Identify requirements and apply process model to selected case study.
		CO2	Analyze and design models for the selected case study using UML modeling.
		CO3	Use various software engineering management tools.
		CO4	Apply testing principles for the selected case study.
CSL502	COMPUTER NETWORK LAB	CO1	Design and setup networking environment in Linux.
		CO2	Use Network tools and simulators such as NS2, Wireshark etc. to explore networking algorithms and protocols.
		CO3	Setup and configure network connections.
		CO4	Implement programs using core programming APIs for understanding networking concepts

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CSL503	DATA WAREHOUSING & MINING LAB	CO1	Design Data Warehouse and perform various OLAP operations.
		CO2	Implement Data exploration and Data Preprocessing techniques.
		CO3	Implement Classical data mining algorithms on a given set of data sample.
		CO4	Implement Classical/Advanced Data Mining algorithms using a tool.
CSL504	Business Comm. & Ethics II	CO1	Learner will be able to communicate effectively and ethically in both oral and written forms.
		CO2	Learner will be able to possess the skill set required for successful employability and exhibit leadership skills.
		CO3	Learner will be able to develop an acumen to prepare for and give various competitive exams.
		CO4	Learner will be able to demonstrate knowledge of professional and personal etiquettes & ethics in the global environment.
CSM501	MINI PROJECT: 2 A	CO1	Identify and formulate a problem statement for an engineering problem
		CO2	Apply knowledge and skill to solve the identified problem
		CO3	Draw proper inferences from the obtained results
		CO4	Analyze the impact of solutions in societal and environmental context
		CO5	Develop interpersonal skills to work as member of a group or leader
		CO6	Use standard norms of engineering practices
		CO7	Excel in written and oral communication
		CO8	Demonstrate project management principles during project work
		CO9	Demonstrate capabilities of self-learning which leads to lifelong learning
SEMESTER – VI			
CSC601	SYSTEM PROGRAMMING & COMPLIER CONSTRUCTION	CO1	Students will be able to recall the concepts and uses of various system program
		CO2	Students will be able to recall the understanding of the assembler designs using various data structures.
		CO3	Students will be able to know the different features and design steps of macros.
		CO4	Students will be able to restate the difference between different loaders and linkers and their contribution in developing efficient user application.
		CO5	Students will be able to identify the relationship among different phases of compiler.
		CO6	Students will be able to apply the optimization techniques for code generation.
CSC602	CRYPTOGRAPHY & SYSTEM SECURITY	CO1	Apply the encryption techniques to different scenario.
		CO2	Use different encryption and decryption techniques and keys in providing different security services.

Subject Code	Subject Name	CO-ID	CO-Statement
		CO3	Use Hashing and MAC techniques to achieve message integrity and authentication of the message.
		CO4	Use RSA digital signature algorithm for user authentication.
		CO5	Analyze different attacks on networks and security protocols and selection of solution to neutralize the attacks.
		CO6	Screen the program for identification of malware and propose a solution to neutralize the malware.
CSC603	MOBILE COMPUTING	CO1	Students will be able to summarize the fundamental concepts of mobile computing.
		CO2	Students will be able to recall the concepts of GSM, GPRS and UTRAN/UMTS System.
		CO3	Students will be able to use and analyze various protocols used in mobile network.
		CO4	Students will be able to use the concepts of WLAN technology and analyze for its functionalities and specifications.
		CO5	Students will be familiarized with the concepts of mobility management.
		CO6	Students will be able to summarize the LTE systems and its interfaces in 3G,4G and 5G of mobile communications.
CSC604	ARTIFICIAL INTELLIGENCE	CO1	Learner will be able to summarize Artificial Intelligence building blocks.
		CO2	Learner will be able to identify the suitable intelligent agent and derive the problem formulation.
		CO3	Learner will be able to apply an appropriate problem-solving method and analyze the strength and weaknesses of AI approaches to knowledge intensive problem solving.
		CO4	Learner will be able to apply appropriate knowledge representation technique and also design models for reasoning with uncertainty.
		CO5	Learner will be able to interpret the role of planning and learning in intelligent systems
		CO6	Learner will be able to recognize the applicability of AI in real world scenarios
CSDL06011	INTERNET OF THINGS	CO1	The learner will be able to summarize the concepts of IoT and identify the essential things required in IoT.
		CO2	The learner will be able to elaborate on the functionality of the IoT stack.
		CO3	The learner will be able to compare different protocols used in the application layer and select the appropriate as per requirement.
		CO4	The learner will be able to analyze real-life IoT-based applications.
		CO5	The learner will be able to identify and analyze the appropriate tools and technology for the development of small IoT-based applications and security concerns related to them.
CSDLO6013 \	QUANTITATIVE ANALYSIS	CO1	Learner will be able to use the statistical concepts for representation of data.
		CO2	Learner will be able to collect data and apply the concepts of sampling methods.

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		CO3	Learner will be able to apply the concepts of Regression and Multiple Linear Regression and analyze a statistical problem.
		CO4	Learner will be able to use the concepts of statistical inference to estimate and analyze various parameters
		CO5	Learner will be able to apply the concepts of Testing of hypothesis.
CSL601	SYSTEM PROGRAMMING & COMPILER CONSTRUCTION LAB	CO1	Student will be able to generate machine code by using various databases generated in pass one of two pass assemblers and construct different databases of two pass macroprocessor.
		CO2	Student will be able to identify and validate different tokens for given high level language code.
		CO3	Student will be able to parse the given input string by constructing Top-Down/Bottom-Up parser.
		CO4	Student will be able to implement synthesis phase of compiler to generate machine code with intermediate code generation, code optimization techniques.
CSL602	CRYPTOGRAPHY & SYSTEM SECURITY LAB	CO1	Apply the knowledge of symmetric cryptography to implement simple ciphers.
		CO2	Analyze and implement public key algorithms like RSA and El Gamal.
		CO3	Analyze and evaluate performance of hashing algorithms and explore GPG tool to implement email security.
		CO4	To explore & use the different network reconnaissance tools to gather information networks like sniffers, port scanners etc. for analyzing packets in a network.
CSL603	MOBILE COMPUTING LAB	CO1	Develop & Demonstrate mobile applications using various tools
		CO2	Articulate the knowledge of GSM, CDMA and Bluetooth technologies and demonstrate it.
		CO3	Simulate the concept of Wireless LAN, Hidden terminal problem and Adhoc network.
		CO4	Use and implement security algorithms for mobile communication network .
CSC604	ARTIFICIAL INTELLIGENCE LAB	CO1	Identify languages and technologies for Artificial Intelligence
		CO2	Apply uninformed and informed searching techniques for real world problems.
		CO3	Implement knowledge base using any AI language
		CO4	Design and implement expert systems for real world problems
CSC605	SKILL BASE LAB COURSE: CLOUD COMPUTING	CO1	Learners will be able to explore various cloud computing service models and implement them to solve the given problems.
		CO2	Learners will be able to implement virtualization techniques using Oracle Virtual Box and Xen / VMware ESXI.
		CO3	Learners will be able to deploy web applications on AWS.
		CO4	Learners will be familiar with different security practices available in public cloud platforms.
		CO5	Learners will be able to explore various commercially available cloud services and recommend the appropriate one for mini project.

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		CO6	Learners will be able to implement the concept of containerization using Docker.
CSM601	MINI PROJECT-2B	CO1	Learner will be able to identify Methodology for solving above problem and apply engineering knowledge and skills to solve it
		CO2	Learner will be able to validate, Verify the results using test cases/benchmark data/theoretical/ inferences/experiments/simulations.
		CO3	Learner will be able to analyze and evaluate the impact of solution/product/research/innovation /entrepreneurship towards societal/environmental/sustainable development
		CO4	Learner will be able to use standard norms of engineering practices and project management principles during project work
		CO5	Learner will be able to communicate through technical report writing and oral presentation.
		CO6	Learner will be able to gain technical competency towards participation in Competitions, Hackathons, etc.
		CO7	Learner will be able to demonstrate capabilities of self-learning, leading to lifelong learning
		CO8	Learner will be able to develop interpersonal skills to work as a member of a group or as leader
SEMESTER – VII			
CSC701	MACHINE LEARNING	CO1	Learner will be able to identify the fundamental concepts of ML and apply the same for a given application.
		CO2	Learner will be able to identify and apply appropriate machine learning technique for given problem statement.
		CO3	Learner will be able to calculate and evaluate model efficiency using appropriate evaluation metrics.
		CO4	Learner will be able apply ensemble techniques to determine the best ML algorithm for the given problem.
		CO5	Learner will be able to identify the fundamental concepts of ML and apply the same for a given application.
CSC702	BIG DATA ANALYSIS	CO1	Learner will be able to understand the building blocks of Big Data Analytics
		CO2	Learner will be able to apply Fundamental enabling techniques like Hadoop and map reduce in solving real world problems
		CO3	Learner will be able to apply and analyze different No SQL system used in handling big data.
		CO4	Learner will be able to apply advanced techniques for emerging applications like stream analytics.
		CO5	Learner will be able to achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications, etc.
		CO6	Learner will be able to apply statistical computing techniques and graphics for analyzing big data.
CSDC 7013	NATURAL LANGUAGE PROCESSING	CO1	Develop a basic understanding of Natural Language Processing with regards to knowledge, ambiguity, stages, challenges and applications in NLP.
		CO2	Perform Word-Level Analysis using Regular Expression, Finite

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			Automata, Finite State Transducers and N-gram language model.
		CO3	Perform Syntax Analysis using Parts of Speech tagging, Context Free Grammar, Hidden Markov Models and Conditional Random Fields.
		CO4	Perform Semantic analysis using various techniques like WSD, Dictionary based approach.
		CO5	Develop a basic understanding of pragmatics in NLP
		CO6	Develop solutions for various NLP problems.
CSDC 7022	BLOCK CHAIN	CO1	Learner will be able to use basic components to show working of blockchain technology.
		CO2	Learner will be able to use concept of cryptocurrencies to show the working of Bitcoin.
		CO3	Learner will be able to apply smart contract concepts to develop distributed applications.
		CO4	Learner will be able to use concept of permission less blockchain to show the working of Ethereum public blockchain.
		CO5	Learner will be able to use concept of permissioned blockchain to show the working of various private blockchain.
CSL7011	MACHINE LEARNING LAB	CO1	Learner will be able to perform data exploratory analysis on a given dataset.
		CO2	Learner will be able to develop different machine learning models.
		CO3	Learner will be able to evaluate the build ML models efficiency.
		CO4	Learner will able to apply ensemble and dimension reduction technique to improve the model's efficiency.
CSL702	BIG DATA ANALYTICS LAB	CO1	Learner will be able to install Hadoop and demonstrate the working of Hadoop Eco system (HDFS,SQOOP,HIVE,HUE)
		CO2	Learner will be able to apply map reduce program to various tasks(word count ,matrix multiplication)
		CO3	Learner will be able to demonstrate the CURD operation on No SQL database(Mongo DB and Neo4j)
		CO4	Learner will be able to implement various data stream algorithm (Bloom filter,FM)
		CO5	To develop and analyze the social network graphs with data visualization techniques.
CSDL 7013	NATURAL LANGUAGE PROCESSING LAB	CO1	Perform raw text processing.
		CO2	Perform word level analysis
		CO3	Perform sentence level analysis
		CO4	Perform document level analysis
CSDL 7022	BLOCKCHAIN LAB	CO1	Learner will be able to demonstrate the concept of cryptographic hash function and Merkle tree.
		CO2	Learner will be able to develop Smart Contract using Solidity.
		CO3	Learner will be able to develop an application using Metamax, Ganache and, Truffle framework
CSP705	MAJOR PROJECT-I	CO1	Apply the knowledge acquired based on curricular and co-curricular activities to develop projects.CSP701

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		CO2	Identify problem based on societal/research needs
		CO3	Design and develop system components /processes based on problem specifications of the project
		CO4	Apply critical and creative thinking to design engineering solutions
		CO5	Select and apply appropriate modern tools and methods to analyze the identified problem
		CO6	Apply knowledge and skill to solve societal problems
		CO7	Analyze impact of solutions in societal and environmental context for sustainable development
		CO8	Use norms of engineering practices and follow professional ethics while attempting solutions
		CO9	Develop interpersonal skills to work as a member of a team or leader
		CO10	Excel in written and oral communication
		CO11	Demonstrate understanding of principles of project management during project work
		CO12	Inculcate a habit of learning and solving problems through appropriate process, which leads to lifelong learning
ILO7015	OPERATION RESEARCH	CO1	Apply and Summarize workings of the simplex method, the relationship between a linear program and its dual, including strong duality and complementary slackness.
		CO2	Analyse, Identify and Solve specialized LPP like transportation, assignment and dynamic programming problems.
		CO3	Select, Apply and Find the usage of Queuing Theory for solving engineering problems.
		CO4	Apply simulation method and usage of simulation in managerial decision-making problems.
		CO5	Apply and solve given problems using Game Theory.
		CO6	Select and apply appropriate models and infer the outcome.
ILO7012	RELIABILITY ENGINEERING	CO1	A learner will be able to apply the concept of Probability theory to engineering problems.
		CO2	A learner will be able to apply various reliability concepts to calculate different reliability parameters.
		CO3	A learner will be able to illustrate the understanding of System Reliability.
		CO4	A learner will be able to illustrate reliability improvement techniques and System Reliability Analysis.
		CO5	A learner will be able to illustrate the various aspects of Maintainability, Availability and Carry out a Failure Mode Effect and Criticality Analysis.
		CO6	A learner will be able to apply the concept of Probability theory to engineering problems.
C415	DISASTER MANAGEMENT &	CO1	Students will be able to comprehend hazards, risks, vulnerability, capacities from social and technological, perspectives.

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	MITIGATION MEASURES	CO2	Students will be able to recognize natural as well as man-made disaster and their extent along with its possible effects on the economy and dynamics of management.
		CO3	Students will be able to Comprehend national structures of development planning and disaster management based on previous history.
		CO4	Students will be able to describe the government policies, acts and various organizational structures associated with emergency.
		CO5	Students will be able to explain the simple dos and donts in extreme events and climate change for effective management of disasters
EEIO 7018	ENERGY AUDIT AND MANAGEMENT	CO1	To know about Energy Conservation Act-2001 and its features towards enhancement of Energy Security
		CO2	To use basic concept of energy optimization techniques and analyze it's role in the energy audit process
		CO3	To apply various data information and financial analysis techniques to check feasibility of project in the energy audit process
		CO4	To apply energy conservation opportunities in energy systems, to enhance efficiency
		CO5	To analyse energy performance of various electrical and mechanical systems
ILO7016	CYBER SECURITY AND LAWS	CO1	To be aware about cybercrimes, information security and Indian IT Act 2000.
		CO2	To understand different types of cyberattacks and security measures to mitigate the attacks
		CO3	To understand different types of attacks and it countermeasures
		CO4	To interpret IT laws in various legal issues
		CO5	To recognize and apply Indian IT Act and its amendments
		CO6	To recognize and apply information security compliances.
SEMESTER – VIII			
CSC801	DISTRIBUTED COMPUTING	CO1	Recall the concepts related to distributed system technologies.
		CO2	Use the concept of RPC and RMI mechanisms for Interprocess communication and compare various communication techniques used in distributed systems.
		CO3	Apply and analyze the various techniques used for clock synchronization, mutual exclusion and deadlock.
		CO4	Summarize the concepts of Resource and Process management.
		CO5	Illustrate the concepts of Consistency, Replication Management and fault Tolerance.
		CO6	Use the knowledge of Distributed File systems in building large-scale distributed applications.
CSDC-8011	DEEP LEARNING	CO1	Learner will be able to summarize the essentials of neural network model

Subject Code	Subject Name	CO-ID	CO-Statement
		CO2	Learner will be able to determine an appropriate activation function, loss function, learning parameters and regularization method for training DNN
		CO3	Learner will be able to apply the concept of Auto encoder to design DNN model for learning representation of data.
		CO4	Learner will be able to use the concepts of CNN for image recognition.
		CO5	Learner will be able to apply an appropriate model for sequence learning problem
		CO6	Learner will be able to recall the concept of GAN and its application
CSDC-8013	APPLIED DATA SCIENCE	CO1	Learner will be able to summarize the fundamental knowledge of the data science process.
		CO2	Learner will be able to identify the need of Descriptive and Inferential Statistics techniques for data exploration.
		CO3	Learner will be able to apply different methodologies, evaluation strategies and visualization techniques on data
		CO4	Learner will be able to apply anomaly detection techniques for detecting outliers.
		CO5	Learner will be able to apply and analyze the results of time-series forecasting.
CSDC-8023	SOCIAL MEDIA ANALYTICS	CO1	Learner will be able to summarize architectural features of social media
		CO2	Learner will be able to identify densed and non-densed network to decide business strategy
		CO3	Learner will be able to summarize the concept of analysis of Hyperlink, Action and Text in Social Media Analytics
		CO4	Learner will be able to identify various tools for Location analytics and Search Engine Analytics.
		CO5	Learner will be able to use the knowledge of Social Information sharing and filtering for Analytics
		CO6	Learner will be able to develop one Social Media Applications.
CSL801	DISTRIBUTED COMPUTING LAB	CO1	Demonstrate communication in distributed system.
		CO2	Demonstrate synchronization mechanisms that are suitable for distributed system.
		CO3	Demonstrate the technique used for resource and process management.
		CO4	Summarize/Implement the concept of DFS with case study.
CSDL-8011	DEEP LEARNING LAB	CO1	Implement basic neural network model to learn logic functions.
		CO2	Design and train feedforward neural networks using various learning algorithms.
		CO3	Build and train deep neural network model for unsupervised learning applications.
		CO4	Build and train deep neural network model for supervised learning applications.

Subject Code	Subject Name	CO-ID	CO-Statement
		CO5	Build and train deep neural network model for sequence learning applications.
CSDL-8023	APPLIED DATA SCIENCE LAB	CO1	Explore and demonstrate various stages of the data science lifecycle for the selected case study.
		CO2	Apply data preparation, exploration, and visualization techniques.
		CO3	Implement and analyze different supervised and unsupervised techniques.
CSDL-8023	SOCIAL MEDIA ANALYTICS LAB	CO1	Explore social media analytics (SMA) tools and evaluation metrics for business
		CO2	Collect, Preprocess, Analyze and visualize social media data from multiple platforms
		CO3	Use SMA tools to analyze social media content and hyperlinks
		CO4	Use SMA tools to analyze user location , usage and privacy settings using SM data
CSP805	MAJOR PROJECT-II	CO1	Apply the knowledge acquired based on curricular and co-curricular activities to develop projects.
		CO2	Identify and analyze problem based on societal/research needs.
		CO3	Design and develop system components /processes based on problem specifications of the project
		CO4	Apply critical and creative thinking to design engineering solutions
		CO5	Select and apply appropriate modern tools and methods to analyze the identified problem
		CO6	Apply knowledge and skill to solve societal problems
		CO7	Analyze impact of solutions in societal and environmental context for sustainable development
		CO8	Learner will be able to use norms of engineering practices and follow professional ethics while attempting solutions.
		CO9	Develop interpersonal skills to work as a member of a team or leader
		CO10	Excel in written and oral communication
		CO11	Demonstrate understanding of principles of project management during project work
		CO12	Inculcate a habit of learning and solving problems through appropriate process, which leads to lifelong learning
ILO8021	PROJECT MANAGEMENT-1	CO1	Learner will be able to illustrate Project Life Cycles and PM Knowledge areas as per Project Management Institute.
		CO2	Learner will be able to apply different selection criteria to select an appropriate project from different options.
		CO3	Learner will be able to develop work break down structure for a Project and schedule based on it.
		CO4	Learner will be able to identify opportunities and threats to the project and decide an approach to deal with them strategically.
		CO5	Learner will be able to apply Earned Value Technique, determine and predict the status of the Project.
		CO6	Learner will be able to understand various types of Project

Subject Code	Subject Name	CO-ID	CO-Statement
			termination methods and ethics in Projects.
ILO8021	PROJECT MANAGEMENT-3	CO1	State Basic Concepts and areas of Project Management.
		CO2	Apply selection criteria and select an appropriate project from different options.
		CO3	Illustrate work break down structure for a project and develop a schedule based on it.
		CO4	Identify opportunities and threats to the project and decide an approach to deal with them strategically.
		CO5	Use Earned value technique and determine & predict status of the project.
		CO6	Capture lessons learned during project phases and document them for future reference.
ILO8018	DIGITAL BUSINESS MANAGEMENT	CO1	Interpret the concept of E-business, contemporary trends and technology in digital businesses.
		CO2	Illustrate various types of Ecommerce
		CO3	Illustrate Digital business support services
		CO4	Examine Security issues in E-commerce and their countermeasures
		CO5	Examine E-business strategy formulation for the development of a successful plan and presentation of digital transformation
ILO8023	ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT	CO1	Learner will be able to define the roles, responsibilities and functions to become a successful entrepreneur.
		CO2	Learner will be able to summarize business plans, business development and Importance of Capital to Entrepreneurship.
		CO3	Learner will be able to summarize Social and Women entrepreneurship
		CO4	Learner will be able to summarize different Acts and government policies for entrepreneurship.
		CO5	Learner will be able to summarize effective management of small and micro business.