Koneru Lakshmaiah Education Foundation
(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)
Accredited by NAAC as 'A++' ❖Approved by AICTE ❖ ISO 21001:2018 Certified
Campus: Green Fields, Vaddeswaram - 522 302, Guntur District, Andhra Pradesh, INDIA.
Phone No. +91 8645 - 350 200; www.klef.ac.in; www.klef.edu.in; www.kluniversity.in
Admin Off: 29-36-38, Museum Road, Governorpet, Vijayawada - 520 002. Ph: +91 - 866 - 3500122, 2576129

Department of Computer science and Engineering

Program: B.Tech - CSE

Academic Year: 2022-23

Course Code	Course Title	CO NO	Description of the Course Outcome
22UC1101	INTEGRATED PROFESSIONAL ENGLISH	CO1	Understand the concepts of grammar to improve communication, reading, and writing skills
		CO2	Demonstrate required knowledge over Dos and Don'ts of speaking in the corporate context. Demonstrate ability to face formal situations / interactions.
		CO3	Understand the varieties of reading and comprehend the tone and style of the author. Skim and scan effectively and appreciate rhetorical devices
		CO4	Apply the concepts of writing to draft corporate letters, emails and memos
22UC2103	ESSENTIAL SKILLS FOR EMPLOYABILITY	CO1	Identify and organize sentence structures based on grammar
		CO2	Illustrate specific writing styles
		CO3	Relate intrapersonal skills
		CO4	Interpret interpersonal Skills for developing oral communication
22UC3105	UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS	CO1	Realize and Understand the basic aspiration, harmony in thehuman being.
		CO2	Envisage the roadmap to fulfill the basic aspiration of humanbeings.
		CO3	Analyze the profession and his role in this existence
		CO4	Understand the profession and his role in this existence
22UC1202	ENGLISH PROFICIENCY	CO1	Demonstrating different interpersonal skills for employability.
		CO2	Distinguishing Business essential skills
		CO3	Classifying social media and corporate communication skills.
		CO4	Applying analytical thinking skills.
22UC2204	CORPORATE READINESS SKILLS	CO1	Understand the importance of business correspondence and utilize proper format, content, and tools for improved results.
		CO2	Apply the techniques of writing and use standardized business vocabulary in formal communication.
		CO3	Understand the properties of numbers, solving the problems on divisibility rules, unit's digit, remainders, averages. Using the concept of Alligatios, solving the problems on mixtures, Understanding the

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Course Code	Course Title	CO NO	Description of the Course Outcome
			concept of surface areas and volumes, solving the 2D & 3D figures.
		CO4	Understand the three dimensions of a cube and answer questions PC)5 2 Based on the concept of 3-D rotation. Understand the concept of Binary Logic and the techniques
22UC0011	ECOLOGY & ENVIRONMENT	CO1	Understanding the importance of Environmental education and conservation of natural resources
		CO2	Understanding the Ecosystems ,biodiversity and their
		CO3	Understand global Environmental issues, pollution
		CO4	Understand the knowledge on solid waste management, disaster management and EIA process
22UC0009	GENDER SENSITIZATION	CO1	Students will have developed a better understanding of important issues related to gender in contemporary India
		CO2	Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through group discussions.
		CO3	Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
		CO4	Students will acquire insight into the gendered division of labour and its relation to politics and economics.
22CS2108	ENTERPRISE PROGRAMMING	CO1	Understand the basic concepts of XML, XSLT and JDBC
		CO2	Develop Enterprise Application using Servlet and JSP
		CO3	Create an enterprise application using JSF and build business logic using EJB, JNDI and Session beans
		CO4	Apply JAX-RS, JMS and JAAS specifications to build web services
22CS2109	OPERATING SYSTEMS	CO 1	Understanding the basic algorithms for subsystem components
		CO	Classify and compare Memory and Process
		CO 3	Assess the requirements for Process synchronization and concurrency issues
		CO 4	Evaluate various persistent storage technologies system protection and security, virtual machine, Network File System, Distributed File Systems, Real time OS
		CO 5	User System call creation in XV6 Operating System environment
22CS2215	AUTOMATA THEORY & FORMAL LANGUAGE	CO 1	Make use of Finite State Machines for Modeling and Solving computing problems for different languages.
		CO 2	Construct regular expressions for different languages.
		CO 3	Model Push Down Automata for CFLs and constructs a PDA for different CFLs.

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		CO4	Make use of Context-Free languages and Turing Machines for different unrestricted languages.
22SC1203	COMPUTATIONAL THINKING FOR OBJECT ORIENTED DESIGN	CO1	Apply Object oriented paradigm for code reusability
		CO2	Design object-oriented solutions to the real-world problems through SOLID design principles.
		CO3	Build Abstract Data Types by applying generic classes and java API.
		CO4	Demonstrate Exception handling and String manipulation techniques
		CO5	Develop a real time project by using object-oriented programming concepts.
22CS2116	ADVANCED OBJECT ORIENTED PROGRAMMING	CO1	Apply Design Patterns & Test-Driven Development with Clean coding Techniques.
		CO2	Understand the Collections & Generics over Object-oriented Programming.
		CO3	Apply the various Concurrent Programming methodologies in Object-oriented Programming
		CO4	Develop the applications using JDBC with PostgreSQL, Servlet & JSP
		CO5	Analyze the various design techniques to solve any real-world problems.
22CS2110	DATABASE MANAGEMENT SYSTEMS	CO1	Illustrate the functional components of DBMS and Design an ER Model for a database.
		CO2	Design a relational model for a database & Implement SQL concepts and relational algebra.
		CO3	Implement PL/SQL programs, normalization techniques, indexing to construct and access database
		CO4	Analyze the importance of transaction Processing, concurrency control and recovery techniques.
		2	virtualization methods
		CO5	Design a database and implement SQL queries and PL/SQL programs to do various operations on data.
22CS2111	SOFTWARE ENGINEERING	CO 1	Understand the software development life cycle and associated process models and Reverse Engineering
		CO 2	Applying Requirement modeling and Agile and Extreme Programming, Other Agile Process Models
		CO 3	Examine Requirement Modeling, Agile Models such as Scrum, kanban and SAFe Methodology.
		CO 4	Categorize various Design Concepts, testing strategies, Test Driven Development and CMMI, Six Sigma techniques
		CO 5	Develop UML Specification for software designs and programs
22CS2212	COMPUTER NETWORKS & SECURITY	CO 1	Apply error detection and correction mechanisms to compute codewords for the source code and outline the working of OSI & TCP/IP reference models.

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 2	Infer Channel allocation problem and algorithms to avoid it and compute the optimal path in a network using various static and dynamic routing algorithms.
		CO 3	Identify the IP addresses of a network using IPV4 classful& classless addressing schemes and outline the functionalities of the transport layer like TCP Connection management and congestion control.
		CO 4	Apply different symmetric and asymmetric encryption algorithms to compute ciphertext and identify the functionality of application layer protocols.
22CS2213	AI FOR DATA SCIENCE	CO 1	Apply Uninformed search strategies and Heuristic Search techniques to solve well defined problems
		CO 2	Apply optimization techniques to solve game playing and Constraint satisfaction problems
		CO 3	Apply knowledge representation. to provide inference using resolution , forward and backward techniques.
		CO 4	Analyze and visualize the real time data for AI applications
		CO 5	Implement Problem solving , EDA techniques for AI applications
22CS2214	DESIGN & ANALYSIS OF ALGORITHMS	CO 1	Apply concepts of mathematics to find space and time complexities of various algorithms including string matching algorithms
		CO 2	Analyze the problems that can be solved by using Divide and Conquer and Greedy Method
		CO 3	Analyze the problems that can be solved by using Dynamic Programming and Backtracking
		CO 4	Analyze the problems that can be solved by using Branch and Bound and NP-Hard Graph problems
		CO 5	Analyze the various design techniques to solve any real-world problems.
22CS4115	PARALLEL & DISTRIBUTED COMPUTING	CO1	Understand the software development life cycle and associated process models and Reverse Engineering.
		CO2	Illustrate Requirement modelling and Agile and Extreme Programming
		CO3	Examine Agile Models such as Scrum, kanban and SAFe Methodology.
		CO4	Categorize various testing strategies, Test Driven Development and CMMI, Six Sigma techniques
22SC1101	COMPUTATIONAL THINKING FOR STRUCTURED DESIGN	CO1	Design Basic and Complex Building Blocks for real world problems using structured programming paradigm
		CO2	Translate computational thinking into Logic Design for Solving real world problems
		CO3	Apply and Analyse CRUD operations on Basic Data Structures using Asymptotic Notations
		CO4	Apply and Analyse CRUD operations on Linear Data Structures using Asymptotic Notations.

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO5	Apply the structured programming paradigm with logic building skills on Basic and Linear Data Structures for solving real world problems
		CO6	Skill the students in such a way that students will be able to develop logic that help them to create programs as well as applications in C
22EC1101	DIGITAL LOGIC & PROCESSORS	CO1	Understand the concept of Engineering Design Process, Visualize and complete his/her innovative design by final drafting using 3D modelling in Auto Desk Fusion 360
		CO2	Understand the concept of web page, web browser, web server, and able to create Static webpages. Apply the HTML5 and CSS knowledge in building static web pages. Introduction to building social profiles through web blogging and video blogging.
		CO3	Understand the concept of report writing using a markup language Latex. Build reports using Latex and apply templates and Bibliography in latex for various documentation purposes.
		CO4	Understand the concept of data visualization and apply visualization techniques in creating data visualization dashboards with tools like Power BI.
22SC1209	IOT WORKSHOP	CO1	To make the students to understand about the programming fundamentals of arduino software and tinkercard
		CO2	To demonstrate the interfacing of Arduino UNO and ESP32 with LCD,LED,buzzer and Button
		CO3	To design and configure the sensors with Ardunio UNO and ESP32 Boards
		CO4	To design and configure the sensors with Ardunio UNO and ESP32 Boards and build Arduino and ESP32 based application
22EC1102	INTRODUCTION TO ELECTRONIC SYSTEMS & IOT	CO1	To acquaint the students about the fundamentals of Electronics
		CO2	To understand Fundamentals of Internet of things
		CO3	To demonstrate the Interfacing Arduino with LCD, LED, buzzer
		CO4	To design and configure Arduino boards using sensors and & actuators
		CO5	To build a small applications using Arduino for real time problems in the world
22ME1103	DIGITAL TOOLS WORKSHOP	CO1	Understand the concept of Engineering Design Process, Visualize and complete his/her innovative design by final drafting using 3D modelling in Auto Desk Fusion 360
		CO2	Understand the concept of web page, web browser, web server, and able to create Static webpages. Apply the HTML5 and CSS knowledge in building static web pages. Introduction to building social profiles through web blogging and video blogging.

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO3	Understand the concept of report writing using a markup language Latex. Build reports using Latex and apply templates and Bibliography in latex for various documentation purposes.
		CO4	Understand the concept of data visualization and apply visualization techniques in creating data visualization dashboards with tools like Power BI.
22SC1202	DESIGN OF DATA STRUCTURES	CO1	Apply measures of efficiency on algorithms and Analyze different Sorting Algorithms.
		CO2	Analyze and compare stack ADT and queue ADT implementations using linked list and applications.
		CO3	Analyze the linked implementation of Binary, Balanced Trees and different Hashing techniques.
		CO4	Analyze different representations, traversals, applications of Graphs and Heap organization.
		CO5	Develop and Evaluate common practical applications for linear and non-linear data structures.
22EC1202	COMPUTER ORGANIZATION & ARCHITECTURE	CO1	Understand the functionality of CPU functional units - control unit, registers, the arithmetic and logic unit, instruction execution unit
		CO2	Understand the concepts of CPU and the operation of main, cache and virtual memory organizations
		CO3	Understand the concepts of the different types of I/O modules and I/O transfer techniques in computer modules
		CO4	Apply the concept of pipelining in instruction execution and design issues of RISC, CISC and parallel computing architectures
22MT1101	Mathematical for Computing	CO 1	Apply matrix algebra to the real-world applications in engineering, physical and biological sciences, computer science, finance, economics and solving the system of equations.
		CO 2	Apply basic and computational techniques on discrete structures like relations, orders, functions & FSM, Lattices, and propositional &predicate logic
		CO 3	Apply graph theory to solving real world structures and their related applications.
		CO 4	Apply Statistical methods to solving the real-world applications in Engineering science, Economics and Management.
		CO 5	Apply basic concepts of Aptitude and Reasoning to solve engineering and real world problems (Tests in skilling hours)
22MT2103	Probability, Statistics &Queueing Theory	CO 1	To understand the importance of probabilistic concepts in a wide spectrum of problems arising in engineering applied science.
		CO 2	To formulate the real world problems in terms of random processes using multivariate distribution functions.
		CO 3	To understand the role of Statistical tests of significance in stochastic process

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 4	To formulate Stochastic process in terms of Markov chains and solve problems in queueing systems, and networks
22PH4101	QUANTUM PHYSICS FOR ENGINEERS	CO1	Able to understand the structure of crystalline solids, semiconductors physics and properties of light in Engineering application of Lasers.
		CO2	Able to understands the behavior of electrons on the microscopic level by using different quantum models
		CO3	Able to solve the time-independent Schrodinger wave equation as an intermediate step to solve the time-dependent Schrodinger wave equation.
		CO4	Able to explain the meaning and significance of the postulates of the special theory of relativity
22PH4002M	OPTICAL ENGINEERING	CO1	Understand how to enter these designs into an industry-standard design tool, OpticStudio by Zemax, to analyze and improve performance with powerful automatic optimization methods
		CO2	Understand how to analyze these characteristics of your optical system using an industry-standard design tool, OpticStudio by Zemax
		CO3	Applying the mathematical tools required for analysis of high-performance systems are complicated enough that this course will rely more heavily on OpticStudio by Zemax.
		CO4	Understand the paraxial system design and optical resolution and efficiency with the introduction to real lenses and their imperfections
22PH4002M	SEMICONDUCTOR DEVICES	CO1	Understand the energy band structures and their significance in electric properties of solids
		CO2	Analyzepn junction at equilibrium and under bias, capacitance and current characteristics, and breakdown behavior
		CO3	Understand and analyze metal-oxide-semiconductor (MOS) device
		CO4	Understand and analyze bipolar junction transistor (BJT)
22CY1005	CHEMISTRY FOR ENGINEERS	CO1	Predict potential complications from combining various chemicals or metals in an engineering setting
		CO2	Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion phenomena
		CO3	Classify water quality and select appropriate purification technique for intended problem
		CO4	Demonstrate the basic knowledge of instrumental methods and their applications in the structural analysis of materials
22CS2204	Mathematical Programming	CO 1	Apply various methods for finding the optimal solution of Linear Programming Problem.
		CO 2	Apply Integer and Fractional programming approaches for solving discrete and concave optimization problems.

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 3	Apply Combinatorial optimization techniques to build Approximation algorithms.
		CO 4	Understand Robust programming and constraint programming, Mathematical Programming using Machine Learning concepts.
22CS3106	Problem Solving Skills - 1	CO 1	Apply the concepts of mathematical principles besideslogic and identifying certain basic mathematical formulae to solve these kinds of problems
		CO 2	Formulate the concepts of mathematical principles of equations that contain the data related to real life situations which requires basic logic to analyze
		CO 3	Solve concepts of Venn diagrams and number patternsand illustrate logic behind connectives, series, and analogiesrespectively
		CO 4	Differentiate assumptions and arguments in critical reasoning
20UC1203	Design Thinking for Innovation	CO 1	Understand the importance of Design thinking process for contextualized problems
		CO 2	Analyse, define, and ideate for solutions
		CO 3	Develop and test the prototype made
		CO 4	Explore the fundamentals of entrepreneurship skills for transforming the challenge into an opportunity
22CS3207	Problem Solving Skills - 2	CO 1	Implement problem solving ability through analyzing the given data and formulate solutions for real world problems based on time, travel, and wages
		CO 2	Determine the fundamental concepts of areas, volumes and derive solutions using simple mathematical principles besides interpreting the data through smart tricks to check the number analytics
		CO 3	Estimate inductive reasoning, to categorize the rules-set from a given list of observations and relate them to predict the conclusions according to the given conditions
		CO 4	Integrate verbal and non-verbal reasoning and to identify the logic behind the given arrangement based on the given conditions to bring out the possible outcome
22CS3064RA	UX DESIGN	CO 1	Perceive and discuss about User Experience design process.
		CO 2	Recognize User Interface and differentiate from User Experience and principles of User Interface.
		CO 3	Focusing and distinguishing about Components of UI design process with Interactive Devices.
		CO 4	Determine graphic design techniques and psychology principles of User Experience
		CO 5	Designing wire frames using Adobe XD, UXPressia and Whimsical

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Course Code	Course Title	CO NO	Description of the Course Outcome
22CS3060RA	CONTINUOUS DELIVERY & DEVOPS	CO 1	Identify the Need of DevOps in SDLC and Cloud Infrastructure in DevOps, Apply Version Control System to track the latest version of Software
		CO 2	Apply Continuous Integration and Continuous Deployment using Infrastructure as Code, Build in Cloud native Applications using Pipeline and Examine the Software and Automation Testing Frameworks.
		CO 3	Analyze need of Containerization in SDLC and Examine the Kubernetes Pod Configuration.
		CO 4	Inspect Configuration Management using Infrastructure as Code, Analyze Continuous Monitoring and Container Orchestration process.
		CO 5	To Build and Inspect the Tools associated to DevOps Life Cycle.
22CS3116RA	SIGNAL PROCESSING	CO 1	Understand the various types of signals, systems and their frequency domain transformation.
		CO 2	Understand the design methodology of different filters and their realizations.
		CO 3	Apply signal processing approaches for extraction of information present in the natural signals.
		CO 4	Apply machine learning approaches for processing of signals.
		CO 5	Apply above signal processing approaches in tutorial problems related to transformation, filtering, feature extraction, machine learning for signal processing
22CS3036RA	CLOUD INFRASTRUCTURE & SERVICES	CO 1	Understand IaaS Architectures and Implementation Guidelines. Apply on-demand compute services
		CO 2	Analyze applications and frameworks for data analysis and Content delivery in the cloud
		CO 3	Analyze Cloud Service Availability, Resiliency and dynamic scaling
		CO 4	Use Networking and security Services. Automate cloud Infrastructure, Deployment and Management
		CO 5	Hands-On Cloud Administration. Implement, monitor, and manage important cloud services and components including IaaS and PaaS
22CS3040RA	CRYPT ANALYSIS & CYBER DEFENSE	CO 1	To Understand the Concept of Business Analytics in detail from domains perspective.
		CO 2	To analyze the application of R using Descriptive Statistics and Correlation concepts.
		CO 3	To analyze the application of Data Visualization techniques in Business Analytics using R.
		CO 4	To analyze the application of select Multivariate Analytical tools using R.
22CS3015RA	EMBEDDED SYSTEMS	CO 1	Understand C for Embedded Systems. Analyse ARM processor and interrupt architecture
		CO 2	Apply Modern Assembly Language Programming with the ARM Processor

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 3	Apply I/O Synchronization and Interrupt Programming. Program the STM32F4xx chip peripherals: I/O ports, ADCs,
		CO 4	Understand Analog Interfacing and Program the STM32F4xx chip peripherals: DACs, SPIs, and I2Cs
		CO 5	Apply Embedded Systems Programming on ARM Cortex-M3/M4 Processor
22CS3020RA	MACHINE LEARNING	CO 1	Understand the basic terminology and measurements of Machine Learning and Apply Machine Learning techniques using Tree and Bayesian models.
		CO 2	Apply and analyze Neural Network and SVM Models for solving Classification and Prediction problems
		CO 3	Apply Dimensionality reduction methods, Evolutionary learning and Ensembled methods to solve classification problems
		CO 4	Illustrate different unsupervised models, Analytical, Explanation-Based and reinforcement learning methods
		CO 5	Implement Machine Learning Techniques using Python Language
22CS3022RA	SOFT COMPUTING	CO 1	Interpret fuzzy logic system
		CO 2	Analyze Artificial Neural Network Models
		CO 3	Demonstrate Swarm and Evolutionary Algorithms
		CO 4	Illustrate Hybrid Fuzzy-Neural- Evolutionary- Swarm Models
		CO 5	Demonstration of neuro, fuzzy, evolutionary, and swarm algorithms using open-source tools
22CS3026RA	ARTIFICIAL NEURAL NETWORKS	CO 1	Understand and build basic network representations, topologies, and models
		CO 2	Apply various techniques for training and optimizing neural networks
		CO 3	Analyze different techniques related to network stochastics
		CO 4	Analyze different techniques related to learning algorithms for neural networks and develop knowledge on emerging software, tools and technologies related to these algorithms
		CO 5	Evaluate different approaches and techniques for solving problems involving neural networks and their applications using python and develop knowledge on emerging software, tools and technologies related to these approaches
22CS3269RA	DEEP LEARNING	CO 1	Able to understand Deep learning and remember the concepts of Perception, Back Propagation,
		CO 2	Able to understand auto encoders- and apply Regularization, and CNN techniques to generate Deep learning models
		CO 3	Apply Long Short Term Memory (LSTM) Restricted BoltzmannMachines,

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 4	Build Markov models, Markov networks, Markov chains,
		CO 5	Implement basic Neural Networks, optimization algorithms
22CS3270RA	COGNITIVE COMPUTING	CO 1	Understand cognitive computing is, and how it differs from traditional approaches
		CO 2	Applying the primary tools associated with cognitive computing
		CO 3	Develop a project that leverages cognitive computing
		CO 4	Analyse and discuss the business implications of cognitive computing
		CO 5	able to implement cognitive computing programs using IBM Watson
22CS3271RA	PERCEPTION AND COMPUTER VISION	CO 1	Understand image representation and modeling.
		CO 2	Understand image transformation methods.
		CO 3	Apply and Interpret image processing algorithms.
		CO 4	Build and evaluate face detection and recognition algorithms.
		CO 5	Evaluate a multitude of image processing techniques and algorithms.
22CS3278RA	DIGITAL VIDEO PROCESSING	CO 1	Understanding the video signals and its characteristics
		CO 2	Understanding the motion analysis, its detection and restoration of video with quality
		CO 3	Understanding video segmentation and motion segmentation using different methods
		CO 4	Learning to analyse the signals using different algorithms
		CO 5	Applying the machine learning algorithms to video signals for the analysis, segmentation and restoration.
22CS3272RA	COMPUTATIONAL EPIDEMIOLOGY	CO 1	Understand the models of Epidemiology and applications of computational science in Epidemiology
		CO 2	Apply computational model on sparse disease incidence data to infer transmission probability, period of infectivity and reproduction number
		CO 3	Design a low cost surveillance and infection control policy using an efficient computational model
		CO 4	Design a computational model for epidemic spread using Machine Learning concepts
		CO 5	Build and Inspect tools associated Epidemiology using R
22CS3273RA	NATURAL LANGUAGE PROCESSING	CO 1	Understand approaches to syntax and semantics in NLP
		CO 2	Apply the statistical estimation and statistical alignment models
		CO 3	Analyze grammar formalism and context free grammars

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 4	Apply Rule based Techniques, Statistical Machine translation (SMT), word alignment
		CO 5	Inspect and Evaluate Language Processing Methods using python
22CS3274RA	SPEECH PROCESSING	CO 1	Understand the speech production and perception mechanism, acoustic phonetics and phonology, speech prosody, and speech sound units.
		CO 2	Understand the speech signal processing in time and frequency domain, discrete Fourier transform, short-time analysis of speech, linear prediction and cepstral analysis of speech.
		CO 3	Apply machine learning models such as Dynamic time warping (DTW), Gaussian mixture models (GMM), Hidden Markov models (HMM), Support vector machines (SVM) and state of art Deep Neural Network (DNN) models, for speech processing.
		CO 4	Apply machine learning approaches for various application of speech processing such as Speech and Speaker recognition, Speech synthesis and Speech enhancement, Language identification etc.
		CO 5	Apply above speech processing approaches in laboratory experiments related to feature extraction, and development of machine learning models for speech processing.
22CS3275RA	BIG DATA ANALYTICS	CO 1	Understand the modelling of various types of data
		CO 2	Understand the Visualization fundamentals
		CO 3	Apply methods and tools for Non-Spatial Data Visualization
		CO 4	Apply methods for Scientific / Spatial Data Visualization and Web data visualization
		CO 5	Evaluate data visualization through Python & Tableau.
22CS3052RA	DATA WAREHOUSING & MINING	CO 1	Understand Data Warehousing Techniques and apply different data processing techniques.
		CO 2	Implementation of Data Pre-Processing Techniques.
		CO 3	Apply mining Algorithms for classifying data into different classes using labeled data.
		CO 4	Applying unsupervised learning algorithm for data categorization.
		CO 5	Implement mining algorithms using modern tolls and techniques for data processing.
22CS3051RA	DATA VISUALISATION TECHNIQUES	CO 1	Understand the concepts of big data, Initial exploration of analysis of data and Data visualization
		CO 2	Understand Initial exploration of data and advanced data analytics by using R
		CO 3	Apply advanced algorithms & Statistical modeling for big data using HDFS, HIVE, and PIG.
		CO 4	Apply advanced SQL functions for in-database analytics by MADlib, Greenplum along with common deliverables of analytics life cycle project

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 5	Build and Evaluate the Big Data Analytical problem using R, Hadoop, HIVE Programming concepts.
22CS3276RA	BIG DATA OPTIMIZATION	CO 1	Understand optimization methods and Apply analytics using R
		CO 2	Apply blind search method and Local Search method for real world problems
		CO 3	Analyz population-based search and develop query processing strategies
		CO 4	Apply and Analyze applications like Travelling Salesman Problem.
		CO 5	Applying functionalities of R
22CS3277RA	BIOINFORMATICS	CO 1	Understand the Overview of Bioinformatics, biological databases, and comparing a data network to a living organism.
		CO 2	Select online resources in biological database
		CO 3	Apply concepts of microarrays and datamining methods.
		CO 4	Analyze pattern matching techniques of sequence alignment and identification
		CO 5	Implement the lab experiments to store and analysis of biological data
22CS3279RA	ADVANCED DATABASES	CO 1	Understand the fundamentals of query optimization and database recovery protocols.
		CO 2	Apply emerging database technologies and distributed databases.
		CO 3	Analyze and Discriminate object oriented and relational database systems.
		CO 4	Analyze multimedia databases.
		CO 5	Build and Evaluate advanced database applications
22CS3280RA	GRAPH & WEB ANALYTICS	CO 1	Understand the impact of big data on graphs, Network Basics and Social Networks
		CO 2	Make use of Web Analytics: - Data sources, tools, Web traffic data.
		CO 3	Analysing Web Analytics Strategy- website traffic analysis, audience identification and segmentation analysis, Emerging Analytics
		CO 4	Compare Email Testing Analysis, competitive Intelligence Analysis, and Social, Mobile, Video Analysis.
		CO 5	Implementing Python programing for graph and web analytics
22CS3037RA	CLOUD INFRASTRUCTURE & SERVICES	CO 1	Understand IaaS Architectures and Implementation Guidelines. Apply on-demand compute services
		CO 2	Analyze applications and frameworks for data analysis and Content delivery in the cloud
		CO 3	Understand Cloud Service Availability, Resiliency and dynamic scaling
		CO 4	Analyze Networking and security Services for Cloud Deployment and Management

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 5	Developing Cloud services using Open Cloud Architectures-EUCALYPTUS
22CS3032RA	ADVANCED OPERATING SYSTEMS	CO 1	Understand the design of multiprocessor and distributed Operating Systems. Analyze distributed file system.
		CO 2	Analyze the scheduling Real time and Parallel Applications on Heterogeneous Distributed Systems. Analyze three basic approaches for implementing distributed mutual exclusion
		CO 3	Understand Replication – preventing and accepting divergence. Analyze Deadlock detection in distributed systems.
		CO 4	Analyze the algorithms for Checkpointing and rollback recovery, Consensus and agreement algorithms, and Failure detectors
		CO 5	Implement the Concepts of multiprocessor Threads, distributed mutual exclusion, distributed scheduling, Distributed deadlocks, Distributed consensuses and Fault Handling.
22CS3036RA	FUNCTIONAL & CONCURRENT PROGRAMMING	CO 1	Apply Functions and Lambdas on purely functional programs using generic types, recursion, pattern matching and higher-order functions.
		CO 2	Apply Algebraic Data Types to model and use infinite sequences with lazy evaluation, functional programming with objects and classes
		CO 3	Apply Functional Data Structures, collections, Parallel Collections, Futures and Promises
		CO 4	Apply the functional design of concurrent systems
		CO 5	Apply the functional design of concurrent systems
22CS3281RA	CLOUD & SERVERLESS COMPUTING	CO 1	Understand Cloud computing and analyse cloud service scheduling hierarchy.
		CO 2	Understand Functions-as-a-service and Event-driven programming. Develop Scalable ModelsUsingServerless Architectures.
		CO 3	Manage application functionalities using Serverless runtimes and Serverless databases.
		CO 4	Apply Serverless Programming Practices and Patterns. Architect, Build, and Operateserverless applications.
		CO 5	Build a real world and scalable full stack application using Serverless technologies
22CS3251RA	ADVANCED COMPUTER ARCHITECTURE	CO 1	Understand fundamentals of computer design
		CO 2	Understand instruction level parallelism
		CO 3	Apply thread level parallelism
		CO 4	Analyse memory and I/O
		CO 5	Develop programs on computer architectures
22CS3252RA	PARALLEL ALGORITHMS	CO 1	Understand fundamental principles behind parallel algorithm design and demonstrate the ability to differentiate among interconnection networks models and communication operations.

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 2	Analyze parallel algorithms for sorting and Computational Geometry
		CO 3	Design and Analysis of Parallel Computational algorithms
		CO 4	Apply parallel algorithms for Graphs and Search problems and analyze its performance
		CO 5	Develop parallel algorithms using OpenMP, MPI and OpenCL
22CS3287RA	CLOUD SECURITY	CO 1	Understand the principles of cryptography and apply various cryptographic algorithms
		CO 2	Analyze various security issues and system vulnerabilities in virtualization
		CO 3	Analyze the technologies for virtualization-based security enhancements
		CO 4	Analyze legal and Compliance issues and examine modern security standards
22CS3253RA	EDGE COMPUTING	CO 1	Describe the Edge/Fog Computing and infer the opportunities and challenges
		CO 2	Examine the Architecture of Edge Computing and explore the issues that are being addressed by the industry
		CO 3	Interpret the Middleware needed for Edge Computing and its Security Requirements
		CO 4	Assess the need for Edge/Fog Computing in various real-time projects
		CO 5	computing paradigms using various applications in Edge Computing
22CS3038RA	HIGH PERFORMANCE COMPUTING	CO 1	Analyze the performance of GPU memory hierarchy and MPI programming
		CO 2	Develop parallel programs using OpenCL library and understand FPGA-Based Supercomputer
		CO 3	Develop mixed mode programs for Multicore, GPU and cluster optimization systems
		CO 4	Generate parallel programs for matrix, graph and sorting problems using Cuda, OpenMP library
22CS3041RA	CRYPT ANALYSIS & CYBER DEFENSE	CO 1	Understand the principles of cryptography by analyzing various attacks and apply different classic encryption techniques.
		CO 2	Understand the principles of block cipher and apply algorithms like DES, AES.
		CO 3	Understand and apply different algorithms of public key crypto system for ensuring secured communication and authentication.
		CO 4	Understand the concept of elliptic curve and its applications to cryptography. Apply hash algorithms for security.
		CO 5	Implement various cryptographic algorithms so as to analyze the achievability of security goals like Confidentiality, integrity, authentication and also Justify the possibility of cryptanalysis attack with

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Course Code	Course Title	CO NO	Description of the Course Outcome
			each algorithm.
22CS3042RA	NETWORK & INFRASTRUCTURE SECURITY	CO 1	Understand security concepts, Infrastructure security techniques and securing enterprise networks. Understand router and switching security mechanism.
		CO 2	Understand hardware procedures for digital certificate and techniques of user authentication.
		CO 3	Appy the standardization schemes to maintain security in Web application and secured payment system. Identify security vulnerability in the system.
		CO 4	Apply security concepts in Email and Internet Protocol.
		CO 5	Understand and apply security principles of firewall, gateways and IDS.
22CS3045RA	INTRODUCTION TO BLOCKCHAIN & CRYPTO CURRENCIES	CO 1	Understand the basic concepts of cryptography for Blockchain
		CO 2	Understand the basics of Blockchain and mining process
		CO 3	Apply about the different types of Blockchain and consensus algorithms
		CO 4	Apply the different types of crypto currencies & its importance and Blockchain applications
		CO 5	Apply and analyze basic cryptography concepts and smart contracts applications using soft wallet
22CS3259RA	DIGITAL FORENSICS	CO 1	Apply Forensic Science and Digital Forensics
		CO 2	Apply OS and File System Forensics
		CO 3	Analyze Digital Evidence and Network Forensics
		CO 4	Analyze Web Forensics and Mobile Device Forensics
		CO 5	Implementing the concepts of Digital Forensics
22CS3260RA	DATABASE & SYSTEM SECURITY	CO 1	Understand Database Users, Roles related to User Administration and Java concepts
		CO 2	Apply Data Encryption and Database Vaults
		CO 3	Apply secret password Encryption & Decryption.
		CO 4	Apply Data Encryption for the Data in Transit.
		CO 5	Design Secure Database Schema
22CS3261RA	PROGRAMMING FOR SMART CONTRACTS	CO 1	Understanding Ethereumblockchain and using wallet for interacting with network
		CO 2	Learn and use solidity programming language to build smart contracts
		CO 3	Building advanced smart contracts with various test setups and try-catch assertions.
		CO 4	Build interactive front end for smart contracts and use Contracts design patterns.
		CO 5	Implement lab experiments through project-based learning on building smart contracts

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Course Code	Course Title	CO NO	Description of the Course Outcome
22CS3262RA	SECURE SOFTWARE ENGINEERING	CO 1	Explain about threats and its properties that target software and illustrate the resources that addresses these issues.
		CO 2	Illustrate the process of analysing and validating security requirements.
		CO 3	Apply software testing methods to analyse the software code to improve the quality and describe the assembly changes for system design.
		CO 4	Apply the governance security policy to ensure enterprise security in project management
		CO 5	Analyse the security principles and apply the techniques to develop a secure software.
22CS3264RA	WEB SECURITY	CO 1	Students should be able to understand the basic concepts of web security
		CO 2	Students should be able to identify different techniques in protecting privacy and principles of web security
		CO 3	Students should be able to deploy SSL server certificates, Clint side digital certificates and Microsoft authenticode.
		CO 4	Students should be able to determine security for content providers through privacy policies and security legislations.
		CO 5	Students should be able to test software/ tools application completely and make sure that it' s performing well and as per the security specifications.
22CS3291RA	SECURITY GOVERNANCE & MANAGEMENT	CO 1	Fundamentals of information security management
		CO 2	Understand the principles of cryptography by analyzing various attacks and apply different classic encryption techniques
		CO 3	To analyse basic number theory, cryptography concepts and smart contracts applications using soft walltet.
		CO 4	Apply security concepts in Email and Internet Protocol. Understand and apply security principles of firewall, gateways and IDS
		CO 5	Analyse various security concepts and their performance using networking tools
22CS3062RA	SOFTWARE VERIFICATION & VALIDATION	CO 1	To Understand test cases suitable for a software development for different domains.
		CO 2	To Identify and apply suitable tests to be carried out. Conduct an inspection or review of software source code for a small or medium sized software project.

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 3	Prepare and apply test planning based on the document using automatic testing tools.
		CO 4	To Document test plans and apply test cases designed
		CO 5	To Test the software application completely and make it sure that it's performing well and as per the specifications
22CS3065RA	DESIGN PATTERNS & CLEAN CODING TECHNIQUES	CO 1	Illustrate how Test-Driven Development and Refactoring work in software design and maintenance.
		CO 2	Understanding Structural and Creational Patterns for effective design of a system
		CO 3	Utilization of behavioural design pattern and Anti-patterns for system design
		CO 4	Understanding the design patterns in an object-oriented language along with clean coding principles to a real world application.
		CO 5	Develop Programs on concepts of Design patterns in JAVA
22CS3256RA	CONTINUOUS DELIVERY & DEVOPS	CO 1	Identify the Need of DevOps in SDLC and Cloud Infrastructure in DevOps, Apply Version Control System to track the latest version of Software
		CO 2	Apply Continuous Integration and Continuous Deployment using Infrastructure as Code, Build in Cloud native Applications using Pipeline and Examine the Software and Automation Testing Frameworks.
		CO 3	Analyze need of Containerization in SDLC and Examine the Kubernetes Pod Configuration.
		CO 4	Inspect Configuration Management using Infrastructure as Code, Analyze Continuous Monitoring and Container Orchestration process.
		CO 5	To Build and Inspect the Tools associated to DevOps Life Cycle.
22CS3257RA	VISUAL PROGRAMING	CO 1	Apply the concepts of C#.Net and Build console and desktop applications.
		CO 2	Build C#.net desktop applications using ADO.NET and also implementing GUI applications using Event handling
		CO 3	Applying the concepts of ASP.NET Standard Server controls and State management techniques to Build the Web applications using ASP.NET Web forms.
		CO 4	Apply the Asp.Net MVC concepts to Build the Web MVC applications
		CO 5	Develop the programs for Visual Programming application development.
22CS3231RA	SOFTWARE PROJECT	CO 1	Understanding the concept of software project management process

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Course Code	Course Title	CO NO	Description of the Course Outcome
	MANAGEMENT	CO 2	Illustrate the various rules and guidelines that involved to improve the time, Cost, Quality, management aspects in software project management.
		CO 3	Identify the guidelines that are involved to improve the Configuration, Human Resource time, Communications management aspects in software project management.
		CO 4	Build the techniques that are involved in the Phases of SPM such as Initiating, planning, executing & controlling projects.
		CO 5	Apply various estimation levels of cost and effort
22CS3295RA	SOFTWARE ARCHITECTURE & DESIGN	CO 1	Able to Understand about software architecture and architectural drivers.
		CO 2	Able to analyze the quality attributes and their scenarios.
		CO 3	Able to Understand architectural styles and apply the knowledge various real time applications.
		CO 4	Able to Analyze and create the documenting the architecture and apply to web services
		CO 5	Evaluate Lab experiments using UML diagrams
22CS3258RA	SOFTWARE RELIABILITY	CO 1	Understand Software Reliability and develop a software project from requirement gathering to implementation.
		CO 2	Analyze software system failures and develop convincing solutions
		CO 3	Estimate Software Reliability parameters using Markovian Modelling, Maximum Likelihood and Least Square Method
		CO 4	Evaluate performance of Binomial-Type, Poison-Type and Markovian Models and Predict Software Reliability using SQA Intelligent Techniques
22CS3255RA	CROSS-PLATFORM DEVELOPMENT FRAMEWORKS	CO 1	Gaining Knowledge on Kotlin basics and to Design on Android Layouts, Views and Navigations
		CO 2	Apply techniques on various devices, internet and to connect with various databases
		CO 3	overview on DART and Flutter Technologies
		CO 4	Develop and deploy dynamic Flutter applications
		CO 5	Design and work on various platforms
22CS3071RA	PROGRAMMING FOR GAME DEVELOPMENT	CO 1	Illustrate the concepts of Game design and development.
		CO 2	Understanding the use of mathematical and geometrical concepts in Game Programming.
		CO 3	Explain the Core architectures of Game Programming.
		CO 4	Relate above advance concepts in game development and explain various platforms and frameworks for Game Programming
		CO 5	Implement Games using Course with Code in Unity

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Course Code	Course Title	CO NO	Description of the Course Outcome
22CS3266RA	AR & VR APPLICATION DEVELOPMENT	CO 1	To understand Basics of Augmented Reality and Interactions. Fundamentals of Augmented, Mixed Reality and its features P
		CO 2	To understand Basics of Virtual Reality and Interactions. Fundamental Concept and Components of Virtual Reality
		CO 3	To understand Graphics Pipelines, Creating a sample augmented reality apps in android
		CO 4	To apply Unity development Environment, IDE Basics, Sprites, User Interfaces, Simple 3D animation Creation
		CO 5	Develop applications through Lab experiments
22CS3296RA	COMPUTER GRAPHICS	CO 1	Apply techniques of computer graphics for the generation of objects.
		CO 2	Model 2D objects using 2D Transformations.
		CO 3	Identify clipping algorithms that are used to remove objects, lines, or line segments that are outside the viewing pane.
		CO 4	Inspect algorithms to find out visible surfaces
		CO 5	Develop graphical objects with modeling.
22CS3268RA	PRINCIPLES OF GAME DESIGN	CO 1	Remembering the definition of Video Games and Design Components
		CO 2	Understand the Game Concepts and its world
		CO 3	Applying the Story telling Character and user interface Design
		CO 4	Analyzing the Game Play to its mechanics and balancing
22CS3267RA	BUSINESS OF GAMES & ENTREPRENEURSHIP	CO 1	Understanding the flow of money in the game industry & how to protect ideas to make the craft of making games an economically justifiable activity.
		CO 2	Explore the mechanism behind gaming production and teamwork with foundation in some of the project management tools and techniques
		CO 3	Understand and work out some of the presentation skills to pitch the gaming ideas in front of investor groups
		CO 4	Explore the skills required to be an entrepreneur and know the rules and regulations to start a company
		CO 5	Explore and Understand Pitching tools & Business Plan Development tools for Gaming startup
22CS3117RA	IOT SENSING AND ACTUATING DEVICES	CO 1	Understand the role of sensor and actuators in real time aspects and Analog and Digital Actuators
		CO 2	Apply the role of signal conditioning circuits and Impedance Matching circuits
		CO 3	Analyze different generation of sensors for the development of IoT based Networks
		CO 4	Analyse the role of different Energy sources and power management in IoT
		CO 5	Implement and Evaluate the practical IoT

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Course Code	Course Title	CO NO	Description of the Course Outcome
22CS3118RA	INTERNET OF THINGS: ARCHITECTURES AND PROTOCOLS	CO 1	Understand the Architectural Overview of IoT
		CO 2	Understand the IoT Reference Architecture and Real-World Design Constraints
		CO 3	Apply the various IoT Protocols in Datalink and Network layers
		CO 4	Apply the various IoT Protocols in Transport and Session Layers
		CO 5	Create IoT based applications using IoT protocols
22CS3298RA	CYBER PHYSICAL SYSTEMS	CO 1	Apply mathematical concepts for modeling to design automation
		CO 2	Apply Middle and High Level Design Decisions to design the automation
		CO 3	Analyze the Human interaction with CPS by making use of IoT Sensors
		CO 4	Analyze AADL and make use of it for modelling the automation
		CO 5	Implement the models and design smart models for automobiles, medical devices and home appliances.
22CS3299RA	FOUNDATIONS OF HYBRID AND EMBEDDED SYSTEMS	CO 1	Understand the History of Embedded &Hybrid System concepts, Purpose of Embedded & Hybrid Systems. Characteristics and Quality Attributes of Embedded & Hybrid Systems
		CO 2	Understand Core of the Embedded System, Core of Hybrid System Memory selection for Embedded Systems & Hybrid Systems, Communication Interface
		CO 3	Apply the Embedded & Hybrid Firmware tools, Embedded & Hybrid Firmware Design Approaches and Development Languages.
		CO 4	Apply Operating System Basics (RTOS) Understand and apply Multiprocessing and Multitasking, Task Scheduling.
		CO 5	Design and Prototype Embedded Computer Systems. Implement a recommender system by using Hybrid Approach
22CS3250RA	CLOUD COMPUTING FOR IOT ENGINEERS	CO 1	To understand the differences between traditional deployment and cloud computing
		CO 2	Understand different cloud infrastructures and service models and virtualization
		CO 3	Apply the concept of Data Analytics by using AWS cloud
		CO 4	Analyze the statistical data analysis and methods for evaluation
		CO 5	Able to evaluate the communication between IoT devices and cloud (AWS).by measuring parameters
22CS3265RA	WIRELESS SENSOR NETWORKS	CO 1	Understand challenges and technologies for wireless networks
		CO 2	Understand architecture and sensors.
		CO 3	Apply the communication, energy efficiency, computing, storage, and transmission strategies.
		CO 4	Build the infrastructure and simulations.

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 5	Apply the concept of programming the in WSN environment
22CS3116RA	SIGNAL PROCESSING	CO 1	Understand the various types of signals, systems and their frequency domain transformation.
		CO 2	Understand the design methodology of different filters and their realizations.
		CO 3	Apply signal processing approaches for extraction of information present in the natural signals.
		CO 4	Apply machine learning approaches for processing of signals.
		CO 5	Apply above signal processing approaches in tutorial problems related to transformation, filtering, feature extraction, machine learning for signal processing
22CS3041RA	CRYPT ANALYSIS & CYBER DEFENSE	CO 1	To Understand the Concept of Business Analytics in detail from domains perspective.
		CO 2	To analyze the application of R using Descriptive Statistics and Correlation concepts.
		CO 3	To analyze the application of Data Visualization techniques in Business Analytics using R.
		CO 4	To analyze the application of select Multivariate Analytical tools using R.
22CS3015RA	EMBEDDED SYSTEMS	CO 1	Understand C for Embedded Systems. Analyse ARM processor and interrupt architecture
		CO 2	Apply Modern Assembly Language Programming with the ARM Processor
		CO 3	Apply I/O Synchronization and Interrupt Programming. Program the STM32F4xx chip peripherals: I/O ports, ADCs,
		CO 4	Understand Analog Interfacing and Program the STM32F4xx chip peripherals: DACs, SPIs, and I2Cs
		CO 5	Apply Embedded Systems Programming on ARM Cortex-M3/M4 Processor
22CS3232RA	MACHINE LEARNING	CO 1	Apply Machine Learning Techniques using Decision Trees to solve Real World Problems
		CO 2	Build Bayesian models for solving Classification and Prediction problems
		CO 3	Apply Neural Network and Genetic Algorithm techniques to solve Classification, Prediction problems
		CO 4	Demonstrates Learning First Order Rules, Analytical Learning Explanation-Based Learning and reinforcement learning
		CO 5	Implement Machine Learning Techniques using Python Language
22CS3133RA	DATA VISUALIZATION TECHNIQUES	CO 1	Understand the modelling of various types of data and the Visualization fundamentals
		CO 2	Apply methods and tools for Non-Spatial Data Visualization
		CO 3	Apply methods for Scientific / Spatial Data Visualization and Web data visualization

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 4	Understand the Dashboard and its categories and Apply visual analytics on dashboards
		CO 5	Evaluate data visualization through Python & Tableau /Power BI
22CS3286RA	CROSS-PLATFORM DEVELOPMENT FRAMEWORKS	CO 1	Gaining Knowledge on Kotlin basics and to Design on Android Layouts, Views and Navigations
		CO 2	Apply techniques on various devices, internet and to connect with various databases
		CO 3	overview on DART and Flutter Technologies
		CO 4	Develop and deploy dynamic Flutter applications
		CO 5	Design and work on various platforms
22CS3234RA	APPLICATION DEVELOPMENT ON CLOUD	CO 1	Analyze, predict and apply the server based computing for hosting the web application with appropriate database and storage.
		CO 2	Implement the cloud services to monitor and secure the cloud infrastructure
		CO 3	Analyze, predict and apply the CI/CD services for hosting the web application.
		CO 4	Analyze, predict and apply appropriate serverless, container based, work flow and messaging based services.
		CO 5	Apply the knowledge and implement the cloud concepts in real time.
22CS3235RA	SOLUTIONS ARCHITECTING ON CLOUD	CO 1	Design Resilient Architectures
		CO 2	Design High-Performing Architectures
		CO 3	Design Secure Applications and Architectures
		CO 4	Design Cost-Optimized Architectures
		CO 5	Designing solutions to the architecture of Cloud
22CS3263RA	VISUAL PROGRAMING	CO 1	Apply the concepts of C#.Net and Build console and desktop applications.
		CO 2	Build C#.net desktop applications using ADO.NET and also implementing GUI applications using Event handling
		CO 3	Applying the concepts of ASP.NET Standard Server controls and State management techniques to Build the Web applications using ASP.NET Web forms.
		CO 4	Apply the Asp.Net MVC concepts to Build the Web MVC applications
		CO 5	Develop the programs for Visual Programming application development.
22CS3204RA	COMPILER DESIGN	CO 1	To design a Lexical analyzer for a given source code.
		CO 2	To design different types of parsers and perform comparative analysis.
		CO 3	To design an efficient syntax-directed translator and intermediate code generator.
		CO 4	To optimize and generate the translated code for the target machine.
		CO 5	To design a compiler for any given language using compiler generation tools.

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Course Code	Course Title	CO NO	Description of the Course Outcome
22CS3061RA	AUTOMATA THEORY AND FORMAL LANGUAGES	CO 1	To design finite machines, regular expressions and regular grammar for regular languages and to prove existence of non-regular languages.
		CO 2	To design Context Free Grammars for Context Free Languages and simplify them for optimization
		CO 3	To design Push Down Automata for CFL and to prove existence of non-Context Free languages
		CO 4	To design a Turing machine for a given problem and to prove the existence of Non-Turing acceptable languages.
22CS3065RA	QUANTUM COMPUTING	CO 1	To introduce basics of quantum computing
		CO 2	Implementing Quantum computing algorithms
		CO 3	Applying concepts of Quantum computing using QISKIT
		CO 4	Analyze and Discuss Quantum Machine learning and deep learning concepts with applications
		CO 5	Practicals on all algorithms discussed above
22CS3066RA	SOFTWARE VERIFICATION & VALIDATION	CO 1	To Understand test cases suitable for a software development for different domains.
		CO 2	To Identify and apply suitable tests to be carried out. Conduct an inspection or review of software source code for a small or medium sized software project.
		CO 3	Prepare and apply test planning based on the document using automatic testing tools.
		CO 4	To Document test plans and apply test cases designed
		CO 5	To Test the software application completely and make it sure that it's performing well and as per the specifications
22CS3016RA	.NET PROGRAMMING (EPAM)	CO 1	Understanding the basic concepts of ., C#.Net and Build console and desktop applications using C#.net framework
		CO 2	Build C#.net desktop applications using ADO.NET
		CO 3	Applying the concepts of ASP.NET Standard Server controls for application development
		CO 4	Build the applications using Web forms, Web Pages and MVC, Page and State management and master pages.
		CO 5	Develop the programs for desktop, web and enterprise application development using .NET Techniques.
22CS3017RA	FRONT END WEB DEVELOPMENT (EPAM)	CO 1	Apply the concepts of HTML5 and CSS3 for static web application.
		CO 2	Pertaining concepts of javascript to build client-side web application
		CO 3	Apply concepts of advanced UI Designing using extended Javascript
		CO 4	Apply concepts of ngx, npm, typescript to build dynamic web application

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO 5	Develop the webapplication using various technologies like html, css, javascript, typescript
22CS3018RA	SOFTWARE TESTING (EPAM)	CO 1	Create test scenarios that are appropriate for software development in many fields
		CO 2	Determine the appropriate tests that should be run. Conduct a small- to medium-sized software proposal's source code inspection or review
		CO 3	Applying automated testing tools, create test plans based on the document.
		CO 4	Make test plans dependent on the document leveraging test automation tools.
		CO 5	Using automated testing tools, make test plans contingent on the document.
22CS3019RA	CLOUD DEVOPS (EPAM)	CO 1	Understanding the basic concepts of Cloud and Devops
		CO 2	Identify the Need of DevOps in SDLC and Cloud Infrastructure in DevOps, Apply Version Control System to track the latest version of Software
		CO 3	Inspect Configuration Management using Infrastructure as Code
		CO 4	Analyze need of Containerization in SDLC and Examine the Kubernetes Pod Configuration.
		CO 5	Build and Inspect the Tools associated to DevOps Life Cycle.
22CS40A7	FUNDAMENTALS OF SOFTWARE ENGINEERING	CO1	Comprehend software development life cycle and prepare SRS document
		CO2	Implementing software design and development techniques using UML
		CO3	Identify verification and validation methods in a software engineering project
		CO4	Optimize the development process using CMMI Levels
22CS40A6	FUNDAMENTALS OF DBMS	CO1	Understand the fundamentals of Database Management Systems.
		CO2	Construct database tables using SQL
		CO3	Apply various Normalization techniques and develop procedures and functions in PL/SQL
		CO4	Apply the file storage structures in the Database Management and Transaction processing.
22CS40A8	FUNDAMENTALS OF INFORMATION TECHNOLOGY	CO1	Understand the architectural design of a computer and various basic concepts of operating systems
		CO2	Understand programming fundamentals Analyse various software development methodologies
		CO3	Undestanding of database design and Apply various SQL commands and Transaction Processing.
		CO4	Apply OOP and model for different case studies using UML
22UC0008	INDIAN CONSTITUTION	CO1	To acquire knowledge of the historical developments that culminated in the drafting of the Indian Constitution.

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Course Code	Course Title	CO NO	Description of the Course Outcome
		CO2	To understand the basic features of the Indian Constitution.
		CO3	To understand the structure of the Federal government as defined by the Indian Constitution.
		CO4	To understand the Indian Judicial system and election commission of india
22UC0007	INDIAN HERITAGE & CULTURE	CO1	Familiarizing students with various aspects of Indian culture and how they contribute to the concept of Unity in Diversity
		CO2	Understand the beginnings of Indian History and the developments during the Ancient period
		CO3	Understand the developments in India during the Medieval Age along with how they contributed to Indian civilization
		CO4	Understand the reasons for colonial rule over India and how independence was achieved from British rule
22IE2040	SOCIAL INTERNSHIP (SI)	CO1	Industrial Training
22IE3042	RESEARCH SEMINAR	CO5	Analyze Research work
22IE3043	TERM PAPER	CO5	Analyze Research work
22IE4051	INTERNSHIP	CO1	Internship
		CO2	Understanding the importance of production training
		CO3	Applying the techniques in the live projects
		CO4	Analyzing the achieved output, compared to production requirments

M. kavitha

Academic Professor I/C

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