CMR TECHNICAL CAMPUS
An UGC Autonomous Institute
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Approved by AICTE, New Delhi and Affiliated to JNTU, Hyderabad

DEPT. OF COMPUTER SCIENCE & ENGINEERING
R19-COURSE OUTCOMES

B. TECH-CSE -III SEMESTER

Course Code:C201 **Course: Analog and Digital Electronics**

Items	Course Outcomes
C201.1	Describe the utilization of components and its characteristics.
C201.2	Analyze the construction and functionalities of Field Effect Transistor
C201.3	Apply postulates of Boolean algebra to the digital circuit functions
C201.4	Design and analyze combinational circuits
C201.5	Implement the sequential logic circuits.

Course code: C202 Course: Data Structures

Items	Course Outcomes
C202.1	Describe basic data structures.
C202.2	Analyze the hash table Representations.
C202.3	Implement searching for trees
C202.4	Apply sorting on the information
C202.5	Design pattern matching on a problem

Course code: C203 Course: Computer Oriented Statistical Methods

Items	Course Outcomes
C203.1	Describe the theory of probability.
C203.2	Evaluate mathematical expectation and discrete probability distributions to various data sets
C203.3	Apply Normal and other continuous distributions and sampling theorems to real data
C203.4	Test the hypothesis and make inferences using sampling theory
C203.5	Analyze Markov chains and transition probabilities in stochastic processes

Course Code: C204 Course: Computer Organization and Architecture

Items	Course Outcomes
C204.1	Describe basic computer organization and architecture.
C204.2	Analyze the basics of instruction sets and their functionality.
C204.3	Evaluate arithmetical operations through central processing unit.
C204.4	Demonstrate the functional units of the computer.
C204.5	Explore the parallel processing mechanisms.

Course Code: C205 Course: Object Oriented Programming using C++

Items	Course Outcomes
C205.1	Explore the object-oriented programming paradigms for problem solving
C205.2	Demonstrate the concept of classes, data abstraction through C++
C205.3	Illustrate inheritance Concepts and Polymorphism
C205.4	Apply file handling and stream classes through C++.
C205.5	Implement exception handling through C++.

Course Code:C206 Course: Analog and Digital Electronics Lab

Items	Course Outcomes
C206.1	Describe the characteristics of UJT.
C206.2	Analyze the characteristics of Diode, FET and JFET.
C206.3	Implement the Boolean expressions using Gates.
C206.4	Design Adder and Subtractor
C206.5	Illustrate the sequential circuits for counters.

Course Code:C207 Course: Data Structure Lab

Items	Course Outcomes
C207.1	Demonstrate the linked list operations.
C207.2	Implement stack operations and queue operations.
C207.3	Apply sorting and searching techniques
C207.4	Illustrate Tree traversal techniques.
C207.5	Visualize Graph traversals

Course Code:C208 Course: IT Workshop Lab

Items	Course Outcomes
C208.1	Describe computing hardware, PC assembly and troubleshooting.
C208.2	Explore the network settings, browsing tools and cybersecurity practices.
C208.3	*Create* the documents using LaTeX, Word with professional formatting.
C208.4	*Apply* Excel functions for different types of calculations, and analysis using charts.
C208.5	*Design* interactive and well-structured presentations using PowerPoint and LaTeX.

Course Code:C209 **Course: C++ Programming Lab**

Items	Course Outcomes
C209.1	Develop programs using classes, objects, and structures to implement basic object-oriented concepts.
C209.2	Demonstrate use of constructors, access specifiers, and object arrays. For real time applications.
C209.3	Illustrate the scope resolution operator, memory allocation and I/O operations
C209.4	Implement multilevel inheritance and reusability
C209.5	Practice pointers, array of objects, and virtual functions for dynamic binding.

IV SEMESTER

Course Code:C210 **Course: Discrete Mathematics**

Items	Course Outcomes
C210.1	Describe the principles of logic for mathematical arguments and proofs
C210.2	Apply set theory, functions, relations, for modeling real-world problems.
C210.3	Analyze the algorithms using mathematical induction and recursion.
C210.4	Solve problems using discrete probability, recurrence relations.
C210.5	Illustrate concepts of graphs, trees, and their applications

Code:C211 Course: Business Economics & Financial Analysis

Items	Course Outcomes
C211.1	Describe the various forms of Business and its impact on economy.
C211.2	Comprehend the demand and supply.
C211.3	Explore the usage of marketing and pricing of a product
C211.4	Solve problems using discrete probability, recurrence relations
C211.5	Illustrate concepts of graphs, trees, and their applications.

Code:C212 Course: Operating Systems

Items	Course Outcomes
C212.1	Describe the operating system concepts
C212.2	Analyze the CPU scheduling algorithms
C212.3	Demonstrate Deadlocks and Processes Synchronization.
C212.4	Illustrate Memory Management Techniques
C212.5	Apply files system inter phase and operations.

Code:C213 Course: Data Base Management Systems

Items	Course Outcomes
C213.1	Analyze the logical design concepts of the database.
C213.2	Design the physical model of a database and its operations.
C213.3	Apply the SQL queries for efficient database management.
C213.4	Implement transaction processing and concurrency control.
C213.5	Examine different indexing mechanisms and database storage access.

Course code: C214 Course: Java Programming

Items	Course Outcomes
C214.1	Solve real world problems using OOP techniques.
C214.2	Apply the packages and interfaces, streams in I/O.
C214.3	Implement exception handling and multithreaded applications with synchronization.
C214.4	Develop the application using collection framework.
C214.5	Design GUI based applications using applets and swings.

Code:C215 Course: OS Lab

Items	Course Outcomes
C215.1	Demonstrate CPU scheduling algorithms.
C215.2	Explore I/O system calls.
C215.3	Simulate Banker's Algorithm for deadlock.
C215.4	Implement the Producer-Consumer Problem.
C215.5	Illustrate IPC mechanisms and memory management techniques.

Code:C216 Course: DBMS Lab

Items	Course Outcomes
C216.1	Demonstrate the database design using E-R diagrams.
C216.2	Design the relational model using normalization.
C216.3	Apply SQL queries for data manipulation.
C216.4	Implement Procedural language.
C216.5	Illustrate various Triggers and Cursors for database.

Code:C217 Course: Java Programming Lab

Items	Course Outcomes
CO217.1	Apply fundamental Java programming concepts by utilizing IDE tools and identify features like refactoring and debugging.
CO217.2	Create interactive GUI-based applications.
CO217.3	Apply object-oriented features in solving problems.
CO217.4	Implement multi-threaded applications.
CO217.5	Utilize file handling, sorting algorithms, and data structures to solve complex problems.

V SEMESTER

Course Code: C301 Course: Formal Languages and Automata Theory

Items	Course Outcomes
C301.1	Describe abstract missions and their languages.
C301.2	Design the finite state mechanics using regular expressions
C301.3	Implement context-free grammar for formal languages
C301.4	Apply normalization to the context-free grammar.
C301.5	Distinguish between decidability and un-decidability problems

Code:C302 Course: Software Engineering

Items	Course Outcomes
C302.1	Compose end-user requirements into the system.
C302.2	Identify and apply the process model based on software requirements.
C302.3	Build the design of a systematic model
C302.4	Construct testing strategies and generate a report
C302.5	Quantify the metrics for process and products.

Code:C303 Course: Computer Networks

Items	Course Outcomes
C303.1	Describe the basic concepts of reference models.
C303.2	Apply sliding window and multiple access protocols.
C303.3	Design routing algorithms and congestion control techniques.
C303.4	Analyze the transport layer services and protocols.
C303.5	Illustrate application layer protocols.

Code:C304 Course: Web Technologies

Items	Course Outcomes
C304.1	Apply server-side scripting with PHP language.
C304.2	Demonstrate parsing XML Data with Java.
C304.3	Develop Server-side programs with Java Servlets.
C304.4	Implement JSP pages using Cookies and Session tracking..
C304.5	Design client-side scripting, validation of forms and AJAX programming

Code:C305 Course: Principles of Programming Languages

Items	Course Outcomes
C305.1	Discover the syntax and semantics of formal languages
C305.2	Apply a suitable programming paradigm for a given computing application.
C305.3	Implement functional programming
C305.4	Explore the concepts of concurrency model
C305.5	Compare and contrast the features of programming languages.

Code:C306 Course: Informational Retrieval Systems

Items	Course Outcomes
C306.1	Describe Information Retrieval systems principles for large collections of data.
C306.2	Develop data models using statistical approaches.
C306.3	Implement different automatic document clustering algorithms.
C306.4	Design the Information Retrieval System for web and text searching.
C306.5	Apply visualization tools for multimedia information retrieval.

Code:C307 Course: Software Engineering Lab

Items	Course Outcomes
C307.1	Apply software engineering principles.
C307.2	Use software development tools.
C307.3	Design and implement software systems
C307.4	Test and validate software systems
C307.5	Collaborate on software development projects.

Code:C308 Course: Computer Networks & Web Technologies Lab

Items	Course Outcomes
C308.1	Implement data link layer protocols.
C308.2	Illustrate routing and congestion control techniques in a network.
C308.3	Design and develop web applications.
C308.4	Develop server-side scripting.
C308.5	Apply web development frameworks and tools.

Code:C309 Course: Advanced Communication Skills Lab

Items	Course Outcomes
CO309.1	Interpret the vocabulary to improve the fluency in English
CO309.2	Illustrate the ideas to use of communication skills
CO309.3	Develop proficiency in academic reading and writing.
CO309.4	Apply innovative presentation styles.
CO309.5	Use advanced communication technologies.

VI SEMESTER

Code:C310 Course: MACHINE LEARNING

Items	Course Outcomes
CO310.1	Describe the concept of computational intelligence
CO310.2	Demonstrate artificial neural networks and their usage.
CO310.3	Implement machine learning algorithms
CO310.4	Analyze instant based learning algorithms by set rules.
CO310.5	Evaluate Analytical and Inductive learning algorithms

Code:C311 Course: Compiler Design

Items	Course Outcomes
CO311.1	Compute tokens and regular expressions for lexical analysis.
CO311.2	Implement top-down and bottom-up parsers
CO311.3	Construct intermediate code for procedures
CO311.4	Optimize the code generation
CO311.5	Analyze the data flow.

Code:C312 **Course: Design & Analysis of algorithms**

Items	Course Outcomes
C312.1	Analyze the algorithms with respect to space and time.
C312.2	Apply disjoint sets and backtracking approaches to solve problems
C312.3	Illustrate dynamic programming strategy.
C312.4	Implement backtracking and branch and bound techniques.
C312.5	Explore NP-Hard and NP-complete problems using non-deterministic algorithms.

Code:C313 **Course: Software Testing Methodologies**

Items	Course Outcomes
C313.1	Compare and contrast the various testing strategies.
C313.2	Demonstrate data flow and domain testing strategies.
C313.3	Describe anomalies and build decision table, kv charts.
C313.4	Analyze the graph-based testing metrics with its applications.
C313.5	Implement test cases using WinRunner tool.

Code:C314 Course: Fundamentals of Internet of Things

Items	Course Outcomes
C314.1	Describe basic protocols in sensor networks.
C314.2	Integrate Arduino boards for various applications
C314.3	Interpret Python programming for Raspberry Pi.
C314.4	Design IoT applications in different domains.
C314.5	Analyze the various applications of IoT.

Code:C315 Course: Machine Learning Lab

Items	Course Outcomes
C315.1	Describe the mathematical and statistical prospectives of Machine learning algorithms through python programming.
C315.2	Implement Machine learning algorithms.
C315.3	Use machine learning libraries and frameworks.
C315.4	Apply classification techniques for real world problems.
C315.5	Analyze and interpret machine learning models

Code:C316 Course: Compiler Design Lab

Items	Course Outcomes
C316.1	Design and implement lexical analyzer.
C316.2	Develop top-down parser.
C316.3	Implement semantic analysis and intermediate code generation.
C316.4	Demonstrate bottom-up parser.
C316.5	Use compiler design tools and techniques.

Code:C317 Course: Software Testing Methodologies Lab

Items	Course Outcomes
C317.1	Identify recording in context sensitive mode and analog mode.
C317.2	Demonstrate the GUI, Bitmap and Database checkpoints.
C317.3	Analyze Data driven test through flat files and excel test.
C317.4	Recognize Batch testing without and with parameter passing.
C317.5	Develop the test case for calculator application.

VII Semester

Course Code:C401 **Course: Cryptography & Network Security**

Items	Course Outcomes
C401.1	Describe the key concepts of cryptography and security
C401.2	Analyze the private and public key cryptographic algorithms.
C401.3	Implement the key distribution and management methods
C401.4	Summarize Transport-level and Wireless Network Security
C401.5	Explore the e-mail and IP Security

Code:C402 **Course: Data Mining**

Items	Course Outcomes
C402.1	Differentiate types of data mining and primitives of data mining.
C402.2	Extract interesting patterns from large amounts of data.
C402.3	Discover the classification of data mining in various fields.
C402.4	Implement clustering applications
C402.5	Analyze and extract insights from continuous data streams, enabling real time decision making.

Code:C403 **Course: Cloud Computing**

Items	Course Outcomes
C403.1	Describe the cloud computing paradigms.
C403.2	Explore various service delivery models of a cloud computing architecture.
C403.3	Demonstrate the cloud infrastructure management and migration tools.
C403.4	Apply the cloud services.
C403.5	Analyze different cloud service providers.

Code:C404 **Course: Software Process and Project Management**

Items	Course Outcomes
C404.1	Describe software process models.
C404.2	Demonstrate process life cycle and artifacts.
C404.3	Design software project plans.
C404.4	Explore project organization.
C404.5	Develop software product using conventional and modern principles.

Code:C405 Course: Electronic Sensors

Items	Course Outcomes
C405.1	Understand sensor Principle, Classification and Characterization.
C405.2	Explore the working of Electro mechanical, Thermal, Magnetic, Radiation
C405.3	Understand Electro analytical sensors
C405.4	Understand the basic concepts of Smart Sensors.
C405.5	Design a system with sensors.

Code:C406 Course: Cryptography & Network Security Lab

Items	Course Outcomes
C406.1	Apply basic bitwise operations on strings using C programming
C406.2	Implement classical encryption algorithms using Java.
C406.3	Demonstrate the working of standard encryption algorithms
C406.4	Develop programs for public key cryptography methods
C406.5	Evaluate message integrity by generating and verifying digests using SHA-1 and MD5 hashing algorithms in java.

Code:C407 Course: Industry Oriented Mini Project

Items	Course Outcomes
C407.1	Identify and explain the problem clearly, generate creative ideas to solve it, and analyze the problem critically to develop effective solutions.
C407.2	Apply appropriate methods, tools, and technologies to design and implement practical and functional solutions
C407.3	Analyze project results, interpret findings, and evaluate outcomes to suggest evidence-based improvements
C407.4	Evaluate contributions to achieve project goals through project management principles
C407.5	Demonstrate professional communication and ethical behavior through proper project documentation and presentation

Code:C408 Course: Seminar

Items	Course Outcomes
C408.1	Understand and explain the technical topic by identifying key concepts, objectives, and relevance to engineering problems.
C408.2	Apply appropriate research methodology and technical tools to analyze the seminar topic effectively.
C408.3	Explain clear and structured presentations, supported by effective visuals and proper documentation.
C408.4	Demonstrate innovation and critical thinking while presenting advanced ideas and engaging in lifelong learning.
C408.5	Defend the seminar content confidently during viva-voce and submit a well-organized technical report

Code:C409 **Course: Project Stage – I**

Items	Course Outcomes
C409.1	Develop a clear and concise problem statement and define achievable project objectives that are well-aligned with the identified problem.
C409.2	Review and analyze relevant literature to identify research gaps, and develop an effective project design grounded in engineering principles.
C409.3	Demonstrate effectively research findings through a structured presentation and a well-organized project report.

VIII SEMESTER

Code:C410 **Course: Organizational Behaviour**

Items	Course Outcomes
C410.1	Describe the environmental and organizational behaviour.
C410.2	Develop the personality and process attributes.
C410.3	Apply decision making at individual and team levels
C410.4	Explore power and politics
C410.5	Analyze the performance and work practices.

Code:C411 **Course: Human Computer Interaction**

Items	Course Outcomes
C411.1	Explore HCI principles for interaction design.
C411.2	Design process of human-computer interaction.
C411.3	Evaluate user interfaces.
C411.4	Develop user centric design solutions.
C411.5	Apply HCI principles to virtual and augmented reality interfaces.

Code:C412 **Course: Microprocessor and Microcontroller**

Items	Course Outcomes
C412.1	Describe the 8086-microprocessor architecture and programming.
C412.2	Explore the 8051-microcontroller architecture.
C412.3	Demonstrate the interfacing techniques of 8086 and 8051 based system.
C412.4	Summarize the internal architecture of ARM processors.
C412.5	Illustrate the concepts of advanced ARM processors.

Code:C413 **Course: Project Stage – II**

Items	Course Outcomes
C413.1	Demonstrate progress in implementing the project by effectively selecting and applying appropriate engineering tools, techniques, and practices in line with project requirements.
C413.2	Apply systematic testing strategies and validation methods to identify issues and improve the functionality and performance of the project.
C413.3	Develop original ideas or innovative approaches in the design or implementation of the project.
C413.4	Describe the proposed system, interpret output/results and connect to defined objectives.
C413.5	Compose a well-structured project report that communicates technical content, results, and conclusions effectively.
C413.6	Analyze the social and environmental impacts through professional communication, collaboration, and ethical conduct.