CMR TECHNICAL CAMPUS
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Approved by AICTE, New Delhi and JNTU, Hyderabad
Kandlakoya, Medchal Road, Hyderabad-501 401,Telangana

Department of CSE [Artificial Intelligence & Machine Learning]

COURSE OUTCOMES FOR R20 REGULATION

Ist YEAR

C101: Algebra and Calculus

1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
2. Find the Eigen values and Eigenvectors and reduce the quadratic form to canonical form using orthogonal transformations.
3. Analyze the nature of convergence of sequence and series.
4. Solve problems involving mean value theorems and evaluate the improper integrals using Beta and Gamma functions.
5. Find the extreme values of functions of two variables with/ without constraints.

C102: Engineering Chemistry

1. The knowledge of atomic, molecular and complex compound structures.
2. The required skills to get clear concepts on hard water, hardness and different purification methods of water.
3. The required principles and concepts of electro chemistry, corrosion and in understanding the problem of water and its treatments.
4. The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.
5. The knowledge of electronic, infrared and NMR spectra.

C103: Programming for Problem Solving

1. To write algorithms and to draw flowcharts for solving problems.
2. To understand use arrays, pointers, strings and structures to write C programs.
3. To understand the files using C programs.
4. To decompose a problem into functions and to develop modular reusable code.
5. To understand the Searching and sorting problems.

C104: English

1. Generate ideas and create effective sentence structures in spoken and written forms.
2. Comprehend passages and texts critically and respond appropriately.
3. Select specific approaches to study and retain information.
4. Interpret technical content using theoretical and practical components of English language.
5. Communicate effectively in formal and informal contexts.

C105: Engineering Workshop

1. Create the different patterns with desired shape and size by using wood.
2. Align and assemble different components to create a product by fitting operations.
3. Fabricate the given material to desired product in a particular pattern by tin smithy.
4. Explain the basic principles of electrical systems in day-to-day applications.
5. Mould the component to desire pattern and shape by black smithy.

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C106: Engineering Chemistry Lab

1. Determination of parameters like hardness and chloride content in water.
2. Estimation of rate constant of a reaction from concentration time relationships.
3. Determination of physical properties like surface tension and viscosity.
4. Calculation of Rf values of some organic molecules by TLC technique.
5. Estimation of amount by conductometry, potentiometry and colorimetry.

C107: English Language and Communication Skills Lab

1. Imitate native accent through audio- visual experience and practice.
2. Pronounce English sounds according to standard pronunciation (RP of England).
3. Speak fluently and clearly.
4. Neutralize their accent thus refining their speech.
5. Participate in discussions and presentations effectively and confidently.

C108: Programming For Problem Solving Lab

1. Formulate the algorithms for simple problems.
2. Translate given algorithms to a working and correct program.
3. Correct syntax errors as reported bythe compilers.
4. Identify and correct logical errors encountered during execution.
5. Represent and manipulate data with arrays, strings and structures.

C109: Ordinary Differential Equations and Vector Calculus

1. Identify whether the given differential equation of first order is exact or not.
2. Solve higher order differential equation and apply the concept of differential equation to real World problems.
3. Evaluate the multiple integrals and apply the concept to find area and volumes of revolution of curves.
4. Evaluate Gradient, Divergence and Curl of vector differential operator.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

C110: Applied Physics

1. The knowledge of fundamentals of Semiconductor physics, will enable the students to apply to various systems like pn junction diodes, transistors, communication and so on.
2. The students can gain knowledge on the optical phenomena like Interference and diffraction.
3. LASER explains the basic mechanisms involved in the interaction between the laser medium and the light source. Students would be able to learn Optical fibre principle and its applications as new materials for various engineering applications.
4. The course also helps the students to be exposed to the magnetic materials and dielectric materials.
5. Magnetic, dielectric behaviour of various materials are exposed to students to apply in industry and engineering.

C111: Basic Electrical & Electronics Engineering

1. To analyze and solve the basic Electrical circuits using different network reduction techniques.
2. To understand the components of low Voltage Electrical Installations.
3. To study the working principles of Electrical Machines.
4. To identify and characterize diodes and their applications.
5. To identify and characterize of transistors and their applications.

C112: Engineering Graphics

1. Understand the conventions and the methods of drawing engineering curves and scales.
2. Understand and draw the projections of points, lines and planes in different types of projections.
3. Understand and draw projections of solids and sectional views of solid (prisms),Auxiliary views.
4. Understand and sketch the development of surfaces to Right Regular Solids-prism, intersection of Solids.
5. Prepare 2D & 3D drawings of solids and their transformations .isometric views of lines, plane figures and conversion of Isometric views to Ortho graphic views, Introduction of CAD software.

C113: Applied Physics Lab

1. Apply the various procedures and techniques for the experiments.
2. Use the different measuring devices and meters to record the data with precision.
3. Apply the mathematical concepts/equations to obtain quantitative results.
4. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.
5. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

C114: Basic Electrical & Electronics Engineering Lab

1. Able to solve the different networks using the concept of circuit laws.
2. Able to characterize the performance of DC Motors and single phase transformer.
3. Able to characterize the performance of three phase induction motors and alternators.
4. Able to understand the characteristics of different electronic devices such as diodes and transistors.
5. Able to understand the half wave and full wave rectifiers with and without filters.

C115: Basic Elements of Engineering Technology

1. Exploring different engineering technologies and their applications.
2. Student should be able to understand IT Networking, Protocols and Computations.
3. Understanding the principle of IOT and its architecture.
4. Knowledge towards Assembling and testing of robots.
5. Understanding functionality of 3D printers and their application.

C116: Environmental Science

1. A student will be able to understand the basics of biotic and abiotic things present in the environment and their effects on environment.
2. A student will be able to understand the basics of natural resources and impacts of things present in the environment and their effects.
3. A student will be able to understand the varieties of life forms and conservation techniques.
4. A student will be able to understand the effects of technological, scientific development on environment.
5. A student will be able to assess the impacts on environment and strategic management of environment as stipulated by the local legislative rules, regulations and concepts of sustainable growth related to human life.

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IInd YEAR

C201: Design &Analysis Algorithms

1. Compare and contrast the algorithms in terms of space and time.
2. Design the algorithm using divide and conquer and greedy approach.
3. Apply the Dynamic programming strategy to problems.
4. Describe Back tracking techniques, branch and bound methods.
5. Design the algorithm using non deterministic approaches.

C202: Data Structures using C

1. Implement fundamental data structures such as stacks, queues and linked lists.
2. Analyze and apply hashing techniques and dictionary data structures for different data access.
3. Analyze and Implement various tree data structures like AVL and splay trees for search operations.
4. Apply and evaluate different sorting algorithms and Graph traversal techniques.
5. Design and Implement to efficient pattern matching algorithms and tree based data structure for text processing.

C203: OOPS Through Java

1. Solve real world problems using OOPS techniques.
2. Apply the packages and interfaces, streams in programs.
3. Make use of exceptions, multithreaded applications with synchronization.
4. Develop the application using collection framework.
5. Design GUI based applications using applets and swings.

C204: Theory of Computation

1. Analyze the concepts of abstract machines and their languages.
2. Design the finite state machines from regular expressions.
3. Find context free grammar for formal languages.
4. Apply normalization to the context free grammar.
5. Distinguish between decidability and un-decidability problems.

C205: Programming with Python

1. Examine python syntax, semantics and flow control.
2. Analyze proficiency in handling strings and arrays.
3. Develop python programs using core data structures.
4. Conduct experiments on file handling, exception handling and modules.
5. Interpret the concepts of object oriented programming in python.

C206: Data Structure using C Lab

1. Construct C programs to implement and manage various linked list data structures.
2. Execute C programs to perform fundamental operations on stacks & queues by effectively utilizing arrays and pointers.
3. Illustrate the working principles of common sorting and searching methods through practical C program implementation.
4. Analyze and implement different traversal techniques in C program.
5. Design and Develop C programs to solve problems by applying various graph traversal techniques.

C207: Python Lab

1. Demonstrate the basic data types ,operators, strings in the data structures.
2. Perform operations on List, tuples, dictionaries in python.
3. Make use control statements , functions in python.
4. Analyze programs using modules, files and object oriented concepts.
5. Perform operations on text files.

C208: OOPS Through Java Lab

1. Make use of Eclipse or Net Bean platform to create a project.
2. Design a java program to perform operations on List.
3. Demonstrate file operations using Java programs.
4. Analyze functions to handle mouse events, to simulate traffic signals.
5. Perform Multi threading concepts, GUI programs using swing controls in java.

C209: Constitution of India

1. Develop the emergence and evolution of Indian Constitution.
2. Elaborate the structure and composition of Indian Constitution.
3. Analyze federalism in the Indian context.
4. Adopt the Indian Political scenario a midst the emerging challenges.
5. Evaluate Indian foreign relations under cold war and post-cold war.

C210: Database Management Systems

1. Design conceptual schemas using ER diagrams.
2. Construct normalized relational schemas from ER models using relational principles
3. Apply SQL for defining, querying, and modifying relational databases.
4. Analyze transaction management and concurrency control techniques.
5. Evaluate file organization and indexing strategies for performance optimization.

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C211: Analog and Digital Electronics

1. Simulate the characteristics of UJT and Diode functions.
2. Analyze the input/output characteristics of FET in C configuration.
3. Excel the realization of Boolean expressions using universal gates.
4. Design and analyze synchronous and asynchronous using counter flip-flops.
5. Develop realization of logic gates using DTL, TTL, ECL, etc.

C212: Computer Oriented Statistical Methods

1. Discuss the theory of probability, Random variables and distributions.
2. Interpret test of Sampling techniques and Test of hypothesis.
3. Apply the test of hypothesis for samples.
4. Find roots of Algebraic and transcendental Equations.
5. Compute solutions for ordinary differential equations.

C213: Operating systems

1. Understand the structures ,functions and services of modern operating systems including batch, time sharing and distributed systems.
2. Analyze and compare different CPU Scheduling algorithms and process handling techniques.
3. Demonstrate knowledge of deadlock , synchronization techniques and methods for concurrency control.
4. Apply memory management strategies such as paging, segmentation and virtual memory.
5. Understand the file system interface and perform system level operations using UNIX System calls.

C214: Computer Organization

1. Distinguish computer Organization and Computer Architecture.
2. Introduce the basics of instruction sets and their functionality.
3. Evaluate different arithmetic operations.
4. Demonstrate the functional units of the computer.
5. Design a pipeline for consistent execution of instructions.

C215: OS Lab

1. Implement and Analyze basic CPU scheduling algorithms using C in a UNIX/LINUX environment.
2. Apply system calls for file manipulation and process control in UNIX/LINUX.
3. Design and Implement solutions for synchronization problems and deadlock avoidance using semaphores and bankers algorithms.
4. Demonstrate inter-process communication techniques using pipes, FIFOS, message queues and shared memory.
5. Implement memory management techniques like paging and segmentation in C.

C216: DBMS Lab

1. Design ER diagrams and convert them into relational schemas.
2. Normalize database tables for better structure and efficiency.
3. Perform basic SQL operations using DDL and DML commands.
4. Write SQL queries with constraints, functions, and views.
5. Use triggers, procedures, and cursors for advanced SQL tasks.

C217: Analog and Digital Electronics Lab

1. Simulate Boolean algebra and digital circuit functions.
2. Analyze combinational and Sequential circuits.
3. Excel Common source JFET Amplifiers.
4. Demonstrate the generation of clock using NAND/NOR gates.
5. Design and realization of Synchronous and Asynchronous counter using flip-flops.

C218: Gender Sensitization Lab

1. Contrast Men and women students and professionals.
2. Interpret Gender and Biology.
3. Measure Gender and Labour.
4. Apply and respond to gender violence.
5. Discuss about the gender co-existence.

IIIrd YEAR

C301: Data Mining

1. List the types of data to be mined and primitives of the data mining system.
2. Extract interesting patterns from large amounts of data.
3. Discover the classification of data mining in various fields.
4. Illustrate suitable data mining algorithms to clustering applications.
5. Evaluate the accuracy of supervised and unsupervised models.

C302: Computer Networks

1. Compute the knowledge of the basic computer network technology.
2. Summarize the functionalities of each layer in the OSI and TCP/IP reference model.
3. Implement sub netting and routing mechanisms.
4. Discuss the essential transport layer protocols.
5. Compile the different protocols in Application layer.

C303: Web Technologies

1. Discuss server-side scripting with PHP language.
2. Develop XML and how to parse and use XML Data with Java.
3. Interpret Server-side programming with Java Servlets.
4. Implement JSP pages using Cookies and Session tracking.
5. Design client-side scripting, validation of forms and AJAX programming.

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C304: Data Analytics

1. Evaluate and Discuss various Data architecture and manage the data for analysis.
2. Explore data analytics and the need of business modeling.
3. Conduct and interpret Regression Analysis.
4. Analyze and Compare supervised and unsupervised models.
5. Apply standard Data visualization techniques.

C305: Distributed Databases

1. Inspect the aspects of distributed database systems.
2. Interpret query processing and optimization techniques.
3. Summarize the transaction management process.
4. Discuss about parallel databases and reliability.
5. Construct the design aspects of the object-oriented database systems.

C306: Data Mining Lab

1. Install WEKA tool.
2. Apply classification algorithms as a component to the existing tools.
3. Implement clustering mining techniques for realistic data.
4. Develop Credit risk assessment.
5. Build Hospital Management systems.

C307: Computer Networks and Web Technologies Lab

1. Implement data link layer framing methods.
2. Compute CRC code for the polynomials.
3. Excel PHP concepts in HTML.
4. Implement Routing and congestion issues in network design.
5. Install Tomcat and web server to perform operation dynamic and static web pages.

C308: R Programming Lab

1. Implement basic concepts of R programming.
2. Implement the concepts of R fundamentals.
3. Apply descriptive statistics on different data sets.
4. Make Use of R Graphics and R Script.
5. Create Data types, Transformations and Relational Database Using SQL.

C309: Intellectual Property Rights

1. Understand and Evaluate the fundamental concepts and types of Intellectual Property (IP).
2. Identify different types of trademarks and related laws.
3. Examine Copyrights, Patents and their Laws.
4. Explain the laws and regulations of trade secrets and Unfair competition.
5. Apply IPR knowledge to real-life case studies and industries.

C310: Artificial Intelligence

1. Formulate and apply problem-solving techniques such as search strategies for AI agents.
2. Analyze Adversarial search, constraint satisfaction problems and propositional-logic-based reasoning.
3. Apply first order logic and knowledge representation techniques to model intelligent behavior.
4. Develop classical and real world AI planning solutions using algorithms and multi-agent planning.
5. Implement probabilistic models and learning approaches for reasoning under uncertainity.

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C311: Compiler Design

1. Compute tokens and regular expressions for lexical analysis.
2. Implement top-down and bottom-up parsers.
3. Construct Intermediate code for Procedures.
4. Optimize the Code generation.
5. Analyze the foundation of Data-Flow.

C312: Software Engineering

1. Ability to translate end-user requirements into the system.
2. Ability to translate end-user requirements into the system.
3. Ability to build the design of systematic models.
4. Construct testing strategies and generate a report.
5. Quantify the metrics for process and products.

C313: Software Testing Methodologies

1. Evaluate basic concepts of software testing, bugs, and Path testing with flow graphs.
2. Apply various testing techniques like Transaction flow, Data flow and Domain testing.
3. Illustrate Path, path products and logic-based testing methodologies using KV charts.
4. Design test cases using decision tables, state graphs, and transition testing.
5. Develop automated testing using the JMeter, Win Runner, selenium, soapUI, Catalon tools.

C314: Fundamentals of Internet of Things

1. Discuss the basic protocols in sensor networks.
2. Analyze the Program and configure Arduino boards for various designs.
3. Apply Python programming and build interfacing using Raspberry Pi.
4. Make use of SDN for implementing IoT applications using Raspberry pi
5. Analyze the various applications of IoT.

C315: Artificial Intelligence Lab

1. Implement fundamental AI search algorithms using LISP/PROLOG.
2. Apply adversarial search techniques and game playing methods using LISP/PROLOG.
3. Solve constraint-based problem such as monkey-banana and 8-puzzle problem LISP/PROLOG.
4. Design and Develop an Expert System with forward chaining using JESS/PROLOG.
5. Build an Expert System with backward chaining using JESS/PROLOG.

C316: Advanced Communication Skills Lab

1. Interpret the vocabulary to improve the fluency in English.
2. Illustrate the ideas to use of communication skills.
3. Inspect gathering ideas and information.
4. Engage in debates.
5. Prepare students for placement.

C317: Software Testing Methodologies Lab

1. Demonstrate the best test strategies in accordance to the development model.
2. Develop GUI checkpoints for single and multiple objects.
3. Create Bit map and Database checkpoints for default, custom, Run time check.
4. Apply data driven test and perform Batch testing.
5. Automate test cases using Manual testing tools for different windows applications.

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IVth YEAR

C401: Business Economics and Financial Analysis

1. Discuss the various Forms of Business and the impact of economic variables on the Business.
2. Comprehend the demand and supply analysis.
3. Explore the usage of marketing and pricing of a product.
4. Maintain the financial accounts of a firm or company.
5. Monitoring the accounts through ratios.

C402: Machine Learning

1. Discuss the concept of computational intelligence.
2. Describe the artificial neural networks and its usage.
3. Implement basic machine learning algorithms.
4. Demonstrate Genetic algorithms and Reinforcement learning.
5. Perform Analytical learning.

C403: Cloud Computing

1. Discuss cloud computing paradigms.
2. Demonstrate cloud computing Fundamentals.
3. Design cloud computing architecture
4. Construct the cloud service models.
5. Make use of cloud service providers.

C404: Deep Learning

1. Understand the architecture and functioning of deep feed forward neural networks including learning mechanisms like back propagation and gradient based learning.
2. Apply regularization strategies and optimization constrains to improve deep learning model generalization and robustness.
3. Analyze and implement optimization techniques for training deep models including adaptive learning rates, meta algorithms and initialization strategies.
4. Design and implement convolution neural network (CNNs),understanding role of pooling, convolution and structural representation.
5. Evaluate and apply deep learning techniques in real-world applications such as computer vision, NLP, and speech recognition.

C405: Information Retrieval systems

1. Evaluate IRS system capabilities.
2. Construct automatic Indexing and information Extraction.
3. Categorize Automatic and Statistical Indexing.
4. Compile Information Visualization Techniques.
5. Develop text searching algorithm for Multimedia Information Retrieval.

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C406: Machine Learning Lab

1. Perform experiments in Machine Learning using real-world data.
2. Extract the data from database using python.
3. Implement K-nearest neighbors using Python.
4. Demonstrate the significance of genetic algorithms.
5. Experiment finite words classification system using Back Propagation.

C407: Industry Oriented Mini Project

1. Identify technical and economically feasible problems of social relevance.
2. Plan and build the project team with assigned responsibilities.
3. Survey the relevant literature for getting exposed to related solutions.
4. Develop adaptable and reusable solutions of minimal complexity by using modern tools.
5. Analyze test solutions to trace against the user requirements.

C408: Seminar

1. Identify and explore recent trends in engineering and technology.
2. Analyze and summarize technical information from various sources.
3. Demonstrate effective communication and presentation skills.
4. Exhibit professionalism and ethical practices.
5. Engage in-depth and lifelong learning.

C409: Project Stage – I

1. Survey the problem, formulation and solution of the selected project.
2. Analyze solutions for contemporary problems using modern tools.
3. Demonstrate ethical and professional sustainability for the benefit of the society.
4. Develop the engineering, finance and management principles.
5. Implement and test solutions to trace against the user requirements.

C410: Organizational Behaviour

1. Discuss conventional and organizational behaviour.
2. Describe the Cognitive process.
3. Make use of decision making at individual and team levels.
4. Compare power and politics.
5. Analyze the leading high performance.

C411: Cyber Forensics

1. Describe the crime types and incident response procedures.
2. Experiment the usage of computers in forensic laboratories.
3. Explore the data analysis and visualization techniques.
4. Make use of various forensic tools for a wide variety of investigations.
5. Design principles of data management methods.

C412: Scripting Languages

1. Analyze the structure and execution of Ruby programs and Ruby TK.
2. Elaborate Embed Ruby Interpreter.
3. Acquire programming skills in scripting language.
4. Explain the object oriented concept of advanced PERL.
5. Justify the TCL structures and visualize TK.

C413: Project Stage-II

1. Identify technically and economically feasible problems of social relevance.
2. Plan and build the project team with assigned responsibilities.
3. Identify and survey the relevant literature for getting exposed to related solutions.
4. Analyze, design and develop adaptable and reusable solutions of minimal complexity by using modern tools.
5. Implement and test solutions to trace against the user requirements.