SIR C.R.REDDY COLLEGE OF ENGINEERING
ELURU-534007, WEST GODAVARI DIST, A P., INDIA
(Approved by AICTE, New Delhi)
Phone no: 08812-230840, 2300656 Fax: 08812-224193
Visit us at http://www.sircrrengg.ac.in
DEPARTMENT OF INFORMATION TECHNOLOGY

R19 COURSE OUTCOMES

Upon the completion of the course students will be able to

COURSE (R19 SERIES)	CO CODE	COURSE OUTCOME DESCRIPTION
English	C111.1	Apply The Four Languages Learning Skills-Listening, Speaking, Reading, Writing (Lsrw) For Professional Success.
	C111.2	Employ Knowledge Of Grammatical Structures And Vocabulary In Speech And Writing.
	C111.3	Apply Effective Communication Skills To Enhance Professional Possibilities.
	C111.4	Develop Acceptable Personality Traits Suitable For Chosen Profession.
Mathematics-I	C112.1	Examine the convergence of series and apply mean value theorem to real life problem.
	C112.2	Solve the Differential Equations of first and higher order related to various engineering applications.
	C112.3	Apply the partial differentiation technique to solve physical problem.
	C112.4	Apply double and triple integrals to find areas and volumes.
Applied Chemistry	C113.1	Identify the advantages and limitations of plastic materials, elastomers and their use in day to day life.
	C113.2	Select the suitable methods of corrosion control and gain the knowledge of applications of batteries.
	C113.3	Recognize the need of nano materials, liquid crystals, semiconductors and super conductors.
	C113.4	Obtain the knowledge of computational chemistry and molecular machines.
	C113.5	Obtain the knowledge of generation of electricity from various Non-Conventional energy sources.
Fundamentals of computer science	C114.1	Describe the concept of computer system, analyze a given problem, develop an algorithm, fundamental programming constructs, identify data representation formats, and describe operators and their precedence, associativity.
	C114.2	Interpret how the computer is works.
	C114.3	Implement appropriate methods for solving problems.
	C114.4	Examine the computer networks, types of network and topologies.
	C114.5	Demonstrate the concepts of Operating systems and Computer Systems Development.
Engineering Drawing	C115.1	Construct polygons, scales and draw curves used in engineering applications, draw orthographic projection of points.
	C115.2	Apply concept of orthographic projection to project lines inclined to both reference planes.
	C115.3	Produce orthographic projections of planes inclined to both the reference planes.
	C115.4	Produce orthographic projections of regular solids inclined to both the reference planes.

	C115.5	Construct isometric view from orthographic views and vice versa.
	C115.6	Represent objects in 3D view through isometric views from orthographic views and vice versa.
English Lab	C116.1	Recognize the sounds of English with the help of audio visual aids.
	C116.2	Build confidence and overcome inhibitions while speaking in English.
	C116.3	Demonstrate acquired language skills in performing the designated activity.
Applied Chemistry Lab	C117.1	Obtain the knowledge of acid-base titrations to determine the strength of acid and base solutions.
	C117.2	Gain the knowledge of Redox titrations to determine the concentration of samples such as Ores, KMnO4 and Copper using different indicators.
	C117.3	Obtain the knowledge of complexometry titrations to determine the hardness of given water sample by EDTA method.
	C117.4	Gain the knowledge of commonly used instruments such as pH meter, Conductivity meter and Potentiometer to determine the strength of given acid solutions.
IT Workshop Lab	C118.1	Apply working knowledge in making simple wood joints and fitting joints and simple sheet metal works.
	C118.2	Apply electrical working knowledge in making simple wirings.
	C118.3	Apply knowledge for computer assembling and software installation and how to solve the trouble shooting problems.
	C118.4	Apply the tools for preparation of PPT, Documentation and budget sheet etc.
Mathematics - II	C121.1	Solve system of linear algebraic equations and apply Eigen value computation technics to reduce a given quadratic to canonical form.
	C121.2	Solve algebraic and Transcendental equations by using Numerical methods.
	C121.3	Apply Newton's forward and backward interpolation and Lagrange's formula for equal and unequal intervals.
	C121.4	Compute numerical solutions of differential equations.
Mathematics - III	C122.1	Apply the concepts of vector calculus to the problems of work done by a force, circulation and flux.
	C122.2	Apply Laplace Transforms to solve the ordinary differential equations.
	C122.3	Compute Fourier series of the periodic function and Apply Fourier transform to a range of non-periodic function.
	C122.4	Solve the first and higher order partial differential equations and apply to various physical problems.
Applied Physics	C123.1	Analyze the intensity variation of light due to interference & diffraction and illustrate the resolving power of various optical instruments.
	C123.2	Explain fundamental concepts of quantum mechanics and apply to one dimensional motion of particles.
	C123.3	Explain various electron theories and summarize various types of solids based on band theory.
	C123.4	Understand how electrons & holes behave in semiconductor and explain how they conduct current.
	C123.5	Summarize magnetic & dielectric material properties and recognize their need in engineering applications.
Programming For Problem Solving Using C	C124.1	Describe the concept of computer system, analyze a given problem, develop an algorithm, fundamental programming constructs, identify data representation formats, and describe operators and their precedence, associativity.
	C124.2	Understand branching and loop statements.
	C124.3	Describe the concept of homogeneous derives data types, strings and functions.
	C124.4	Understand pointers and heterogeneous data types.
	C124.5	Describe the concept of file system and functions.

Digital Logic Design	**C125.1**	Describe various number systems, their conversions & various codes.
	C125.2	Apply minimization techniques to simplify Boolean functions.
	C125.3	Analyze the combinational logic to solve the Digital Design problems.
	C125.4	Evaluate Digital Design problems using sequential logic.
	C125.5	Design Synchronous & Asynchronous circuits using combinational & sequential logic.
Applied Physics Lab	**C126.1**	Apply the knowledge of different phenomena of light like interference, diffraction and handle various optical measuring instruments.
	C126.2	Analyze various electronic circuits and study the temperature dependence of semiconductors.
	C126.3	Draw the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments.
Communication Skills Lab	**C127.1**	Recognize the sounds of English with the help of audio visual aids.
	C127.2	Build confidence and overcome inhibitions while speaking in English.
	C127.3	Demonstrate acquired language skills in performing the designated activity.
Programming for Problem Solving Using C Lab	**C128.1**	Describe the basics of computers and understand the problem-solving aspect.
	C128.2	Design and develop C program to evaluate simple expressions and logical operations.
	C128.3	Develop & Implement C programs with suitable modules to solve the given problem.
	C128.4	Demonstrate the concept of pointer and perform I/O operations in files.
Engineering Exploration Project Lab	**C129.1**	Explore multiple fields of engineering
	C129.2	Ability to recognize basic requirements of project work.
	C129.3	Apply the engineering design process to investigate and solve ill-defined problems.
Discrete Mathematical Structures	**C211.1**	Understand the fundamentals and various algorithms, theorems, Graphs of DMS.
	C211.2	Apply various algorithms, theorems, Graphs to solve problems in DMS.
	C211.3	Evaluate various conditions/Statements/problems using the concepts in DMS.
Principles of Software Engineering	**C212.1**	Understand basic concepts of software engineering, phases of software development in common process models, unified and agile process models.
	C212.2	Apply various engineering practices such as requirements analysis and specification, modeling, code analysis, testing, and quality assurance strategies for developing software.
	C212.3	Analyze the gathered requirements for creating various requirement models.
	C212.4	Prepare the architectural design, components level design, interface design and acquire skills to design and implement test cases at the Unit and Integration level.
Python Programming	**C213.1**	Develop essential programming skills in computer programming concepts like data types, containers.
	C213.2	Apply the basics of programming in the Python language.
	C213.3	Solve coding tasks related conditional execution, loops.
	C213.4	Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming.
Data Structures	**C214.1**	Understand basic concepts of sorting, searching, linear and non-linear data Structures and algorithms.
	C214.2	Apply the different linear and non-linear data structures, sorting and searching algorithms to various computing problems.

	C214.3	Analyze the performance of various data structures, sorting and searching algorithms.
	C214.4	Evaluate the linear and no linear data structures in a given application.
Computer Organization	C215.1	Understand the functional architecture of computing systems.
	C215.2	Identify, compare and assess issues related to bus, memory, Control and I/O functions.
	C215.3	Correlate and analyze the operations carried out in Processing Unit.
	C215.4	Design solutions in the area of computer architecture.
Object Oriented Programming through C++	C216.1	Student will be able to Understand the concepts of object-oriented programming and basic structure of C++ programming.
	C216.2	Apply the concepts of OOP.
	C216.3	Apply C++ programs with reusability concept.
	C216.4	Apply the concepts of Exceptions Handling, templates & STL.
Python Programming Lab	C217.1	Write, Test and Debug Python Programs.
	C217.2	Use Conditionals and Loops for Python Programs.
	C217.3	Use functions and represent Compound data using Lists, Tuples and Dictionaries.
	C217.4	Use various applications using python.
Data Structures through C++ Lab	C218.1	Understand basic data structures such as arrays, linked lists, stacks and queues.
	C218.2	Implement and know the application of algorithms for sorting and Searching.
	C218.3	Ability to design programs using a variety of data structures such as stacks, queues, binary trees, search trees, heaps and graphs.
	C218.4	Implement ADTs such as lists, graphs, and search trees in C to solve problems.
Probability and Statistics	C221.1	Ability to solve various problems regarding probability and conditional probability.
	C221.2	Ability to solve random variables Examine, analyze and compare probability distributions.
	C221.3	Ability to Prepare null and alternative hypothesis and test its validity based on random sample.
	C221.4	Ability to solve various types of regression problems and various queuing model.
Java Programming	C222.1	Understand the java programming constructs, control Structures, classes, objects, methods, arrays, inheritance, interfaces, packages, exception handling, string handling, multi-threaded programing and data base connectivity.
	C222.2	Apply the java programming constructs, control structures, classes, objects, methods, arrays, inheritance, interfaces, packages, exception handling, string handling, multi-threaded programing and data base connectivity for a given scenario.
	C222.3	Analyze the java programming constructs, control structures, arrays, inheritance, interfaces, exception handling, string handling and multi-threaded programing.
	C222.4	Recommend the best suitable java construct/concept for a given application/problem.
Operating Systems	C223.1	Understand OS evaluation, its structure and services, process concepts, deadlocks concepts, virtual memory, memory management strategies, process synchronization, threads, file systems, system protection & security.
	C223.2	Apply process scheduling policies, mechanisms, process synchronization, inter process communications, threads scheduling, disk scheduling, file concepts, deadlocks concepts, page replacement algorithms, system protection, system security, paging and segmentation techniques in memory management.

	C223.3	Analyze various CPU scheduling, disk scheduling, dead lock, memory allocation, replacement algorithms, system protection, system security, IPC Communications, file concepts, threads concepts.
	C223.4	Evaluate process scheduling, replacement algorithms; file system and implementation issues, disk scheduling, UNIX/LINUX/WINDOWS OS platforms and other process subsystem related concepts.
Database Management Systems	C224.1	Understand the basic concepts of Data Base, Relational Model, Transaction Management and Concurrency Control, Crash Recovery, Filing and Indexing Techniques.
	C224.2	Apply ER Model for designing Conceptual Data Base and Relational Model for designing Logical Data Base.
	C224.3	Analyze the concepts of Relational Model, Schema Refinement and Normalization.
	C224.4	Design Data Base applications using SQL Queries.
Theory of Computation	C225.1	Understand the fundamental concepts of automata and their languages, grammars.
	C225.2	Apply the concept of pumping lemma to prove that the language is not a regular or context free language.
	C225.3	Analyze a given automata machine and can find out its language.
	C225.4	Design various automata's, FA, PDA for the given language and its grammar.
	C225.5	Design Turing Machine for any given computational problem.
Java Programming Lab	C226.1	Evaluate default value of all primitive data type, Operations, Expressions, Control-flow, and Strings.
	C226.2	Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism.
	C226.3	Illustrating simple inheritance, multi-level inheritance, Exception handling mechanism.
	C226.4	Construct Threads, Event Handling, implement packages, developing applets.
UNIX Operating Systems Lab	C227.1	Understand the fundamentals of UNIX commands and System calls.
	C227.2	Apply the synchronization concepts using shared memory, semaphores for the given problem.
	C227.3	Apply deadlock avoidance and detection algorithms and various concepts of file systems.
	C227.4	Analyze various thread concepts, CPU scheduling algorithms, and memory management concepts.
Database Management Systems Lab	C228.1	Apply the database concepts, technology and create the relations by specifying primary and foreign keys.
	C228.2	Construct a database by using data definition, data manipulation and control languages.
	C228.3	Build PL/SQL programs including stored procedures, functions, cursors and Triggers.
	C228.4	Design a Database application and retrieve the values with the help of queries using SQL.
Socially Relevant Project	C229.1	Use scientific reasoning to gather, evaluate, and interpret ideas.
	C229.2	Analyze and design solutions to solve the ideas.
	C229.3	Use one or more creative tools to complete the projects.
Advanced Data Structures	C311.1	Understand the concepts of advance data structures like external sorting methods, hashing, queues and trees.
	C311.2	Apply the various advanced data structures in consideration with space and time complexity, and cost amortization.
	C311.3	Apply advanced data structures such as balanced search trees, hash tables, priority queues and trees for various problems.
	C311.4	Analyze the given problems using various advanced data structures by considering the advantages and disadvantages of different solutions.

Computer Networks	**C312.1**	Understand the Physical Layer concepts of OSI reference Models.
	C312.2	Apply the Data link Layer concepts of OSI reference Models.
	C312.3	Apply the OSI and TCP/IP Models for a given Problem.
	C312.4	Analyze the concepts of OSI, and TCP/IP Models.
Compiler Design	**C313.1**	Understand the major phases of compilation and to understand the knowledge of Lex tool & YAAC tool.
	C313.2	Apply the parsers and experiment the knowledge of different parsers design without Automated tools.
	C313.3	Construct the intermediate code representations and generation.
	C313.4	Analyze the source code for a novel language into machine code for a novel computer.
	C313.5	Evaluate the various optimization techniques for compile time.
Artificial Intelligence	**C314.1**	Understand Basics of Artificial Intelligence.
	C314.2	Apply and analyze various strategies of problem solving, problem reductions and game playing.
	C314.3	Analyze logic concepts and various ways of knowledge representation and advanced knowledge representation techniques.
	C314.4	Identify advanced topics of AI such as expert systems and applications, uncertainty measure, Fuzzy sets and Fuzzy logic.
Software Testing Methodologies	**C315.1**	Understand STM terminology, Methodology, Verification and Validation.
	C315.2	Apply Black box and White box testing methods to write test cases.
	C315.3	Identify regression and static, dynamic testing techniques.
	C315.4	Identify concepts of Efficient Test Suit Management, Software Quality Management and Automation testing, Testing of Object Oriented software and Web based Systems.
Design and Analysis of Algorithms	**C316.1**	Understand various algorithmic approaches and their notations for denoting performance of an algorithm, basics of sets and traversal search techniques; understand NP-Complete theory and lower bound theory.
	C316.2	Apply various algorithmic approaches like divide and conquer, greedy, dynamic programming, backtracking and branch & amp; bound to solve problems.
	C316.3	Apply graph search and string matching algorithms to real world problems.
	C316.4	Analyze the performance of a given algorithm and denote its time complexity using asymptotic notations.
Computer Networks & Compiler Design Lab	**C317.1**	Implement various protocols using TCP and UDP.
	C317.2	Compare the performance of different transport layer protocols.
	C317.3	Use simulation tools to analyze the performance of various network protocols.
	C317.4	Analyze various routing algorithms.
	C317.5	Implement error correction codes.
	C317.6	Implement parsers.
AI Tools & Techniques Lab	**C318.1**	Understand the basics and functionality of Prolog programming.
	C318.2	Apply various prolog concepts to evaluate AI related algorithm A*, AO*, BFS, DFS etc.
	C318.3	Analyze various problems like monkey banana, towers of Hanoi, travelling salesman, medical diagnosis etc., using AI techniques.

	C318.4	Evaluate complex problems using AI techniques.
Data Warehousing and Data Mining	C321.1	Understand the process of Knowledge Discovery of Databases and the architectures.
	C321.2	Apply the preprocessing techniques like cleaning, integration, reduction, transformation and discretization.
	C321.3	Apply the various data mining techniques like frequent pattern and association rule mining techniques, classification and clustering techniques for the given data to be mined.
	C321.4	Analyze the given data using various mining methodologies and techniques to mine and discover interesting patterns for decision support.
Renewable Energy Sources	C322.1	Analyze Solar radiation data & Radiation on Tilted surfaces.
	C322.2	Design of Photovoltaic systems and Implementation of MPPT.
	C322.3	Identify various components of WEC system and Implementation of MPPT to Wind farms.
	C322.4	Compare various Hydro systems and Tidal, Wave power generators.
	C322.5	Illustrate Biomass Combustion Systems and Fuel cell, Geothermal based power generation.
Web Technologies	C324.1	Illustrate the basic concepts of HTML, CSS, JS and PHP, Servlets, Jsp & apply those concepts to design web pages.
	C323.2	Identify and understand various concepts related to dynamic web pages and validate them using web concepts like JavaScript.
	C323.3	Outline the concepts of Extensible Mark-up language & AJAX.
	C323.4	Develop and Analyze dynamic Web Applications using PHP, Servlets, Jsp and MySql.
	C323.5	Illustrate the basic concepts of Web development frameworks Ruby on Rails and Mango DB and JQuery.
Software Project Management	C324.1	Understand the concepts of project management & planning.
	C324.2	Apply the process to be followed in the software development life-cycle models.
	C324.3	Analyze the project plans through managing people, communications and conduct activities necessary.
	C324.4	Develop communication, modeling, and construction & deployment practices in software development.
Managerial Economics and Financial Accountancy	C325.1	Understand the fundamental concepts of managerial economics, production & cost analysis, markets & pricing strategies, accounting & financing analysis and capital budgeting.
	C325.2	Apply production cost analysis, capital budgeting, financial analysis techniques in evaluating various investment opportunities.
	C325.3	Analyze the various aspects of managerial economics, production & cost analysis, markets & pricing strategies, accounting & financing analysis and capital budgeting.
	C325.4	Evaluate the performance evaluation of production cost analysis, financial statements and investment project proposals with the help of accounting tools and capital budgeting techniques.
Web Technologies Lab	C326.1	Illustrate the concepts of HTML, CSS, JS and PHP, Servlets, Jsp & apply those concepts to design web pages.
	C326.2	Identify and apply various concepts related to dynamic web pages and validate them using web concepts like JavaScript.
	C326.3	Develop and Analyze dynamic Web Applications using PHP, Servlets, Jsp and MySql.
Data Mining Lab	C327.1	Understand the functionality of R by using add-on packages.
	C327.2	Apply various statistical functions and examine data from files and other sources and perform various data manipulation

		tasks on them.
	C327.3	Apply preprocessing techniques and mining methods to extract knowledge using R Graphics and Tables to visualize the results.
	C327.4	Analyze the data for real life applications.
Industrial Training	C328.1	Understand the organizational structure of a company.
	C328.2	Develop knowledge of contemporary issues.
	C328.3	Develop written communication and technical report writing skills.
	C328.4	Develop work habits and attitudes necessary for job success.
Cryptography and Network Security	C411.1	Understand various cryptographic techniques and network security algorithms.
	C411.2	Apply various cryptographic techniques and network security algorithms for given scenario.
	C411.3	Analyze various cryptographic techniques and network security algorithms for a given network applications.
	C411.4	Evaluate various cryptographic techniques and network security algorithms for a given network applications.
Machine Learning	C412.1	Understand learning concept and identify problems relevant to machine learning.
	C412.2	Describe issues in decision tree learning and Experimental Evaluation of Learning Algorithms, the theory of Artificial intelligence and Support Vector Machine.
	C412.3	Apply Dimensionality reduction techniques and Rule Learning in Machine Learning.
	C412.4	Implement the concepts of Bayesian Learning and Instance based Learning.
Advanced Computer Networks	C413.1	Understand the Network Layer, Transport Layer and Application Layer Principles.
	C413.2	Describe the QOS Techniques like Scheduling, Traffic shaping and Admission control.
	C413.3	Apply the various routing algorithms, Sub netting and Addressing of IP V4and IPV6.
	C413.4	Analyze the various Network Layer, Transport Layer and Application Layer Principles in network design and implementation.
Embedded Systems	C414.1	Understand the concepts of ES components, hardware, software, firmware, Embedded OS, RTOS, interrupts, Programming components of Embedded C, design and integration, testing tools.
	C414.2	Apply the concepts of design and integration with the help of Embedded OS principles and Embedded C, ISR programming and communication between components, testing techniques and tools.
	C414.3	Compare various microprocessor and microcontroller families, RTOS and Embedded OS design methodologies, ISR handling functions, hardware, software, firmware integration techniques, different testing tools.
	C414.4	Analyze different Embedded applications, concepts and constructs using different versions and configurations of microprocessor and micro controllers in real time with various implementations.
Cloud Computing	C415.1	Understand knowledge of different aspects of Cloud Computing such as: Services, Models and Challenges.
	C415.2	Identify the Infrastructure of Cloud Computing and also make use of the different Cloud Computing Applications and Paradigms.
	C415.3	Analyze the importance of Cloud Resourcing Virtualization and Cloud Resourcing and Scheduling.
	C415.4	Summarize Cloud based Storage and need of Security in Cloud Computing.
	C415.5	Outline the Development of Cloud-based applications like Google and Microsoft.

Distributed Systems	**C416.1**	Understand the foundations of Distributed systems concepts, inter process communication, remote invocation and transaction management techniques.
	C416.2	Apply various Synchronization issues and global state for distributed systems.
	C416.3	Implement various mutual exclusion and deadlock detection algorithms and fault tolerance mechanisms in distributed systems.
	C416.4	Analyze various IPC techniques, concurrency and transaction recovery techniques.
Unified Modeling Language Lab	**C417.1**	Understand the modeling tools like IBM Rational Rose/Star UML.
	C417.2	Analyze the requirements and create Use Case scenario of an application.
	C417.3	Develop Use Case, Class, Activity, Sequence, State, Component and Deployments diagrams.
	C417.4	Design simple applications and models.
Project – I	**C418.1**	Understand software engineering process models to solve complex problems.
	C418.2	Able to gather and document the requirements of the real world problems.
	C418.3	Design architecture of the application and develop the data store layout by utilizing modern tools.
	C418.4	Develop solutions using programming languages.
	C418.5	Develop the team work and leadership skills with professional and ethical values.
Management and Organizational Behaviour	**C421.1**	Understand the concepts related to Management functions, Global leadership and Organizational structure.
	C421.2	Understand the concept of functional management.
	C421.3	Examine simple problems like Value Chain, SWOT and Strategic Management.
	C421.4	Practice to build positive attitude through personality development and motivational theories and think strategically through contemporary management practices.
	C421.5	Implement the group performance and grievance handling in managing the organizational culture.
Enterpreneur-ship	**C422.1**	Explain the concept, meaning and features of entrepreneurs.
	C422.2	Infer the entrepreneual environment & Policies of central and state government.
	C422.3	Interpret the business plan preparation from sources to evaluation.
	C422.4	Analyze the entrepreneurship as a career option.
	C422.5	Discuss the management of small business in all aspects.
Blockchain Technologies	**C423.1**	Outline the Basic and advanced concepts in Blockchain.
	C423.2	Identify the Architecting Blockchain solutions for various applications.
	C423.3	Review the Ethereum Blockchain implementations.
	C423.4	Discuss the Hyperledger Blockchain implementation.
Project- II	**C424.1**	Understand software engineering process models to solve complex problems.
	C424.2	Gather and document the requirements of the real world problems.
	C424.3	Design architecture of the application and develop the data store layout by utilising modern tools.
	C424.4	Develop solutions using programming languages.
	C424.5	Develop the team work and leadership skills with professional and ethical values.

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Information Technology
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