SIR C.R.REDDY COLLEGE OF ENGINEERINGELURU-534007, WEST GODAVARI DIST, A P., INDIA

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DEPARTMENT OF COMPUTER SCIENCENDENGINEERING

COURSE	C.O 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	Solve the Differential Equations of first and higher order related to various engineering applications.
	C112.2	Apply Laplace Transforms to solve linear differential equations with constant coefficients.
	C112.3	Apply the knowledge of partial differentiation techniques to solve physical problem like maxima and minima of functions.
	C112.4	Solve the first and higher order of partial differential equations and apply to various engineering problems
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	C114.1	Interpret how the computer is works.

Science	C114.2	Implement appropriate methods for solving problems
	C114.3	Examine the computer networks, types of network and topologies.
	C114.4	Demonstrate the concepts of Operating systems and Computer Systems Development
	C114.5	Demonstrate the concepts of Databases.
	C114.6	Organize the advanced computer technologies like distributed computing & wireless networks
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.
English Language 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.
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.
	C117.1	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	C118.1	Assemble and disassemble components of a PC
	C118.2	Construct a fully functional virtual machine, Summarize various Linux operating system commands,
	C118.3	Secure a computer from cyber threats, Learn and practice programming skill in Github, Hackerrank,
		Codechef, HackerEarth etc.
	C118.4	Recognize characters & extract text from scanned images, Create audio files and podcasts
	C118.5	Create video tutorials and publishing, Use office tools for documentation, Build interactive presentations, Build websites, Create quizzes & analyze responses.
Mathematics II	C119.1	Apply the concept of vector differentiation and to find scalar potential.
	C119.2	Apply the concept of vector integration theorems to find scalar potential.
	C119.3	Understand and Apply the partial differentiation in physical problem
	C119.4	Apply the concept of Fourier transform to evaluate the given integral
Mathematics III	C120.1	Apply the concepts of vector calculus to the problems of work done by a force, circulation and flux
	C120.2	Apply Laplace Transforms to solve the ordinary differential equations
	C120.3	Compute Fourier series of the periodic function and Apply Fourier transform to a range of non-periodic function.
	C120.4	Solve the first and higher order partial differential equations and apply to various physical problems
Applied Physics	C121.1	Analyze the intensity variation of light due to interference & diffraction and illustrate the resolving power of various optical instruments
	C121.2	Explain fundamental concepts of quantum mechanics and apply to one dimensional motion of particles.
	C121.3	Explain various electron theories andsummarize various types of solids based on band theory.
	C121.4	Understand how electrons & holes behave in semiconductor and explain how they conduct current.
	C121.5	Summarize magnetic & dielectric material properties and recognize their need in engineering applications.

Programming for Problem Solving Using C	C122.1	Describe the concept of computer system, analyze a given problem, develop an algorithm, fundamental programming constructs, identify data representation formats, describe operators and their precedence, associativity.
	C122.2	Understand branching and loop statements.
	C122.3	Describe the concept of homogeneous derives data types, strings and functions.
	C122.4	Understand pointers and heterogeneous data types.
	C122.5	Describe the concept of file system and functions.
Digital Logic Design	C123.1	Describe various number systems, their conversions & various codes
	C123.2	Apply minimization techniques to simplify Boolean functions.
	C123.3	Apply the combinational logic to solve the Digital Design problems
	C123.4	Evaluate Digital Design problems using sequential logic.
	C123.5	Design Synchronous & Asynchronous circuits using combinational & sequential logic
Applied Physics Lab	C124.1	Apply the knowledge of different phenomena of light like interference, diffraction and handle various optical measuring instruments.
	C124.2	Analyze various electronic circuits and study the temperature dependence of semiconductors.
	C124.3	Draw the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments
Communication Skills Lab	C125.1	Recognize the sounds of English with the help of audio visual aids
	C125.2	Build confidence and overcome inhibitions while speaking in English.
	C125.3	Demonstrate acquired language skills in performing the designated activity.

Programming for Problem Solving Using C lab	C126.1	Understand various computer components, Installation of software. C programming development environment, compiling, debugging, and linking and executing a program using the development environment.
	C126.2	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs.
	C126.3	Construct programs that demonstrate effective use of C features including arrays, strings, structures, pointers and files.
	C126.4	Apply and practice logical ability to solve the real world problems.
Engineering exploration	C127.1	understand various tools regarding projects
project	C127.2	apply innovative thinking in inventing new things
	C127.3	Analyzing the applications in projects
	C127.4	Apply the mathematical logic and different proof methods to validate the arguments.
MFCS	C211.1	Identify and apply operations on discrete structures such as sets, relations and algebraic structures in different areas of computing.
	C211.2	Apply the counting techniques and principles of number theory to solve Combinatorial and problems of computer science.
	C211.3	Solve the complex problems using the recurrence relations.
	C211.4	Apply concepts of graphs and trees to Design algorithms for real world problems and find Solutions with optimal complexity.
SOFTWARE ENGINEERING	C212.1	Understand basic concepts of software engineering, evolution of software and process patterns.
	C212.2	Apply various agile software methods and principles
	C212.3	Analyze the principles of requirement Engineering.
	C212.4	Create architectural design and components for the project.
	C212.5	Apply different testing techniques.

PYTHON PROGRAMMING	C213.1	Apply various agile software methods and principles.
	C213.2	Identify and apply operations on discrete structures such as sets, relations and algebraic structures in different areas of computing.
	C213.3	Apply the counting techniques and principles of number theory to solve Combinatorial and problems of computer science.
	C213.4	Solve the complex problems using the recurrence relations.
DATA STRUCTURES	C214.1	Apply concepts of graphs and trees to Design algorithms for real world problems and find Solutions with optimal complexity.
	C214.2	Object oriented paradigms are useful to solve various software engineering problems.
	C214.3	Linked lists, stacks, queues are needed to implement various other structures to solve software engineering problems
	C214.4	Searching trees are useful to finding solutions to various problems
	C214.5	Minimum spanning trees are useful for designing Local area networks with reduced cost.
COMPUTER ORGANIZATION	C215.1	Sorting and searching techniques are useful for various software engineering problems.
	C215.2	Understand the principles and implementation of Computer Arithmetic and organization of Basic Computer system.
	C215.3	Describe the operations of Register Transfer Language and Micro operations in Basic Computer organization
	C215.4	Describes the architecture of Central Processing Unit and Micro programmed Controlled unit.
	C215.5	Understand the Memory system and I/O Organization

OBJECT ORIENTED PROGRAMMING	C216.1	Illustrate Concepts of Parallel Processing, Pipelining and inter process communication
	C216.2	Differentiate object-oriented programming and procedural programming languages.
	C216.3	Apply C++ features such as composition of objects, operator overloading, dynamic memory allocation, inheritance, and polymorphism.
	C216.4	Apply generic programming with templates and exception handling mechanism.
DATA STRUCTURES LAB	C217.1	Apply the various OOPs concepts with the help of programs.
	C217.2	Implementation of Binary search tree and tree traversal.
	C217.3	Implement of stacks and queues using arrays and linked lists
	C217.4	Implementation of Different Searching and Sorting techniques.
PYTHON PROGRAMMING LAB	C218.1	Apply and practice logical ability to solve the problems.
	C218.2	Analyzing the complexity of problems, Modularize the problems into small modules and then convert theminto programs
	C218.3	Apply the in-built functions and customized functions for solving the problems
PROBABILITY ANDSTATISTICS	C219.1	Apply concepts of graphs and trees to Design algorithms for real world problems and find Solutions with optimal complexity.
	C219.2	Classify the concepts of data science and its importance
	C219.3	Solve various problems on Correlation and regression equations.
	C219.4	Apply the concepts of Discrete and continuous probability distributions

JAVA PROGRAMMING	C220.1	Apply null and alternative hypothesis tests to solve random samples.
	C220.2	Apply OOPs concepts and basics of java programming to simplifies software development.
	C220.3	Solve the inter-disciplinary applications using the concept of inheritance and interfaces.
	C220.4	Develop error free applications using exception handling mechanisms and multi tasking applications using multithreading concepts.
OPERATING SYSTEM	C221.1	Create interactive JDBC applications for standalone and Internet with database connectivity.
	C221.2	Understand the basic principles of operating systems.
	C221.3	Analyze the process management policies, synchronization and its scheduling by CPU.
	C221.4	Analyze the memory management and its allocation policies.
	C222.1	Identify the mechanisms used for prevention and detection of deadlocks and File systems
DATABASE MANAGEMENT SYSTEMS	C222.2	Interpret the fundamentals of DBMS
	C222.3	Analyze DB design methodology and normalization process
	C222.4	Understand ER concepts and Develop Queries in RDBMS
FORMAL LANGUAGES AND AUTOMATA THEORY	C223.1	Compare and Contrast various transaction and concurrency management techniques
	C223.2	Students can Able to Design Finite Automata for different language classes and can apply techniques to find the equivalency and minimal forms of a Finite Automata.
	C223.3	Students can Able To Design Regular Expressions for different set of Languages and can construct Finite Automaton for the languages. And also can apply pumping lemma to identify non regular languages.
	C223.4	Students can Able To Construct context free grammar for various languages and apply Context Free Grammars to solve problems in computer science.
	C223.5	Students can Able To solve various problems in computer science by applying normal form techniques and push down automata.

PROFESSIONAL ETHICS AND HUMAN VALUES	C224.1	Students can Able To design Turing machines and apply them to solve complex problems. Can also able to identify the different computational problems and their associated complexity.
	C224.2	Identify and apply operations on discrete structures such as sets, relations and algebraic structures in different areas of computing.
	C224.3	Apply the counting techniques and principles of number theory to solve Combinatorial and problems of computer science.
	C224.5	Solve the complex problems using the recurrence relations.
SR PROJECT	C225.1	Apply concepts of graphs and trees to Design algorithms for real world problems and find Solutions with optimal complexity.
	C225.2	Identify and apply operations on discrete structures such as sets, relations and algebraic structures in different areas of computing.
	C225.3	Apply the counting techniques and principles of number theory to solve Combinatorial and problems of computer science.
	C225.3	Solve the complex problems using the recurrence relations.
JAVA PROGRAMMING LAB	C226.1	Apply concepts of graphs and trees to Design algorithms for real world problems and find Solutions with optimal complexity.
	C226.2	Develop programming skills in computer programming concepts in Java programming language.
	C226.3	Solve coding problems in Java language.
OPERATION SYSTEM AND UNIX LAB	C227.1	Solve coding problems related to OOP in Java language.
	C227.2	Demonstrate the fundamental UNIX commands & system calls.
	C227.3	Apply the scheduling algorithms for the given problem.
	C227.4	Apply the process synchronization concept using shared memory, semaphores for the given situation.
	C227.5	Experiment an algorithm to detect and avoid dead lock.
	C228.1	Apply the various methods used for memory management and page replacement algorithm

DATABASE MANAGEMENT LAB	C228.2	Able to create database with different types of integrity constraints and use the SQL commands.
	C228.3	Able to use database security and authorization to access database for the different kinds of the user.
	C228.4	Develop an Entity-Relationship Model with the appropriate entireties, attributes, relationships and connectivity.
	C228.5	Able to access and manipulate data using PL/SQL blocks.
	C228.6	Able to connect database to front end using JDBC and ODBC driver.
DATAWARE HOUSING AND DATA MINING	C311.1	Design a Data warehouse system and perform business analysis with OLAP tools
	C311.2	Apply suitable pre-processing and visualization techniques for data analysis.
	C311.3	Apply frequent pattern and association rule mining techniques for data analysis.
	C311.4	Apply appropriate classification techniques for data analysis.
	C311.5	Apply appropriate clustering techniques for data analysis.
COMPUTER NETWORKS	C312.1	Illustrate OSI and TCP/IP Models and basics of physical layer and their issues.
	C312.2	Demonstrate Data Link layer issues and MAC sub layers concepts
	C312.3	Demonstrate the basic concepts of Error Detection and LAN & PAN Technologies.
	C312.4	Analyze and implement the algorithms of network and transport layers and concerned services
	C312.5	Apply and execute the concepts of TCP, UDP and the application layer conceptions
COMPILERDESIGN	C313.1	Explain different phases of compilation with Design of lexical analyzer for a language.
	C313.2	Compare top down with bottom up parsers, and develop appropriate parser to produce parse tree representation of the input.
	C313.3	Apply optimization techniques to intermediate code for statements and generate machine code for highlevel language program.
	C313.4	Design syntax directed translation schemes for a given context free grammar and generate symbol tablesfor runtime environment

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 and Fuzzy sets and Fuzzy logic
SOFTWAR E TESTINGMETHODO LIGIES	C315.1	Apply software testing knowledge and engineering methods and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
	C315.2	Write test cases for given software to test it before delivery to the customer and write test scripts for both desktop and web based applications
	C315.3	Design and conduct a software test process for a software project.
	C315.4	Analyze the needs of software test automation.
ES-II	C316.1	Recite the corporate etiquette.
	C316.2	Make presentations effectively with appropriate body language
	C316.3	Apply their core competencies to succeed in professional and personal life
COMPUTER NETWORKSLAB	C317.1	Apply the basics of Physical layer and transport layer in real time applications
	C317.2	Apply data link layer concepts, design issues, and protocols
	C317.3	Apply Network layer routing protocols and IP addressing
	C317.4	Implement the functions of Application layer and Presentation layer paradigms and Protocols

ARTIFICIAL INTELLIGENCE LAB	C318.1	Understand the basics and functionality of PROLOG programming
	C318.2	Apply PROLOG concepts to solve basic problems
	C318.3	Implement various AI methods like A* algorithm, DFS, BFS for water jug problem, Towers of Hanoi Problem, and Hill climbing in PROLOG.
	C318.4	Design various programs such as Monkey Banana problem, medical diagnosis, Travelling Sales man problem.
DATA MININGLAB	C319.1	Apply the knowledge of R by using add-on packages.
	C319.2	Use R Graphics and Tables to visualize results of various statistical operations on data.
	C319.3	Demonstrate various data mining tasks (classification and clustering) on the given data sets.
	C319.4	Apply the knowledge of R gained to data Analytics for real life applications
WEB TECHNOL OGIES	C321.1	Design the static web page using HTML and CSS.
	C321.2	Design the dynamic web page using Java Script.
	C321.3	Prepare XML documents to store and transport data.
	C321.4	Build Dynamic website using PHP Programming and Database Connectivity.
	C321.5	Implement the Programs in RUBY.
DISTRIBUTED SYSTEMS	C322.1	Elucidate the foundations and issues of distributed systems
	C322.2	Illustrate the various synchronization issues and global state for distributed systems
	C322.3	Illustrate the Mutual Exclusion and Deadlock detection algorithms in distributed systems
	C322.4	Describetheagreementprotocolsandfaulttolerancemechanismsindistributedsystems
	C322.5	Describethefeaturesofpeer-to-peeranddistributedsharedmemorysystems

DESIGN AND ANALYSIS OF ALGORITHMS	C323.1	Understand fundamentals of algorithms and analyze efficiency of algorithms.
	C323.2	Apply Divide & Conquer and Greedy methods to design an algorithm for a problem.
	C323.3	Apply Dynamic Programming technique to design an algorithm for a problem.
	C323.4	Analyze algorithms for problems using various algorithmic methods such as Branch and bound, backtracking.
	C323.5	Apply NP completeness theory and String Matching technique to design an algorithm for a problem
POC	C324.1	Analyze the performance of analog modulation schemes in time and frequency domains.
	C324.2	Analyze the performance of angle modulated signals.
	C324.3	Characterize analog signals in time domain as random processes and noise
	C324.4	Determine the performance of analog communication systems in Presence of Noise
	C324.5	Analyze pulse modulation techniques and TDM system
IRS	C325.1	Apply IR principles to locate relevant information large collections of data
	C325.2	Design different document clustering algorithms
	C325.3	Implement retrieval systems for web search tasks.
	C325.4	Design an Information Retrieval System for web search tasks.
WEB TECHNOLOGIES LAB	C326.1	Design the static web page using HTML and CSS.
	C326.2	Design the dynamic web page using Java Script.
	C326.3	Prepare XML documents to store and transport data.
	C326.4	Build Dynamic website using PHP Programming and Database Connectivity.
		Develop and Analyze dynamic Web Applications using PHP & MySql, Install & Use Frameworks

CRYPTOGRAPHYAND NETWORK SECURITY	C411.1	Understand the basic principles of cryptography.
	C411.2	Apply the functionality of secret and public key cryptography.
	C411.3	Apply various message authentication functions and secure algorithms.
	C411.4	Understand the different levels of security and services.
UML AND DESIGN PATTERNS	C412.1	Understand the fundamentals of different unified process models.
	C412.2	Create user and programmatic interaction using UML.
	C412.3	Identify the appropriate design pattern to solve OOD problems.
	C412.4	Develop design solution using creational pattern and apply structural pattern tosolve design problem.
	C412.5	Construct design solution by using behavioral pattern.
MACHINE LEARNING	C413.1	Understand learning concept and identify problems relevant to Machine Learning
	C413.2	Apply decision tree learning and Experimental Evaluation of Learning
	C413.3	Understand the concepts of Computational Learning. and Rule Learning
	C413.4	Understand the theory of Artificial Intelligence and Support Vector Machine
	C413.5	Apply Bayesian learning and Instance based learning
EMBEDDEDSYSTEMS	C414.1	Understand the basic concepts of an embedded system and ableto know an embedded system design approach to perform a specific function.
	C414.2	Analyze to understand different concepts of communication interface, timers & counter, analog anddigital electronic components required for an embedded hardware design
	C414.3	Make use of various embedded firmware design approaches, development languages and interrupts on embedded environment.
	C414.4	Understand how to integrate hardware and firmware of an embedded system using real time operating system..
	C414.5	Analyze and develop embedded software development life cycles andtools including testing..

SOFTWARE PROJECT MANAGEMENT	C415.1	Apply the process to be followed in the software development life-cycle models
	C415.2	Apply the concepts of project management & planning.
	C415.3	Implement the project plans through managing people, communications and change.
	C415.4	Conduct activities necessary to successfully complete and close the Software projects.
CLOUD COMPUTING	C416.1	Understand knowledge of different aspects of Cloud Computing such as: Services, Models, and Challenges.
	C416.2	Identify the Infrastructure of Cloud Computing and also Analyze the different Cloud Computing Applications and Paradigms.
	C416.3	Analyze the importance of Cloud Resourcing Virtualization and Cloud Resourcing and Scheduling.
	C416.4	Understand Cloud based Storage and need of Security in Cloud Computing
	C416.5	Understand the Development of Cloud-based applications like Google and Microsoft.
UML LAB	C417.1	Understand the Case studies and design the Model.
	C417.2	Understand how design patterns solve design problems
	C417.3	Develop design solutions using creational patterns.
PROJECT-1	C418.1	Identify the complex engineering problems relevant to the society and industry.
	C418.2	Apply critical and creative thinking in the design of engineering projects, Plan and manage your time effectively.
	C418.3	Gather knowledge over the field of research to identity the complex and real time problems.
	C418.4	Develop the team work and leadership skills with professional and ethical values.
IPR&P	C419.1	
	C419.2	
	C419.3	
	C419.4	

MANAGEMENT AND ORGANIZATI ONAL BEHAVIOUR	C422.1	Obtain Knowledge and management function Global leadership and Organisational structure
	C422.2	Understand the concept of functional management that is HR and marketing and management
	C422.3	To provide the basic awareness into select management practices and strategic management
	C422.4	To develop positive attitude through personality development and motivational theories
	C422.5	Ability to understand about the group performance and Grievance handling in and out of theorganization culture
ENTREPRENEURSHIP	C423.1	Gain the competency of preparing business plans
	C423.2	Get the awareness on industrial policies
	C423.3	Study the impact of launching small business
	C423.4	Understand the recourse planning and market selection for startups.
BID DATA ANLYTICS	C424.1	Illustrate Big Data Challenges in different domains including social media, transportation, finance and medicine
	C424.2	Use various techniques for mining data stream.
	C424.3	Design and develop Hadoop
	C424.4	Identify the characteristics of datasets and compare the trivial data and big data for various applications
	C424.5	Explore the various search methods and visualization techniques
PROJECT	C425.1	Identify the complex engineering problems relevant to the society and industry.
	C425.2	Apply modern technologies, tools, and systems in the field of information technology to analysethe identified problem.
	C425.3	Design and implement a viable solution to the problem.
	C425.4	Apply communication, report writing skills& Presentation skills.
	C425.5	Develop the teamwork and leadership skills with professional and ethical values.

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