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 COMPUTER SCIENCE AND ENGINEERING

COURSE	CO CODE	COURSE OUTCOMES
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

MATHEMATICS-II	C113.1	Solve algebraic and transcendental equations by using Numerical methods.
	C113.2	Apply the concepts of interpolation to numerical integration and solve the differential equations by using numerical methods.
	C113.3	Compute Fourier series of the periodic function and apply Fourier transform to a range of non-periodic function.
	C113.4	Solve the wave, heat and Laplace equations
APPLIED PHYSICS	C114.1	Apply the knowledge of different phenomena of light in daily life.
	C114.2	Characterize the coherent sources over ordinary sources and understand the polarization phenomenon, Lasers and their practical implications
	C114.3	Able to differentiate the properties of the materials based on the response in electric and magnetic fields.
	C114.4	Understand the electron transport mechanism in metals based on Quantum mechanics
	C114.5	Gain the basic knowledge in semiconductor physics.
COMPUTER PROGRAMMING	C115.1	summarize the knowledge on Computer Hardware, Software concepts, Writing Algorithms, Drawing Flowcharts, Writing, Compiling and Executing simple C programs in Linux environment.
	C115.2	Distinguishes branching, iteration and data representation using Arrays and Strings.
	C115.3	Constructs programs using Modular programming and Recursive solution formulation.
	C115.4	Explains working with pointers and how they are used to allocate memory dynamically and Uses miscellaneous aspects like enum, typedef, structure and union types in applications.

	C115.5	Demonstrate the operations on files
ENGINEERING DRAWING	C116.1	Construct polygons and draw curves used in engineering applications
	C116.2	Construct scales, Apply concept of orthographic projection to project points and lines parallel to one reference planes.
	C116.3	Produce orthographic projections of lines inclined to both the reference planes.
	C116.4	Produce orthographic projections of planes inclined to both the reference planes.
	C116.5	Produce orthographic projections of regular solids inclined to both the reference planes.
	C116.6	Represent objects in 3D view through isometric views from orthographic views and vice versa
	COURSE NAME:	
ENGLISH LAB	C117.1	Recognize the sounds of English with the help of audio visual aids
	C117.2	Build confidence and overcome inhibitions while speaking in English.
	C117.3	Demonstrate acquired language skills in performing the designated activity.
PHYSICS LAB	C118.1	Apply the knowledge of different phenomena of light like interference, diffraction and handle various optical measuring instruments.
	C118.2	Verify the laws of thermodynamics, electro magnetism and stretched string.
	C118.3	Draw the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments
	C1110.1	Describe the basics of computer and understand the problem solving aspect

COMPUTER PROGRAMMING LAB	C1110.2	Design and develop C program to evaluate simple expressions and logical operations.
	C1110.3	Develop and implement C programs with suitable modules to solve the given problem.
	C1110.4	Demonstrate the concept of pointer and pe form I/O operations in files
ENGLISH-II	C121.1	Apply the four languages learning skills-listening, speaking, reading, writing (LSRW) for professional success.
	C121.2	Employ knowledge of grammatical structures and vocabulary in speech and writing
	C121.3	Apply effective communication skills to enhance professional possibilities.
	C121.4	Develop acceptable personality traits suitable for chosen profession.
MATHEMATICS-III	C122.1	Solve system of linear algebraic equations and apply Eigen value computation technics to reduce a given quadratic to canonical form
	C122.2	Apply double and triple integrals to find areas and volumes.
	C122.3	Apply special functions to evaluate improper integrals
	C122.4	Apply the concepts of vector calculus to the problems of work done by a force, circulation and flux
APPLIED CHEMISTRY		
	C123.1	Identify the advantages and limitations of plastics, elastomers and their use in day to day life.
	C123.2	Identify the fuels which are commonly used and their economics, advantages and limitations.
	C123.3	Select the suitable methods of corrosion control and gain the knowledge of applications of batteries.

	C123.4	Recognize the need of nano materials, green synthesis, liquid crystals, Superconductors and their uses.
	C123.5	Obtain the knowledge of semiconductors, insulators and magnetic materials.
	C123.6	Obtain the knowledge of generation of electricity from various Non-Conventional energy sources like solar energy, hydropower, geothermal energy.
OOP THROUGH C++	C124.1	Explain the concepts of object-oriented programming and basic structure of C++ programming
	C124.2	Apply the concept of constructor, destructor and operator overloading.
	C124.3	Construct the C++ program, by using various inheritance concepts and virtual functions
	C124.4	Design the template and exception handling for simple and complex programs.
	C124.5	Describe various standard template library.
ENVIRONMENTAL STUDIES	C125.1	Acquire knowledge about the importance of environment & availability of resources
	C125.2	Understand different environmental challenges induced due to anthropogenic activities as well as nature.
	C125.3	Identify the solutions to the environmental problems for the sake of healthy life by protecting our natural resources.
	C125.4	Create awareness on the social issues, environmental protection acts
	C125.5	Understand the environmental impact of developmental activities.
	C126.1	Calculate frictional force by resolving the forces into components, moment of force

ENGINEERING MECHANICS	C126.2	Draw complete and correctly labelled Free Body Diagrams of rigid bodies or systems of rigid bodies in static equilibrium
	C126.3	Compute the Centroid and the Centre of gravity of 2-D bodies using the method of composite area
	C126.4	Analyse the properties of surfaces & solids in relation to moment of inertia.
	C126.5	Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems
	C126.6	Determine the complete motion of a rigid body resulting from an application of a system of forces, using work energy and impulse momentum principles
APPLIED CHEMISTRY LAB	C127.1	Obtain the knowledge of acid-base titrations to determine the strength of acid and base solutions.
	C127.2	Gain the knowledge of Redox titrations to determine the concentration of samples such as Ores, $KMnO_4$ and Copper using different indicators.
	C127.3	Obtain the knowledge of complexometry titrations to determine the hardness of given water sample by EDTA method.
	C127.4	Gain the knowledge of commonly used instruments such as pH meter, Conductivity meter and Potentiometer to determine the strength of given acid solutions.
English Language Lab-II	C128.1	Recognize the sounds of English with the help of audio visual aids
	C128.2	Build confidence and overcome inhibitions while speaking in English.
	C128.3	Demonstrate acquired language skills in performing the designated activity.

OOP LAB	C129.1	Understand the object oriented concepts with language environment.
	C129.2	Design and implement the various concepts related to language.
	C129.3	Apply various operations on Exception Handler and STL.
STATISTICS WITH R PROGRAMMING	C211.1	Apply basic elements of R programming structures in problem solving.
	C211.2	Apply online resources for R and import new function packages into the R workspace
	C211.3	Make use of datasets to create testable hypotheses and identify appropriate statistical tests.
	C211.4	Apply appropriate statistical tests using R Create and edit visualizations
MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE	C212.1	Apply the mathematical logic and different proof methods to validate the arguments.
	C212.2	Identify and apply operations on discrete structures such as sets, relations and algebraic structures in different areas of computing.
	C212.3	Apply the counting techniques and principles of number theory to solve Combinatorial and problems of computer science.
	C212.4	Solve the complex problems using the recurrence relations.
	C212.5	Apply concepts of graphs and trees to Design algorithms for real world problems and find Solutions with optimal complexity.
DIGITAL LOGIC DESIGN	C213.1	Define different number systems, binary addition and subtraction, r's complement representation and operations with this representation.
	C213.2	Describe different Boolean algebra theorems and apply them for logic functions and able to perform gate level minimization by using K-maps.

	C213.3	Define different combinational circuits .and to be able to build simple circuits.
	C213.4	Analyse storage elements like latches, flip flops and clocked sequential Circuits
	C213.5	Design asynchronous and synchronous sequential circuits, like counters and shift registers.
PYTHON PROGRAMMING	C214.1	Understanding of scripting and the contributions of scripting languages.
	C214.2	Implement a given algorithm as a computer program.
	C214.3	Understanding of the built-in objects of Python.
	C214.4	Understanding of Python especially the object-oriented concepts.
	C214.5	Identify and repair coding errors in program using testing.
DATA STRUCTURES THROUGH C++	C215.1	Describe the procedural and object-oriented paradigm with concepts of streams, classes, functions, arrays, data and objects
	C215.2	Implement basic data structures such as linked lists, stacks, and queues
	C215.3	Simulate nonlinear data structures like binary search tree and threaded binary trees and Use them in designing applications like sorting, expression trees etc.
	C215.4	Demonstrate different techniques for Graphs
COMPUTER GRAPHICS	C216.1	Describe the general software architecture of programs that use 3D computer graphics
	C216.2	Discuss hardware system architecture for computer graphics
	C216.3	Apply models for lighting/ shading
DATA STRUCTURES	C217.1	Implementation of different operations stacks, queues and linked list.
	C217.2	Implementation of Binary search tree, Hash table and Heap.

THROUGH C++ LAB	C217.3	Implementation of Graph traversal techniques and minimum cost spanning tree techniques
	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	Analysing the complexity of problems, Modularize the problems into small modules and then convert them into programs
	C218.3	apply the in-built functions and customized functions for solving the problems
SOFTWARE ENGINEERING	C221.1	Describe the evolution of software and process patterns
	C221.2	Able to write a good software requirements specification for the project
	C221.3	Focus on software design and interface design
	C221.4	Demonstrate testing techniques
	C221.5	Obtain Knowledge about software reliability , quality and reuse approach
JAVA PROGRAMMING	C222.1	Apply the syntax and semantics of Java programming language and basic concepts of OOP.
	C222.2	Develop reusable and error free programs using the concepts of inheritance, polymorphism, interfaces, packages and exception handling.
	C222.3	Apply the concept of Multithreading to develop efficient codes.
	C222.4	Write simple GUI interfaces and web related applications for a computer program to interact with users, and to understand the event-based GUI handling principles.
ADVANCED DATA STRUCTURES	C223.1	Analyse external sorting algorithms
	C223.2	Apply various hashing techniques

	C223.3	Implement concepts related to priority queues and various tree data structures
	C223.4	Analyse digital search strategies
COMPUTER ORGANIZATION	C224.1	Ability to identify the basic components and design of a computer and Operation of CPU.
	C224.2	Ability to identify the issues involved in the instruction execution and various stages of instruction life stage.
	C224.3	To understand types of addressing modes and Computer Instructions.
	C224.4	Understand how data transfer takes place among the various peripherals in the computer system.
	C224.5	Understand the organization of the memory system and its effect on performance of the computer.
	C224.6	To understand the functionality of Control unit.
FORMAL LANGUAGES AND AUTOMATA THEORY	C225.1	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.
	C225.2	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.
	C225.3	Students can Able To Construct context free grammar for various languages and apply Context Free Grammars to solve problems in computer science.
	C225.4	Students can Able To solve various problems in computer science by applying normal form techniques and push down automata.

	C225.5	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.
PRINCIPLES OF PROGRAMMING LANGUAGES	C226.1	Analyse the syntax and semantics of programming languages
	C226.2	Understand the data, data types, and basic statements
	C226.3	Implement the call-return architecture
	C226.4	Understand the object-orientation, concurrency, and event handling in programming languages
	C226.5	Implement the programs in non-procedural programming paradigms.
ADVANCED DATA STRUCTURES LAB	C227.1	Implementation of operations on AVL trees, B Tree, and Binary Heap
	C227.2	Implementation of Algorithms for finding minimum cost spanning tree
	C227.3	Implementation of static hashing and Huffman coding algorithm
JAVA PROGRAMMING LAB	C228.1	Develop programming skills in computer programming concepts in Java programming language.
	C228.2	Solve coding problems in Java language.
	C228.3	Solve coding problems related to OOP in Java language
COMPILER DESIGN	C311.1	Explain different phases of compilation with Design of lexical analyser for a language.
	C311.2	Compare top down with bottom-up parsers and develop appropriate parser to produce parse tree representation of the input.
	C311.3	Apply optimization techniques to intermediate code for statements and generate machine code for high level language program.

	C311.4	Design syntax directed translation schemes for a given context free grammar and generate symbol tables for runtime environment
UNIX PROGRAMMING	C312.1	Apply various UNIX commands on a standard UNIX/LINUX operating system.
	C312.2	Analyse the file system, Filters in the UNIX operating system.
	C312.3	Construct various shell scripts for simple applications.
	C312.4	Apply various process commands to manage the process in UNIX environment.
OBJECT ORIENTED ANALYSIS AND DESIGN USING UML	C313.1	Demonstrate the basics of OO based analysis and design by using UML and Design Patterns.
	C313.2	Analyse and learn the process of requirement elicitation and representing the same by using Use Case Diagrams.
	C313.3	Elaborate perspective of designing the structure of models using Class Diagrams by gathering the information collected from analysis phase.
	C313.4	Able to apply various Design Patterns.
	C313.5	Determines the knowledge of representing the detailed functionality of a model by various UML diagrams.
	C313.6	Applying additional functionalities of UML diagrams
DATABASE MANAGEMENT SYSTEMS	C314.1	The ability to apply the concepts of engineering i.e collecting data, organize the data in a systematic form, arrange the data in a computational way.
	C314.2	Able to design the ER diagrams as well as interpret the design of database and demonstrate an understanding of the relational data model using relational algebra.

	C314.3	Formulate using SQL solutions to broad range of query and data update problems.
	C314.4	Demonstrate, understand normalization theory and apply such knowledge to the normalization of a database.
	C314.5	To understand concurrency control, transaction management and examine issues in data storage and can formulate appropriate solutions.
OPERATING SYSTEMS	C315.1	Understand OS evolution, its Types, services and structures provided by it.
	C315.2	Apply process scheduling algorithms, policies and mechanisms of process synchronization; inter process communication, deadlocks and other process subsystem related concepts
	C315.3	Apply memory allocation and de allocation policies and mechanism for free space management and auxiliary memory, file system design and implementation issues, secondary storage concepts.
	C315.4	Investigate LINUX and Android operating system platforms w.r.t similarities and dissimilarities in design philosophies
UNIFIED MODELLING LAB	C316.1	Understand the Case studies and design the Model.
	C316.2	Understand how design patterns solve design problems
	C316.3	Develop design solutions using creational patterns.
OPERATING SYSTEMS LAB	C317.1	Demonstrate the fundamentals of UNIX commands and System calls
	C317.2	Apply Various CPU scheduling algorithms for the given problem.
	C317.3	Apply the process synchronization concept using shared memory, semaphores for the given situation

	C317.4	Apply algorithms to detect and avoid dead locks.
DATABASE MANAGEMENT SYSTEMS LAB	C318.1	Able to create database with different types of integrity constraints and use the SQL commands
	C318.2	Able to use database security and authorization in order to access database for the different kinds of the user
	C318.3	Develop an Entity-Relationship Model with the appropriate entireties, attributes, relationships, connectivity, and cardinality to represent 1-1,1-M and M-N relationships
	C318.4	Able to access and manipulate data using PL/SQL blocks
	C318.5	Able to connect database to front end using JDBC and ODBC driver
COMPUTER NETWORKS	C321.1	Understand the concept of network reference models
	C321.2	Analyse various protocols of data link layer and classification of multiplexing
	C321.3	Analyse the design issues of data link layer
	C321.4	Understand the concept of medium access control sub layer
	C321.5	Compare and analyse different routing and congestion control algorithms of network layer
	C321.6	Understand the concepts of transport and application layer
DATA WAREHOUSING AND MINING	C322.1	Understand the basic concepts of data mining and data warehouse.
	C322.2	Understand various data pre-processing techniques to build data warehouse
	C322.3	Understand the differences between OLTP and OLAP and data cube Computation Techniques.
	C322.4	Understands Mining Frequent Patterns, Classification & Prediction in data mining.
	C322.5	Understands Cluster Analysis in data mining.

DESIGN AND ANALYSIS OF ALGORITHMS	C323.1	Understand fundamentals of algorithms and analyse 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	Analyse algorithms for problems using various algorithmic methods such as Branch and bound, backtracking.
SOFTWARE TESTING METHODOLOGIES	C324.1	Understand the basic testing procedures.
	C324.2	Acquire support in generating test cases and test suites.
	C324.3	Demonstrate the test applications manually by applying different testing methods and automation tools.
	C324.4	Apply tools to resolve the problems in Real time environment.
Artificial Intelligence	C325.1	Understand basics of Artificial Intelligence
	C325.2	Apply and analyse various strategies of problem solving, problem reductions and game playing
	C325.3	Analyse logic concepts and various ways of knowledge representation and advanced knowledge representation techniques.
	C325.4	Understand of some of the more advanced topics of AI such as expert systems and applications, uncertainty measure and Fuzzy sets and Fuzzy logic
NETWORK PROGRAMMING LAB	C327.1	Create sockets and analyse different (client/server) models.
	C327.2	Analyse the different protocols.
	C327.3	Implement the several security algorithms

SOFTWARE TESTING LAB	C328.1	Find practical solutions to the problems
	C328.2	Solve specific problems alone or in teams
	C328.3	Manage a project from beginning to end
	C328.4	Work independently as well as in teams
DATA WAREHOUSING AND MINING LAB	C329.1	The data mining process and important issues around data cleaning, pre-processing, and integration
	C329.2	The principal algorithms and techniques used in data mining, such as clustering, association mining.
	C329.3	The principle algorithms and techniques used in data mining, such as classification and prediction.
CRYPTOGRAPHY AND 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.
SOFTWARE ARCHITECTURE AND DESIGN PATTERNS	C412.1	Understand the Software Architectural Patterns, Structures and Views.
	C412.2	Analyse the Software Design and Architecture Evaluation.
	C412.3	Apply the Object-Oriented Concepts on Design Patterns.
	C412.4	Solve the real-world software design problems using Design Patterns.
	C413.1	Design the web page using HTML and CSS.

WEB TECHNOLOGIES	C413.2	Design the web page using Java Script.
	C413.3	Prepare XML documents to store and transport data.
	C413.4	Build Dynamic website using PHP Programming and Database Connectivity.
	C413.5	Implement the Programs in PERL and RUBY.
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	C414.1	Understand the concept of economics & estimating demand & Demand elasticity & Supply for a product.
	C414.2	Student will be able to understand the basic concept of production & cost analysis
	C414.3	Have Knowledge on forms of Business organization & conditions of different market structure & pricing policies.
	C414.4	Obtain knowledge about accounting & Financing Analysis
	C414.5	Ability to understand the concepts the related to Capital & Capital Budgeting.
BIGDATA ANALYTICS	C415.1	Analyse the behaviour of Java Data Structures like List, Sets, Stacks, Queues and Maps.
	C415.2	Explain the Hadoop cluster building process.
	C415.3	Understand Hadoop API and write Map Reduce programs.
	C415.4	Explain various Hadoop input/output classes and interfaces.
	C415.5	Write Pig scripts using Pig Latin.
	C415.6	Apply Structure to Big Data with Hive Query language.

SOFTWARE PROJECT MANAGEMENT	C416.1	Gains the knowledge on phases in the life cycle of software development, project planning and project infrastructure.
	C416.2	Identify the major and minor milestones, artifacts and metrics from management and technical perspective.
	C416.3	Analyse effort estimation and activity planning techniques.
	C416.4	Performs risk management and project management.
	C416.5	Apply cost control techniques for project monitoring.
	C416.6	Apply quality models in software projects for maintaining software quality
SOFTWARE ARCHITECTURE AND DESIGN PATTERNS LAB	C417.1	Ability to develop Software Architectures
	C417.2	To Implement Creational and Structural patterns
	C417.3	To Create behavioural patterns in structures.
WEB TECHNOLOGIES LAB	C418.1	Design the web page using HTML, CSS and JavaScript.
	C418.2	Prepare XML documents to store and transport data.
	C418.3	Build Dynamic website using PHP Programming and Database Connectivity.
	C418.4	Implement the Programs in PERL and RUBY.
DISTRIBUTED SYSTEMS	C421.1	understand the concept of Distributed system
	C421.2	understand the issues and solutions of various inter process communication
	C421.3	Understand the objects and remote invocation concept of operating system in distributed system
	C421.4	understand the database issues and file system and concept of transaction and replication

MANAGEMENT SCIENCE	C422.1	student will acquire the knowledge on management functions, global leadership
	C422.2	understand the concepts of functional management and project management
	C422.3	obtain knowledge about contemporary management practice organizational behaviour
	C422.4	Ability to understand the concepts of strategic management
MACHINE LEARNING	C423.1	Understand the characteristics of machine learning that make it useful to real-world Problems.
	C423.2	Use of machine learning algorithms to solve problems using Classification and concept learning
	C423.3	Apply different Machine Learning Models in problem Solving.
	C423.4	Apply effectively neural networks for Appropriate applications
ARTIFICIAL NEURAL NETWORKS	C424.1	Understand the structure of Artificial Neurons which mimics biological neurons and its architecture
	C424.2	Understand the Mathematical foundations and learning mechanisms with basic knowledge of optimization.
	C424.3	Understand the structure and learning of Perceptron's
	C424.4	Understand Multi-layer feed forward networks and Back propagation algorithms
	C424.5	Analyse Radial Basis Function Networks and support vector Machines
SEMINARS	C425.1	Collect, Organize & Analyse information about emerging technologies /market demands/current trends.
	C425.2	Exhibit effective communication skills, stage courage, and confidence.
	C425.3	Demonstrate intrapersonal skills

	C425.4	Awareness in keeping with new innovations and inventions.
PROJECT	C426.1	Identify the complex engineering problems relevant to the society and industry.
	C426.2	Apply modern technologies, tools, and systems in the field of information technology to analyse the identified problem.
	C426.3	Design and implement a viable solution to the problem.
	C426.4	Apply communication, report writing skills& Presentation skills.
	C426.5	Develop the teamwork and leadership skills with professional and ethical values.