



RISE KRISHNA SAI GANDHI GROUP OF INSTITUTIONS::ONGOLE

(Approved by AICTE-NEW DELHI, Affiliated to JNTUK KAKINADA)

NH-16, Valluru,-523272, Ongole, Prakasam District, A.P

Department of Computer Science and Engineering

Year: I

Regulation: R20

Academic Year: 2022-23

Sem: I

COURSE : Communicative English		
CO No.	Course Outcomes	Taxonomy Level
After successful completion of this course students will be able to:		
C111.1	Understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information.	Understanding
C111.2	Recall the familiar topics and general questions to the students	Remembering
C111.3	Rephrase suitable strategies for note-making to locate specific information.	Understanding
C111.4	Identify the paragraph structure and able to match beginning/sending/heading with paragraph.	Applying
C111.5	Make use of grammatical structure and correct word forms.	Applying

COURSE : Mathematics-I		
CO No.	Course Outcomes	Taxonomy Level
After successful completion of this course students will be able to:		
C112.1	Test the convergence of an infinite series , utilize mean value theorems to real life problems and express a function in terms of power series.	Applying
C112.2	Solve first order and first degree differential equations arising in various Engineering fields.	Applying
C112.3	Solve linear differential equations of higher order and use the knowledge to study LCR Circuits and SHM.	Applying
C112.4	Apply the techniques of multivariable differential calculus to determine extrema and series Expansions of a function of several variables.	Applying
C112.5	Using multiple integrals to find areas, surface areas and volumes.	Applying



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COURSE: Applied Physics		
CO No.	Course Outcomes	Taxonomy Level
After successful completion of this course students will be able to:		
C113.1	Explain the properties interference, diffraction, polarization of light in wave form.	Understanding
C113.2	Identify the applications of laser in optical fiber communication.	Applying
C113.3	Interpret the concepts of classical and quantum free electron theories in formation of bands in solids.	Understanding
C113.4	Explain the cause of dielectric and magnetic nature to the materials.	Understanding
C113.5	Explain the cause of conductivity in semiconductors and insulators.	Understanding

COURSE : PPSC		
CO No.	Course Outcomes	Taxonomy Level
After successful completion of this course students will be able to:		
C114.1	To use different operators, data types and write programs that use two-way/ multi-way selection.	Applying
C114.2	To select the best loop construct for a given problem.	Applying
C114.3	To design and implement programs to analyze the different pointer applications.	Analyzing
C114.4	To decompose a problem into functions and to develop modular reusable code.	Analyzing
C114.5	To apply File, I/O operations.	Applying



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COURSE : ITWS LAB		
CO No.	Course Outcomes	Taxonomy Level
After successful completion of this course students will be able to:		
C115.1	Assemble and disassemble components of a PC	Applying
C115.2	Construct a fully functional virtual machine, Summarize various Linux operating system commands,	Applying
C115.3	Recognize characters & extract text from scanned images, Create audio files and podcast	Applying

COURSE :ECS LAB		
CO No.	Course Outcomes	Taxonomy Level
After successful completion of this course students will be able to:		
C116.1	Develop phonetic sounds and uses	Applying
C116.2	Recall words stress and syllabic words.	Remembering
C116.3	Classify Rhythm an intonation.	Understanding
C116.4	Utilize the knowledge of contrastive word stress	Applying
C116.5	Compose weak and strong forms	Creating



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Department of Computer Science and Engineering

COURSE : AP LAB		
CO No.	Course Outcomes	Taxonomy Level
After successful completion of this course students will be able to:		
C117.1	Apply the basic concepts of light to determine wavelength of light by Newton's Rings.	Applying
C117.2	Apply the basic concepts of laser and techniques for diffraction grating.	Applying
C117.3	Apply the basic concepts of magnetism to study the variation of B versus H.	Applying
C117.4	Apply the basic concepts of dielectrics to determine dielectric constant by charging and discharging method.	Applying
C117.5	Apply the basic concepts of semiconductor to determine energy gap of semiconductor.	Applying

COURSE: PPSC LAB		
CO No.	Course Outcomes	Taxonomy Level
After successful completion of this course students will be able to:		
C118.1	Gains knowledge on various concepts of a C Language.	Understanding
C118.2	Able to draw flow charts and write algorithms.	Applying
C118.3	Able to design and development to C problem solving skills.	Applying
C118.4	Able to design and develop modular programming skills.	Applying
C118.5	Able to trace and debug a program.	Applying

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Department of Computer Science and Engineering

Year: I

Regulation: R20

Academic Year: 2022-23

Sem: II

CO No.	COURSE: Mathematics-II	Taxonomy Level
After successful completion of this course students will be able to		
C121.1	Solve system of linear algebraic equations using matrix techniques and find Eigen values and Eigen vectors.	Applying
C121.2	Use Cayley-Hamilton theorem to find inverse and higher powers of matrices and study the nature of Quadratic forms.	Applying
C121.3	Evaluate a root of algebraic and transcendental equations and a solution for system of equations using numerical methods.	Applying
C121.4	Apply Newton's interpolation and Lagrange's interpolation formula to find interpolating polynomial.	Applying
C121.5	Evaluate the solutions of ordinary differential equations to its analytical computations using different methods.	Applying

CO No.	COURSE: Applied Chemistry	Taxonomy Level
After successful completion of this course students will be able to		
C122.1	Analyze different types of composite materials and the preparation, Properties and applications of the polymers.	Analyzing
C122.2	Apply the knowledge of using redox chemistry in storage devices (batteries) and techniques used for preventing corrosion	Applying
C122.3	Summarize the importance of materials like nano materials, Super conductors, liquid crystals and semiconductors	Understanding
C122.4	Analyze the principles and applications of analytical techniques And different types of nonconventional energy sources	Analyzing
C122.5	Demonstrate the importance of molecular machines and computational chemistry.	Understanding



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CO No.	COURSE : Python Programming	Taxonomy Level
After successful completion of this course students will be able to:		
C124.1	Develop essential programming skills in computer	Understanding
C124.2	Apply the basics of programming in the Python language	Applying
C124.3	Solve coding tasks related conditional execution, loops	Analyzing
C124.4	Understand the accessing of files and its operations.	Understanding
C124.5	Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming.	Analyzing

CO No.	COURSE : Computer Organization	Taxonomy Level
After successful completion of this course students will be able to:		
C123.1	Analyze different types of composite materials and the preparation, Properties and applications of the polymers.	Analyzing
C123.2	Apply the knowledge of using redox chemistry in storage devices(batteries) and techniques used for preventing corrosion	Applying
C123.3	Summarize the importance of materials like nano materials, Super conductors, liquid crystals and semiconductors	Understanding
C123.4	Analyze the principles and applications of analytical techniques And different types of nonconventional energy sources	Analyzing
C123.5	Demonstrate the importance of molecular machinesand computational chemistry.	Understanding

CO No.	COURSE : Data Structures	Taxonomy Level
After successful completion of this course students will be able to:		
C125.1	Discuss the computational efficiency of the principal algorithms for sorting and searching, by summarizing the properties, interfaces and behaviors of basic abstract data types.	Understanding
C125.2	Understands the concept of dynamic data structures using Singly Linked List and its kinds.	Understanding
C125.3	Implements Stacks and Queues using Arrays and Linked Lists.	Applying
C125.4	Represents the given data using tree applications.	Applying
C125.5	Demonstrate different methods for Graph traversing.	Applying



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CO No.	COURSE :Python Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C126.1	Develop essential programming skills in computer programming concepts like data types, containers	Understanding
C126.2	Apply the basics of programming in the Python language Applying	Applying
C126.3	Solve coding tasks related conditional execution, loops Applying	Applying
C126.4	Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming	Applying
C126.5	Learn GUI and Modules to develop case study examples	Applying

CO No.	COURSE : DS Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C127.1	Using data structures such as arrays and linked list for performing searching and sorting operations.	Applying
C127.2	Programs to demonstrate Stacks and Queues.	Applying
C127.3	Programs to demonstrate algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.	Applying



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Department of Computer Science and Engineering

CO No.	COURSE: ES	Taxonomy Level
After going through this course the student will be able to		
C128.1	Explain the concepts of the ecosystem and its functions in the environment.	Understanding
C128.2	Summarize the natural resources and their importance for the sustenance of life & need to conserve the natural resources.	Understanding
C128.3	Demonstrate the values, threats, conservation practices to protect the biodiversity.	Applying
C128.4	Describe various attributes of the pollution and their impacts and measures to reduce pollution along with waste management practices.	Remembering
C128.5	Evaluate social issues both rural and urban environment and the possible means to combat the challenges, with help of environmental legislations of India	Evaluating

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Department of Computer Science and Engineering

Year: II

Regulation: R20

Academic Year: 2022-23

Sem: I

CO No.	Course Name: Mathematics - III	Taxonomy Level
After going through this course the student will be able to		
C211.1	Interpret the physical meaning of different operators such as gradient, curl and divergence, estimate the work done against a field.	Applying
C211.2	Apply the LaPlace transform for solving differential equations.	Applying
C211.3	Find or compute the Fourier series of periodic signals and be able to apply integral expressions for the Fourier and inverse Fourier transform to a range of non-periodic waveforms.	Applying
C211.4	Formation of partial differential equation and identify solution methods for first order partial differential equations.	Applying
C211.5	Classify higher order partial differential equations and solve heat flow and wave problems.	Applying

CO No.	Course Name: Object Oriented Programming through C++	Taxonomy Level
After going through this course the student will be able to		
C212.1	Compare the procedural and object-oriented paradigm with concepts of streams, classes, functions, data and objects.	Understanding
C212.2	Explain dynamic memory management techniques using pointers, constructors, destructors, etc	Understanding
C212.3	Experiment with the concept of function overloading, operator overloading, virtual functions and polymorphism.	Applying
C212.4	Use of inheritance with the understanding of early and late binding using pointer object.	Applying
C212.5	Demonstrate the use of generic programming, exception handling and Standard Template Library	Understanding



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CO No.	Course Name: Operating Systems	Taxonomy Level
After going through this course the student will be able to		
C213.1	Describe various generations of operating systems and functions of operating systems.	Understanding
C213.2	Describe the concept of program, process and thread and analyze various CPU scheduling algorithms and compare their performance.	Understanding
C213.3	Solve Inter Process Communication problems using Mathematical equations by various methods.	Applying
C213.4	Compare various Memory Management Schemes especially paging and Segmentation in OS and apply various Page replacement techniques.	Understanding
C213.5	Outline file systems in operating system like UNIX/Linux and Windows.	Understanding

CO No.	Course Name: Software Engineering	Taxonomy Level
After going through this course the student will be able to		
C214.1	Ability to transform an object-oriented design into high quality, executable code.	Creating
C214.2	Compare conventional and agile software methods.	Understanding
C214.3	Skills to design, implement and execute test cases at the unit and integration level.	Applying

CO No.	Course Name: Mathematical Foundation for Computer Science	Taxonomy Level
After going through this course the student will be able to		
C215.1	Demonstrate skills in solving mathematical problems.	Understanding
C215.2	Comprehend mathematical principles and logic.	Understanding
C215.3	Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software.	Understanding
C215.4	Manipulate and analyze data numerically and /or graphically using appropriate software.	Applying
C215.5	Communicate effectively mathematical ideas/results verbally or in writing.	Understanding

CO No.	Course Name: OOP Through C++ Lab	Taxonomy Level
After going through this course the student will be able to		
C216.1	Able to apply the various OOPs concepts with the help of programs.	Applying



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CO No.	Course Name: Operating Systems Lab	Taxonomy Level
After going through this course the student will be able to		
C217.1	Able to use Unix utilities and perform basic shell control of the utilities.	Remembering
C217.2	Able to use Unix file system and file access control.	Understanding
C217.3	Able to use of an operating system to develop software.	Applying
C217.4	Able to use Linux environment efficiently.	Applying
C217.5	Able to solve problems using bash for shell scripting.	Understanding

CO No.	Course Name: Software Engineering Lab	Taxonomy Level
After going through this course the student will be able to		
C218.1	Able to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project.	Analyzing
C218.2	Able to prepare SRS document, design document, test cases and software configuration management and risk management related document.	Understanding
C218.3	Able to develop function-oriented software design using tools like rational rose.	Applying
C218.4	Able to use modern engineering tools necessary for software project management, estimations, time management and software reuse.	Applying
C218.5	Generate test cases for software testing.	Applying

CO No.	Course Name: WAD Using Full Stack Module I	Taxonomy Level
After going through this course the student will be able to		
C219.1	Analyze a web page and identify its elements and attributes.	Understanding
C219.2	Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet	Understanding
C219.3	Implement MVC and responsive design to scale well across PC, tablet and Mobile Phone.	Applying
C219.4	Create web pages using HTML and Cascading Style Sheets.	Creating

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Department of Computer Science and Engineering

Year: II

Regulation: R20

Academic Year: 2022-23

Sem: II

CO No.	Course Name: Probability & Statistics	Taxonomy Level
After going through this course the student will be able to:		
C221.1	Compare various discrete probability distributions.	Understanding
C221.2	Compare various continuous probability distributions.	Understanding
C221.3	Find the confidence interval for mean of a population.	Remembering
C221.4	Make use of test of hypothesis for the null hypothesis concerning mean and proportions and perform ANOVA for one way and two-way classification.	Applying
C221.5	Apply correlation and regression lines of two variables for real life problems.	Applying

CO No.	Course Name: Database Management Systems	Taxonomy Level
After going through this course the student will be able to:		
C222.1	Describe a relational database and object-oriented database.	Understanding
C222.2	Create, maintain and manipulate a relational database using SQL.	Applying
C222.3	Describe ER model and normalization for database design.	Understanding
C222.4	Examine issues in data storage and query processing and can formulate appropriate solutions.	Understanding
C222.5	Outline the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.	Applying

CO No.	Course Name: Formal Languages and Automata Theory	Taxonomy Level
After going through this course the student will be able to:		
C223.1	Classify machines by their power to recognize languages.	Understanding
C223.2	Summarize language classes and grammars relationship among them with the help of Chomsky Hierarchy.	Understanding
C223.3	Employ finite state machines to solve problems in computing.	Applying
C223.4	Illustrate deterministic and non-deterministic machines.	Understanding
C223.5	Quote the hierarchy of problems arising in the computer science.	Applying



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CO No.	Course Name: Java Programming	Taxonomy Level
After going through this course the student will be able to:		
C224.1	Able to realize the concept of OOP and Java Programming Constructs.	Understanding
C224.2	Able to describe the basic concepts of Java such as operators, classes, objects, inheritance, packages, enumerations and various keywords.	Understanding
C224.3	Apply the concept of exception handling and input or output operations.	Applying
C224.4	Able to design the applications of Java and Java Applet.	Applying
C224.5	Able to analyze and design the concept of event handling and abstract window tool kit.	Applying

CO No.	Course Name: Managerial Economics and Financial Accountancy	Taxonomy Level
After going through this course the student will be able to:		
C225.1	Equipped with the knowledge of estimating the demand and demand elasticities for a product and relate economic principles with business practices for getting successful outcomes.	Remembering
C225.2	The knowledge of understanding of the input-output-cost relationships and estimation of the least cost combination of inputs and also make use of cost analysis to find Break Even Point (BEP) of an enterprise in order to avoid losses.	Understanding
C225.3	Understand the nature of different markets and price output determination under various market conditions and also to have the knowledge of different business units.	Understanding
C225.4	Prepare financial statements and the usage of various accounting tools for analysis.	Applying
C225.5	Evaluate various investment project proposals with the help of capital budgeting techniques for decision making.	Evaluating

CO No.	Course Name: Database Management Systems Lab	Taxonomy Level
After going through this course the student will be able to:		
C226.1	Utilize SQL to execute queries for creating database and performing data manipulation operations.	Applying
C226.2	Examine integrity constraints to build efficient databases.	Understanding
C226.3	Apply Queries using Advanced Concepts of SQL.	Applying
C226.4	Build PL/SQL programs including stored procedures, functions, cursors and triggers.	Creating



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CO No.	Course Name: R Programming Lab	Taxonomy Level
After going through this course the student will be able to:		
C227.1	Access online resources for R and import new function packages into the R workspace.	Understanding
C227.2	Import, review, manipulate and summarize data-sets in R.	Understanding
C227.3	Explore data-sets to create testable hypotheses and identify appropriate statistical tests.	Understanding
C227.4	Perform appropriate statistical tests using R.	Applying
C227.5	Create and edit visualizations with R.	Creating

CO No.	Course Name: Java Programming Lab	Taxonomy Level
After going through this course the student will be able to:		
C228.1	Evaluate default value of all primitive data type, Operations, Expressions, Control flow, Strings.	Understanding
C228.2	Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism.	Understanding
C228.3	Illustrating simple inheritance, multi-level inheritance, Exception handling mechanism.	Applying
C228.4	Construct Threads, Event Handling, implement packages, developing applets.	Applying

CO No.	Course Name: WAD Using Full Stack Module II	Taxonomy Level
After going through this course the student will be able to:		
C229.1	Develop of the major Web application tier- Client-side development.	Applying
C229.2	Participate in the active development of cross-browser applications through JavaScript.	Creating
C229.3	Develop JavaScript applications that transition between states.	Applying


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Department of Computer Science and Engineering

Year: III

Regulation: R20

Academic Year: 2022-23

Sem: I

CO No.	Course Name: Computer Networks	Taxonomy Level
After going through this course the student will be able to:		
C311.1	Demonstrate different network models for networking links OSI, TCP/IP, B-ISDN, N-BISDN and get knowledge about various communication techniques, methods, and protocol standards.	Understanding
C311.2	Discuss different transmission media and different switching networks.	Understanding
C311.3	Analyze data link layer services, functions, and protocols like HDLC and PPP.	Analyzing
C311.4	Compare and classify medium access control protocols like ALOHA, CSMA, CSMA/CD, CSMA/CA, Polling, Token passing, FDMA, TDMA, CDMA protocols.	Understanding
C311.5	Determine application layer services and client server protocols working with the client server paradigms like WWW, HTTP, FTP, e-mail, and SNMP etc.	Understanding

CO No.	Course Name: Design and Analysis of Algorithms	Taxonomy Level
After going through this course the student will be able to:		
C312.1	Analyze the performance of a given algorithm, denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms.	Analyzing
C312.2	List and describe various algorithmic approaches and Solve problems using divide and conquer & greedy Method.	Applying
C312.3	Synthesize efficient algorithms dynamic programming approaches to solve in common engineering design situations.	Applying
C312.4	Organize important algorithmic design paradigms and methods of analysis: backtracking, branch and bound algorithmic approaches.	Analyzing
C312.5	Demonstrate NP- Completeness theory, lower bound theory and String Matching.	Understanding



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CO No.	Course Name: Data Warehousing and Data Mining	Taxonomy Level
After going through this course the student will be able to:		
C313.1	Illustrate the importance of Data Warehousing, Data Mining and its functionalities and Design schema for real time data warehousing applications.	Understanding
C313.2	Demonstrate on various Data Preprocessing Techniques viz. data cleaning, data integration, data transformation and data reduction and Process raw data to make it suitable for various data mining algorithms.	Applying
C313.3	Choose appropriate classification technique to perform classification, model building and evaluation.	Applying
C313.4	Make use of association rule mining techniques viz. Apriori and FP Growth algorithms and analyze on frequent item sets generation.	Analyzing
C313.5	Identify and apply various clustering algorithm (with open-source tools), interpret, evaluate and report the result.	Evaluating

CO No.	Course Name: Optimization in Operations Research	Taxonomy Level
After going through this course the student will be able to:		
C314.1	State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.	Analyzing
C314.2	Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.	Analyzing
C314.3	Apply and Solve transportation and assignment problem by using Linear programming Simplex method.	Analyzing
C314.4	Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.	Analyzing
C314.5	Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.	Analyzing



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Department of Computer Science and Engineering

CO No.	Course Name: Software Project Management	Taxonomy Level
After going through this course the student will be able to:		
C315.1	Apply the process to be followed in the software development life-cycle models.	Applying
C315.2	Apply the concepts of project management & planning.	Applying
C315.3	Implement the project plans through managing people, communications and change.	Applying
C315.4	Conduct activities necessary to successfully complete and close the Software projects.	Analyzing
C315.5	Implement communication, modeling, and construction & deployment practices in software development.	Analyzing

CO No.	Course Name: Data Warehousing and Data Mining Lab	Taxonomy Level
After going through this course the student will be able to:		
C316.1	Design a data mart or data warehouse for any organization.	Understanding
C316.2	Extract knowledge using data mining techniques and enlist various algorithms used in information analysis of Data Mining Techniques.	Applying
C316.3	Demonstrate the working of algorithms for data mining tasks such as association rule mining, classification for realistic data.	Applying
C316.4	Implement and Analyze on knowledge flow application on data sets and Apply the suitable visualization techniques to output analytical results.	Applying

CO No.	Course Name: Computer Networks Lab	Taxonomy Level
After going through this course the student will be able to:		
C317.1	Know how reliable data communication is achieved through data link layer.	Understanding
C317.2	Suggest appropriate routing algorithm for the network.	Understanding
C317.3	Provide internet connection to the system and its installation.	Applying
C317.4	Work on various network management tools.	Analyzing



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CO No.	Course Name: Animation Course: Animation Design	Taxonomy Level
After going through this course the student will be able to:		
C318.1	Learn various tools of digital 2-D animation.	Understanding
C318.2	Understand production pipeline to create 2-D animation.	Understanding
C318.3	Apply the tools to create 2D animation for films and videos.	Applying
C318.4	Understand different styles and treatment of content in 3D model creation.	Understanding
C318.5	Apply tools to create effective 3D modelling texturing and lighting.	Applying

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Department of Computer Science and Engineering

Year: III

Regulation: R20

Academic Year: 2022-23

Sem: II

CO No.	Course Name: Machine Learning	Taxonomy Level
After going through this course the student will be able to:		
C321.1	Explain the fundamental usage of the concept of machine learning system.	Understanding
C321.2	Demonstrate on various regression techniques.	Applying
C321.3	Analyze the ensemble learning methods.	Analyzing
C321.4	Illustrate the clustering techniques and dimensionality reduction models in machine learning.	Applying
C321.5	Discuss the neural network models and fundamental concepts of Deep Learning.	Understanding

CO No.	Course Name: Compiler Design	Taxonomy Level
After going through this course the student will be able to:		
C322.1	Demonstrate phases in the design of compiler.	Remembering
C322.2	Organize Syntax Analysis, Top Down and LL (1) grammars.	Understanding
C322.3	Design Bottom-Up Parsing and Construction of LR parsers.	Applying
C322.4	Analyze synthesized, inherited attributes and syntax directed translation schemes.	Applying
C322.5	Determine algorithms to generate code for a target machine.	Understanding

CO No.	Course Name: Cryptography and Network Security	Taxonomy Level
After going through this course the student will be able to:		
C323.1	Explain different security threats and countermeasures and foundation course of cryptography mathematics.	Understanding
C323.2	Classify the basic principles of symmetric key algorithms and operations of some symmetric key algorithms and asymmetric key cryptography.	Understanding
C323.3	Revise the basic principles of Public key algorithms and Working operations of some Asymmetric key algorithms such as RSA, ECC and some more.	Understanding
C323.4	Design applications of hash algorithms, digital signatures and key management techniques.	Applying
C323.5	Determine the knowledge of Application layer, Transport layer and Network layer security Protocols such as PGP, S/MIME, SSL,TSL, and Ipsec.	Applying



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Department of Computer Science and Engineering

CO No.	Course Name: Object Oriented Analysis and Design	Taxonomy Level
After going through this course the student will be able to:		
C324.1	Analyze the nature of complex system and its solutions.	Analyzing
C324.2	Illustrate & relate the conceptual model of the UML, identify & design the classes and relationships.	Understanding
C324.3	Analyze & Design Class and Object Diagrams that represent Static Aspects of a Software System and apply basic and Advanced Structural Modeling Concepts for designing real time applications.	Analyzing
C324.4	Analyze & Design behavioural aspects of a Software System using Use Case, Interaction and Activity Diagrams.	Analyzing
C324.5	Analyze & Apply techniques of State Chart Diagrams and Implementation Diagrams to model behavioural aspects and Runtime environment of Software Systems.	Analyzing

CO No.	Course Name: Basic Electronics	Taxonomy Level
After going through this course the student will be able to:		
C325.1	Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation	Understanding
C325.2	Know the construction, working principle and how it can be used as a p-n junction as diode in different modes of operation	Applying
C325.3	Understand the construction, principle of operation of transistors	Understanding
C325.4	Understand the characteristics of transistors	Understanding
C325.5	Know the construction, principle and operations of thyristors	Understanding

CO No.	Course Name: Machine Learning using Python Lab	Taxonomy Level
After going through this course the student will be able to:		
C326.1	Implement procedures for the machine learning algorithms.	Applying
C326.2	Design and Develop Python programs for various Learning algorithms.	Creating
C326.3	Apply appropriate data sets to the Machine Learning algorithms.	Applying
C326.4	Develop Machine Learning algorithms to solve real world problems.	Creating



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Department of Computer Science and Engineering

CO No.	Course Name: Compiler Design Lab	Taxonomy Level
After going through this course the student will be able to:		
C327.1	Design simple lexical analysers.	Creating
C327.2	Determine predictive parsing table for a CFG.	Understanding
C327.3	Apply Lex and Yacc tools.	Applying
C327.4	Examine LR parser and generating SLR Parsing table.	Understanding
C327.5	Relate Intermediate code generation for subset C language.	Understanding

CO No.	Course Name: Cryptography and Network Security Lab	Taxonomy Level
After going through this course the student will be able to:		
C328.1	Apply the knowledge of symmetric cryptography to implement encryption and decryption using Caesar Cipher, Substitution Cipher, Hill Cipher.	Applying
C328.2	Demonstrate the different algorithms like DES, BlowFish, and Rijndael, encrypt the text "Hello world" using Blowfish Algorithm.	Applying
C328.3	Analyze and implement public key algorithms like RSA, Diffie-Hellman Key Exchange mechanism, the message digest of a text using the SHA-1 algorithm.	Analyzing

CO No.	Course Name: MEAN Stack Technologies Lab	Taxonomy Level
After going through this course the student will be able to:		
C329.1	Develop professional web pages of an application using HTML elements like lists, navigations, tables, various form elements, embedded media which includes images, audio, video and CSS Styles.	Creating
C329.2	Utilize JavaScript for developing interactive HTML web pages and validate form data.	Applying
C329.3	Build a basic web server using Node.js and also working with Node Package Manager (NPM).	Creating
C329.4	Build a web server using Express.js.	Creating
C329.5	Make use of Typescript to optimize JavaScript code by using the concept of strict type checking.	Applying



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Department of Computer Science and Engineering**Year: IV****Regulation: R19****Academic Year: 2022-23****Sem: I**

CO No.	Course Name: Cryptography and Network Security	Taxonomy Level
After going through this course the student will be able to:		
C411.1	Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory.	Understanding
C411.2	Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication.	Applying
C411.3	Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.	Applying
C411.4	Apply different digital signature algorithms to achieve authentication and create secure applications.	Applying
C411.5	Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP.	Applying
C411.6	Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications.	Applying

CO No.	Course Name: UML & Design Patterns	Taxonomy Level
After going through this course the student will be able to:		
C412.1	Illustrate software design with UML diagrams.	Applying
C412.2	Design software applications using OO concepts.	Applying
C412.3	Identify various scenarios based on software requirements.	Understanding
C412.4	Apply UML based software design into pattern-based design using design patterns.	Applying
C412.5	Illustrate the various testing methodologies for OO software.	Understanding

CO No.	Course Name: Machine Learning	Taxonomy Level
After going through this course the student will be able to:		
C413.1	Identify machine learning techniques suitable for a given problem.	Remembering
C413.2	Solve the problems using various machine learning techniques.	Applying
C413.3	Apply Dimensionality reduction techniques.	Applying
C413.4	Design application using machine learning techniques ANN and SVM.	Applying
C413.5	Apply Bayesian learning using bayes theorem, naive bayes classifier and K-NN Algorithm.	Applying



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Department of Computer Science and Engineering

CO No.	Course Name: Fundamentals of Utilization of Electrical Energy	Taxonomy Level
After going through this course the student will be able to:		
C414.1	Explain the various sources of electrical energy and its generation technologies for conventional and non-conventional energy sources.	Understanding
C414.2	Recognize various types of illumination equipment, illumination measurement and illumination techniques.	Understanding
C414.3	Analyze about various methods used for electrical energy-based heating and welding applications.	Analyzing
C414.4	Explain about the mechanisms, equipment and technology used in the electric traction.	Understanding
C414.5	Identify the importance of electrical earthing, earthing equipment, and electrical earthing measurement methods.	Understanding

CO No.	Course Name: Software Project Management	Taxonomy Level
After going through this course the student will be able to:		
C415.1	Apply the process to be followed in the software development life-cycle models.	Applying
C415.2	Apply the concepts of project management & planning.	Applying
C415.3	Implement the project plans through managing people, communications, and change.	Analyzing
C415.4	Conduct activities necessary to successfully complete and close the Software projects.	Applying
C415.5	Implement communication, modeling, and construction & deployment practices in software development.	Applying

CO No.	Course Name: Mean Stack Technologies	Taxonomy Level
After going through this course the student will be able to:		
C416.1	Enumerate the Basic Concepts of Web & Markup Languages.	Understanding
C416.2	Develop web Applications using Scripting Languages & Frameworks.	Applying
C416.3	Make use of Express JS and Node JS frameworks.	Applying
C416.4	Illustrate the uses of web services concepts like restful, react js.	Applying
C416.5	Apply Deployment Techniques & Working with cloud platform.	Applying



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NH-16, Valluru,-523272, Ongole, Prakasam District, A.P

Department of Computer Science and Engineering

CO No.	Course Name: UML Lab	Taxonomy Level
After going through this course the student will be able to:		
C417.1	Know the syntax of different UML diagrams.	Understanding
C417.2	Create use case documents that capture requirements for a software system.	Understanding
C417.3	Create class diagrams that model both the domain model and design model of a software system.	Applying
C417.4	Create interaction diagrams that model the dynamic aspects of a software system.	Applying
C417.5	Write code that builds a software system.	Understanding
C417.6	Develop simple applications.	Applying

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NH-16, Valluru,-523272, Ongole, Prakasam District, A.P

Department of Computer Science and Engineering

Year: IV

Regulation: R19

Academic Year: 2022-23

Sem: II

CO No.	Course Name: Management and Organizational Behaviour	Taxonomy Level
After going through this course the student will be able to:		
C421.1	After completion of the Course the student will acquire the knowledge on management functions, global leadership, and organizational structure.	Applying
C421.2	Will familiarize with the concepts of functional management that is HRM and Marketing of new product developments.	Applying
C421.3	The learner can think in strategically through contemporary management practices.	Applying
C421.4	The learner can develop positive attitude through personality development and can equip with motivational theories.	Understanding
C421.5	The student can attain the group performance and grievance handling in managing the organizational culture.	Applying

CO No.	Course Name: TQM	Taxonomy Level
After going through this course the student will be able to:		
C422.1	Importance of quality	Understanding
C422.2	Principles and Practices of TQM	Applying
C422.3	Tools and Techniques in Quality Management	Understanding
C422.4	Learning methods for the maintenance and improvement in quality of product	Understanding
C422.5	Knowing and applying advanced techniques in quality Management.	Applying

CO No.	Course Name: Dev Ops	Taxonomy Level
After going through this course the student will be able to:		
C423.1	Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility.	Applying
C423.2	Describe Dev Ops & Dev Sec Ops methodologies and their key concepts.	Applying
C423.3	Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models	Applying
C423.4	Set up complete private infrastructure using version control systems and CI/CD tools.	Applying



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NH-16, Valluru,-523272, Ongole, Prakasam District, A.P

Department of Computer Science and Engineering

CO No.	Subject Name: Project	Taxonomy Level
After going through this course the student will be able to:		
C424.1	Summarize the contemporary scholarly literature, activities, and explored tools for hands-on in the respective project area.	Understanding
C424.2	List out the specific requirements to develop the workable solution for the identified computing problem.	Analyzing
C424.3	Develop a workable computing solution for the identified problem.	Applying
C424.4	Evaluate the performance of the developed solution.	Evaluating
C424.5	Compile the results and findings of the project in written and verbal formats.	Creating

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NH-16, Valluru,-523272, Ongole, Prakasam District, A.P

Department of CSE – Data Science

Year: I

Regulation: R20

Academic Year: 2022-23

Sem: I

CO No.	Course Name: Communicative English	Taxonomy Level
After successful completion of this course students will be able to:		
C111.1	Understand social or transactional dialogues spoken by native speakers of English and identify the context	Understanding
C111.2	Understand social or transactional dialogues spoken by native speakers of English and identify the context	Understanding
C111.3	Understand social or transactional dialogues spoken by native speakers of English and identify the context	Understanding
C111.4	Understand social or transactional dialogues spoken by native speakers of English and identify the context	Understanding
C111.5	Understand social or transactional dialogues spoken by native speakers of English and identify the context	Understanding

CO No.	Course Name: Mathematics-I	Taxonomy Level
After successful completion of this course students will be able to:		
C112.1	Utilize mean value theorems to real life problems	Understanding
C112.2	Solve the differential equations related to various engineering fields	Applying
C112.3	Familiarize with functions of several variables which is useful in optimization	Understanding
C112.4	Apply double integration techniques in evaluating areas bounded by region	Applying
C112.5	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional and 3-dimensional coordinate systems	Understanding



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NH-16, Valluru,-523272, Ongole, Prakasam District, A.P

Department of CSE – Data Science

CO No.	Course Name: Applied Chemistry	Taxonomy Level
After successful completion of this course students will be able to:		
C113.1	Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers.	Understanding
C113.2	Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.	Understanding
C113.3	Synthesize nanomaterials for modern advances of engineering technology. and Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.	Applying
C113.4	Analyze the principles of different analytical instruments and their applications. and Design models for energy by different natural sources.	Understanding
C113.5	Obtain the knowledge of computational chemistry and molecular machines	Understanding

CO No.	Course Name: Programming for problem solving using C	Taxonomy Level
After successful completion of this course students will be able to:		
C114.1	To write algorithms and to draw flowcharts for solving	Understanding
C114.2	To convert flowcharts/algorithms to C Programs, compile and debug programs	Understanding
C114.3	To use different operators, data types and write programs that use two-way/ multi-way selection	Applying
C114.4	To select the best loop construct for a given problem	Applying
C114.5	To design and implement programs to analyze the different pointer applications	Applying
C114.6	To decompose a problem into functions and to develop modular reusable code	Applying
C114.7	To apply File I/O operations	Applying



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NH-16, Valluru,-523272, Ongole, Prakasam District, A.P

Department of CSE – Data Science

CO No.	Course Name: Computer Engineering Workshop	Taxonomy Level
After successful completion of this course students will be able to:		
C115.1	Assemble and disassemble components of a PC	Understanding
C115.2	Construct a fully functional virtual machine, Summarize various Linux operating system commands	Applying
C115.3	Recognize characters & extract text from scanned images, Create audio files and podcasts	Understanding

CO No.	Course Name: Communicative English Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C116.1	A student analyzing vowels, consonants, pronunciation, phonetic transcription, and common errors gains enhanced communication skills, linguistic awareness, foreign language proficiency, self-correction ability, and improved confidence in public speaking, contributing to academic and professional success.	Applying
C116.2	Student mastering word stress in di-syllabic and poly-syllabic words, recognizing weak and strong forms, and understanding contrastive stress (homographs) achieves refined pronunciation, improved spoken fluency, and heightened awareness of nuanced stress patterns in English.	Understanding
C116.3	Student comprehending stress in compound words, mastering rhythm, intonation, and accent neutralization develops advanced oral proficiency, clear communication skills, and the ability to convey meaning effectively in diverse linguistic contexts.	Applying
C116.4	By listening to short audio texts and adeptly identifying context and specific information to answer questions orally, students develop strong listening comprehension skills, honing their ability to extract and articulate relevant details effectively.	Applying
C116.5	Engaging in newspaper reading to comprehend and identify key terms and structures, students acquire the skills necessary for extracting pertinent information and constructing well-informed reports.	Applying



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Department of CSE – Data Science

CO No.	Course Name: Applied Chemistry Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C117.1	The students entering into the professional course have practically very little exposure to lab classes.	Understanding
C117.2	The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis	Understanding
C117.3	student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills..	Applying

CO No.	Course Name: PPSC Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C118.1	Gains Knowledge on various concepts of a C language.	Applying
C118.2	Able to draw flowcharts and write algorithms.	Understanding
C118.3	Able design and development of C problem solving skills.	Understanding
C118.3	Able to design and develop modular programming skills.	Applying
C118.4	Able to trace and debug a program.	Creating

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NH-16, Valluru,-523272, Ongole, Prakasam District, A.P

Department of CSE – Data Science

Year: I

Regulation: R20

Academic Year: 2022-23

Sem: II

CO No.	Course Name: Mathematics-II	Taxonomy Level
After successful completion of this course students will be able to:		
C121.1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications	Understanding
C121.2	Solve system of linear algebraic equations using Gauss elimination, Gauss Jordan, Gauss Seidel	Understanding
C121.3	Evaluate the approximate roots of polynomial and transcendental equations by different algorithms	Understanding
C121.4	Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals	Understanding
C121.5	Apply numerical integral techniques to different Engineering problems	Understanding
C121.6	Apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations	

CO No.	Course Name: Applied Physics	Taxonomy Level
After successful completion of this course students will be able to:		
C122.1	Understanding coherent sources, their conditions for sustained interference, coupled with an in-depth analysis of interference vs. diffraction and illustration of light polarization with applications	Understanding
C122.2	Explore radiation emission types and identify fiber applications in medical, communication, and diverse fields ; Apply fiber optic concepts across various domains .	Applying
C122.3	Explain the significance of wave function; Identify the role of classical and quantum free electron theory in the study of electrical conductivity; Classify the energy bands of solids	Understanding
C122.4	plain the applications of dielectric and magnetic materials ;Apply the concept of magnetism to magnetic devices	Applying
C122.5	Identify the type of semiconductor using Hall effect and Identify applications of semiconductors in electronic devices; Explain Meissner's effect, BCS theory & Josephson effect in superconductors .	Understanding



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Department of CSE – Data Science

CO No.	Course Name: Digital Logic Design	Taxonomy Level
After successful completion of this course students will be able to:		
C123.1	An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation	Understanding
C123.2	An ability to understand the different switching algebra theorems and apply them for logic functions.	Understanding
C123.3	An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.	Applying
C123.4	Students will be able to design various logic gates starting from simple ordinary gates to complex programmable logic devices & arrays.	Understanding
C123.5	Students will be able to design various sequential circuits starting from flip-flop to registers and counters.	Understanding

CO No.	Course Name: Python Programming	Taxonomy Level
After successful completion of this course students will be able to:		
C124.1	Develop essential programming skills in computer programming concepts like data types, containers.	Understanding
C124.2	Apply the basics of programming in the Python language.	Understanding
C124.3	Solve coding tasks related conditional execution, loops.	Applying
C124.4	Solve coding tasks related to the fundamental notions and techniques used in objectoriented programming.	Applying



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NH-16, Valluru,-523272, Ongole, Prakasam District, A.P

Department of CSE – Data Science

CO No.	Course Name: Data Structures	Taxonomy Level
After successful completion of this course students will be able to:		
C125.1	Assemble and disassemble components of a PC	Understanding
C125.2	Discuss the computational efficiency of the principal algorithms for sorting & searching	Applying
C125.3	Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs	Understanding
C125.4	Demonstrate different methods for traversing trees	Understanding

CO No.	Course Name: Applied Physics Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C126.1	Mastery in experimental techniques: Thin object thickness determination using the wedge method and calculating the radius of curvature with Newton's rings for a plano-convex lens.	Applying
C126.2	Proficiency in optical analysis: Skillful determination of wavelengths in mercury spectrum lines via diffraction grating and finding the dispersive power of a prism.	Understanding
C126.3	Understanding electrical properties: Acquiring knowledge of dielectric constant through charging and discharging methods, and estimating Planck's constant using the photoelectric effect.	Applying
C126.4	Expertise in material characterization: Understanding B-H curve variations through magnetizing magnetic materials and mastering the four-probe method for semiconductor resistivity determination.	Understanding
C126.5	Optical measurement skills: Expertise in determining the numerical aperture and acceptance angle of an optical fiber, and proficiently measuring laser light wavelength using a diffraction grating.	Understanding



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Department of CSE – Data Science

CO No.	Course Name: Python Programming Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C127.1	Write, Test and Debug Python Programs.	Understanding
C127.2	Use Conditionals and Loops for Python Programs.	Understanding
C127.3	Use functions and represent Compound data using Lists, Tuples and Dictionaries.	Understanding
C127.3	Use various applications using python.	Applying

CO No.	Course Name: Data Structures Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C128.1	Use basic data structures such as arrays and linked list.	Applying
C128.2	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.	Understanding
C128.3	Use various searching and sorting algorithms.	Understanding

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NH-16, Valluru,-523272, Ongole, Prakasam District, A.P

Department of CSE – Data Science

Year: II

Regulation: R20

Academic Year: 2022-23

Sem: I

CO NO.	Course Name: Mathematics - III	Taxonomy Level
After successful completion of this course students will be able to:		
C211.1	Interpret the physical meaning of different operators such as gradient, curl and divergence, estimate the work done against a field.	Applying
C211.2	Apply the LaPlace transform for solving differential equations.	Applying
C211.3	Find or compute the Fourier series of periodic signals and be able to apply integral expressions for the Fourier and inverse Fourier transform to a range of non-periodic waveforms.	Applying
C211.4	Formation of partial differential equation and identify solution methods for first order partial differential equations.	Applying
C211.5	Classify higher order partial differential equations and solve heat flow and wave problems.	Applying

CO No.	Course Name: Mathematical Foundation for Computer Science	Taxonomy Level
After successful completion of this course students will be able to:		
C212.1	Demonstrate skills in solving mathematical problems.	Understanding
C212.2	Comprehend mathematical principles and logic.	Understanding
C212.3	Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software.	Understanding
C212.4	Manipulate and analyze data numerically and /or graphically using appropriate software.	Applying
C212.5	Communicate effectively mathematical ideas/results verbally or in writing.	Understanding



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Department of CSE – Data Science

CO No.	Course Name: Fundamentals of DataScience	Taxonomy Level
After successful completion of this course students will be able to:		
C213.1	Apply principles of NumPy and Pandas to the analysis of data. x Make use of various file formats in loading and storage of data. x Identify and apply the need and importance of pre	Understanding
C213.2	Apply principles of NumPy and Pandas to the analysis of data. x Make use of various file formats in loading and storage of data. x Identify and apply the need and importance of pre	Understanding
C213.3	Apply principles of NumPy and Pandas to the analysis of data. x Make use of various file formats in loading and storage of data. x Identify and apply the need and importance of pre	Applying
C213.4	Apply principles of NumPy and Pandas to the analysis of data. x Make use of various file formats in loading and storage of data. x Identify and apply the need and importance of pre	Understanding

CO No.	Course Name: Java Programming	Taxonomy Level
After successful completion of this course students will be able to:		
C214.1	Able to realize the concept of OOP and Java Programming Constructs.	Understanding
C214.2	Able to describe the basic concepts of Java such as operators, classes, objects, inheritance, packages, enumerations and various keywords.	Understanding
C214.3	Apply the concept of exception handling and input or output operations.	Applying
C214.4	Able to design the applications of Java and Java Applet.	Applying
C214.5	Able to analyze and design the concept of event handling and abstract window tool kit.	Applying



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Department of CSE – Data Science

CO No.	Course Name: Database Management Systems	Taxonomy Level
After successful completion of this course students will be able to:		
C215.1	Describe a relational database and object-oriented database.	Understanding
C215.2	Create, maintain and manipulate a relational database using SQL.	Applying
C215.3	Describe ER model and normalization for database design.	Understanding
C215.4	Examine issues in data storage and query processing and can formulate appropriate solutions.	Understanding
C215.5	Outline the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.	Applying

CO No.	Course Name: FDS Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C216.1	Perform various operations on numpy arrays	Applying
C216.2	Importing data from different file formats using pandas	Understanding
C216.3	Draw different types of charts using matplotlib	Applying

CO No.	Course Name: Java Programming	Taxonomy Level
After successful completion of this course students will be able to:		
C217.1	Evaluate default value of all primitive data type, Operations, Expressions, Control flow, Strings.	Understanding
C217.2	Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism.	Understanding
C217.3	Illustrating simple inheritance, multi-level inheritance, Exception handling mechanism.	Applying
C217.4	Construct Threads, Event Handling, implement packages, developing applets.	Applying
C217.5	Evaluate default value of all primitive data type, Operations, Expressions, Control flow, Strings.	Understanding



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Department of CSE – Data Science

CO No.	Course Name: Database Management Systems Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C218.1	Utilize SQL to execute queries for creating database and performing data manipulation operations.	Applying
C218.2	Examine integrity constraints to build efficient databases.	Understanding
C218.3	Apply Queries using Advanced Concepts of SQL.	Applying
C218.4	Build PL/SQL programs including stored procedures, functions, cursors and triggers.	Creating

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Department of CSE – Data Science

Year: II

Regulation: R20

Academic Year: 2022-23

Sem: II

CO No.	Course Name: Probability & Statistics	Taxonomy Level
After successful completion of this course students will be able to:		
C221.1	Compare various discrete probability distributions.	Understanding
C221.2	Compare various continuous probability distributions.	Understanding
C221.3	Find the confidence interval for mean of a population.	Remembering
C221.4	Make use of test of hypothesis for the null hypothesis concerning mean and proportions and perform ANOVA for one way and two-way classification.	Applying
C221.5	Apply correlation and regression lines of two variables for real life problems.	Applying

CO No.	Course Name: Computer Organization	Taxonomy Level
After successful completion of this course students will be able to:		
C222.1	Illustrate the importance of Data Warehousing, Data Mining and its functionalities and Design schema for real time data warehousing applications.	Understanding
C222.2	Demonstrate on various Data Preprocessing Techniques viz. data cleaning, data integration, data transformation and data reduction and Process raw data to make it suitable for various data mining algorithms.	Applying
C222.3	Choose appropriate classification technique to perform classification, model building and evaluation.	Applying
C222.4	Make use of association rule mining techniques viz. Apriori and FP Growth algorithms and analyze on frequent item sets generation.	Analyzing
C222.5	Identify and apply various clustering algorithm (with open-source tools), interpret, evaluate and report the result.	Evaluating



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Department of CSE – Data Science

CO No.	Course Name: Data Warehousing and Data Mining	Taxonomy Level
After successful completion of this course students will be able to:		
C223.1	Classify machines by their power to recognize languages.	Understanding
C223.2	Summarize language classes and grammars relationship among them with the help of Chomsky Hierarchy.	Understanding
C223.3	Employ finite state machines to solve problems in computing.	Applying
C223.4	Illustrate deterministic and non-deterministic machines.	Understanding
C223.5	Quote the hierarchy of problems arising in the computer science.	Applying

CO No.	Course Name: Formal Languages and Automata Theory	Taxonomy Level
After successful completion of this course students will be able to:		
C224.1	Classify machines by their power to recognize languages.	Understanding
C224.2	Summarize language classes and grammars relationship among them with the help of Chomsky Hierarchy.	Understanding
C224.3	Employ finite state machines to solve problems in computing.	Applying
C224.4	Illustrate deterministic and non-deterministic machines.	Understanding
C224.5	Quote the hierarchy of problems arising in the computer science.	Applying

CO No.	Course Name: Managerial Economics and Financial Accountancy	Taxonomy Level
After successful completion of this course students will be able to:		
C225.1	Equipped with the knowledge of estimating the demand and demand elasticities for a product and relate economic principles with business practices for getting successful outcomes.	Remembering
C225.2	The knowledge of understanding of the input-output-cost relationships and estimation of the least cost combination of inputs and also make use of cost analysis to find Break Even Point (BEP) of an enterprise in order to avoid losses.	Understanding
C225.3	Understand the nature of different markets and price output determination under various market conditions and also to have the knowledge of different business units.	Understanding
C225.4	Prepare financial statements and the usage of various accounting tools for analysis.	Applying
C225.5	Evaluate various investment project proposals with the help of capital budgeting techniques for decision making.	Evaluating



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Department of CSE – Data Science

CO No.	Course Name: R Programming Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C226.1	Access online resources for R and import new function packages into the R workspace.	Understanding
C226.2	Import, review, manipulate and summarize data-sets in R.	Understanding
C226.3	Explore data-sets to create testable hypotheses and identify appropriate statistical tests.	Understanding
C226.4	Perform appropriate statistical tests using R.	Applying
C226.5	Create and edit visualizations with R.	Creating

CO No.	Course Name: Data Warehousing and Data Mining Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C227.1	Design a data mart or data warehouse for any organization.	Understanding
C227.2	Extract knowledge using data mining techniques and enlist various algorithms used in information analysis of Data Mining Techniques.	Applying
C227.3	Demonstrate the working of algorithms for data mining tasks such as association rule mining, classification for realistic data.	Applying
C227.4	Implement and Analyze on knowledge flow application on data sets and Apply the suitable visualization techniques to output analytical results.	Applying
C227.5	Design a data mart or data warehouse for any organization.	Understanding



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Department of CSE – Data Science

CO No.	Course Name: WAD Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C228.1	Develop of the major Web application tier- Client-side development.	Applying
C228.2	Participate in the active development of cross-browser applications through JavaScript.	Creating
C228.3	Develop JavaScript applications that transition between states.	Applying

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Department of CSE – Data Science

Year: III

Regulation: R20

Academic Year: 2022-23

Sem: I

CO No.	Course Name: Compiler Design	Taxonomy Level
After successful completion of this course students will be able to:		
C311.1	Demonstrate phases in the design of compiler.	Remembering
C311.2	Organize Syntax Analysis, Top Down and LL (1) grammars.	Understanding
C311.3	Design Bottom-Up Parsing and Construction of LR parsers.	Applying
C311.4	Analyze synthesized, inherited attributes and syntax directed translation schemes.	Applying
C311.5	Determine algorithms to generate code for a target machine.	Understanding

CO No.	Course Name: Operating Systems	Taxonomy Level
After successful completion of this course students will be able to:		
C312.1	Describe various generations of operating systems and functions of operating systems.	Understanding
C312.2	Describe the concept of program, process and thread and analyze various CPU scheduling algorithms and compare their performance.	Understanding
C312.3	Solve Inter Process Communication problems using Mathematical equations by various methods.	Applying
C312.4	Compare various Memory Management Schemes especially paging and Segmentation in OS and apply various Page replacement techniques.	Understanding
C312.5	Outline file systems in operating system like UNIX/Linux and Windows.	Understanding



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NH-16, Valluru,-523272, Ongole, Prakasam District, A.P

Department of CSE – Data Science

CO No.	Course Name: Machine Learning	Taxonomy Level
After successful completion of this course students will be able to:		
C313.1	Explain the fundamental usage of the concept of machine learning system.	Understanding
C313.2	Demonstrate on various regression techniques.	Applying
C313.3	Analyze the ensemble learning methods.	Analyzing
C313.4	Illustrate the clustering techniques and dimensionality reduction models in machine learning.	Applying
C313.5	Discuss the neural network models and fundamental concepts of Deep Learning.	Understanding

CO No.	Course Name: Optimization in Operations Research	Taxonomy Level
After successful completion of this course students will be able to:		
C314.1	State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.	Analyzing
C314.2	Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.	Analyzing
C314.3	Apply and Solve transportation and assignment problem by using Linear programming Simplex method.	Analyzing
C314.4	Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.	Analyzing
C314.5	Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.	Analyzing



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CO No.	Course Name: Dev Ops	Taxonomy Level
After successful completion of this course students will be able to:		
C315.1	Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility.	Applying
C315.2	Describe Dev Ops & DevSec Ops methodologies and their key concepts.	Applying
C315.3	Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models	Applying
C315.4	Set up complete private infrastructure using version control systems and CI/CD tools.	Applying

CO No.	Course Name: Operating Systems & Compiler Design Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C316.1	Implement various scheduling, page replacement algorithms and algorithms related to deadlocks	Understanding
C316.2	Design programs for shared memory management and semaphores	Applying
C316.3	Determine predictive parsing table for a CFG	Applying
C316.4	Apply Lex and Yacc tools.	Applying
C316.5	Examine LR parser and generating SLR Parsing table	Applying



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Department of CSE – Data Science

CO No.	Course Name: Machine Learning Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C317.1	Implement procedures for the machine learning algorithms.	Understanding
C317.2	Design and Develop Python programs for various Learning algorithms.	Understanding
C317.3	Apply appropriate data sets to the Machine Learning algorithms	Applying
C317.4	Develop Machine Learning algorithms to solve real world problems.	Analyzing

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Department of CSE – Data Science

Year: III

Regulation: R20

Academic Year: 2022-23

Sem: II

CO No.	Course Name: Computer Networks	Taxonomy Level
After successful completion of this course students will be able to:		
C321.1	Demonstrate different network models for networking links OSI, TCP/IP, B-ISDN, N-BISDN and get knowledge about various communication techniques, methods, and protocol standards.	Understanding
C321.2	Discuss different transmission media and different switching networks.	Understanding
C321.3	Analyze data link layer services, functions, and protocols like HDLC and PPP.	Analyzing
C321.4	Compare and classify medium access control protocols like ALOHA, CSMA, CSMA/CD, CSMA/CA, Polling, Token passing, FDMA, TDMA, CDMA protocols.	Understanding
C321.5	Determine application layer services and client server protocols working with the client server paradigms like WWW, HTTP, FTP, e-mail, and SNMP etc.	Understanding

CO No.	Course Name: BIG DATA ANALYTICS	Taxonomy Level
After successful completion of this course students will be able to:		
C322.1	Illustrate big data challenges in different domains including social media, transportation, finance and medicine	Remembering
C322.2	Use various techniques for mining data stream	Understanding
C322.3	Design and develop Hadoop	Applying
C322.4	Identify the characteristics of datasets and compare the trivial data and big data for various applications	Applying
C322.5	Explore the various search methods and visualization techniques	Understanding



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NH-16, Valluru,-523272, Ongole, Prakasam District, A.P

Department of CSE – Data Science

CO No.	Course Name: Design and Analysis of Algorithms	Taxonomy Level
After successful completion of this course students will be able to:		
C323.1	Analyze the performance of a given algorithm, denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms.	Analyzing
C323.2	List and describe various algorithmic approaches and Solve problems using divide and conquer & greedy Method.	Applying
C323.3	Synthesize efficient algorithms dynamic programming approaches to solve in common engineering design situations.	Applying
C323.4	Organize important algorithmic design paradigms and methods of analysis: backtracking, branch and bound algorithmic approaches.	Analyzing
C323.5	Demonstrate NP- Completeness theory, lower bound theory and String Matching.	Understanding

CO No.	Course Name: Distributed Systems	Taxonomy Level
After successful completion of this course students will be able to:		
C324.1	Elucidate the foundations and issues of distributed systems	Analyzing
C324.2	Illustrate the various synchronization issues and global state for distributed systems	Understanding
C324.3	Illustrate the Mutual Exclusion and Dead lock detection algorithms in distributed systems	Analyzing
C324.4	Describe the agreement protocols and fault tolerance mechanisms in distributed systems	Analyzing
C324.5	Describe the features of peer-to-peer and distributed shared memory systems	Analyzing



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Department of CSE – Data Science

CO No.	Course Name: Mean stack Development	Taxonomy Level
After successful completion of this course students will be able to:		
C325.1	Build static web pages using HTML 5 elements.	Understanding
C325.2	Apply JavaScript to embed programming interface for web pages and also to perform Client side validations.	Applying
C325.3	Build a basic web server using Node.js, work with Node Package Manager (NPM) and recognize the need for Express.js.	Understanding
C325.4	Develop JavaScript applications using typescript and work with document database using MongoDB.	Understanding
C325.5	Utilize Angular JS to design dynamic and responsive web pages.	Understanding

CO No.	Course Name: Computer Networks Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C326.1	Know how reliable data communication is achieved through data link layer.	Understanding
C326.2	Suggest appropriate routing algorithm for the network.	Understanding
C326.3	Provide internet connection to the system and its installation.	Applying
C326.4	Work on various network management tools.	Analyzing

CO No.	Course Name: Compiler Design Lab	Taxonomy Level
After successful completion of this course students will be able to:		
C327.1	Design simple lexical analysers.	Creating
C327.2	Determine predictive parsing table for a CFG.	Understanding
C327.3	Apply Lex and Yacc tools.	Applying
C327.4	Examine LR parser and generating SLR Parsing table.	Understanding
C327.5	Relate Intermediate code generation for subset C language.	Understanding



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Department of CSE – Data Science

CO No.	Course Name: Deep learning with Tensor flow	Taxonomy Level
After successful completion of this course students will be able to:		
C328.1	Implement deep neural networks to solve real world problems	Applying
C328.2	Choose appropriate pre-trained model to solve real time problem	Applying
C328.3	Interpret the results of two different deep learning models.	Analyzing

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