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

Department of Computer Science and Engineering

Year: I **Regulation: R20** **Academic Year: 2020-21** **Sem: I**

COURSE : Communicative English		
CO No.	Course Outcomes	BT 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	BT 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	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	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	BT 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

CO No.	**COURSE : PPSC**	BT Level
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

CO No.	**COURSE : ITWS LAB**	BT Level
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

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CO No.	**COURSE :ECS LAB**	BT Level
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

COURSE : APPLIED PHYSICS LAB		
CO No.	Course Outcomes	BT 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

CO No.	**COURSE: PPSC LAB**	BT Level
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: 2020-21** **Sem: II**

CO No.	SUBJECT: MATHEMATICS-II	BT Level
After successful completion of this course students will be able to		
C121.1	Solve system of linear algebraic equations using matrix techniques and findEigen 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 findinterpolating polynomial.	Applying
C121.5	Evaluate the solutions of ordinary differential equations to its analytical computations using different methods.	Applying

CO No.	COURSE:APPLIED CHEMISTRY	BT 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 machinesand computational chemistry.	Understanding

CO No.	COURSE : PYTHON	BT Level
C123.1	Develop essential programming skills in computer	Understanding
C123.2	Apply the basics of programming in the Python language	Applying
C123.3	Solve coding tasks related conditional execution, loops	Analyzing
C123.4	Understand the accessing of files and its operations.	Understanding
C123.5	Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming.	Analyzing

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CO No.	COURSE : CO	BT Level
After successful completion of this course students will be able to		
C124.1	Analyze different types of composite materials and the preparation, Properties and applications of the polymers.	Analyzing
C124.2	Apply the knowledge of using redox chemistry in storage devices(batteries) and techniques used for preventing corrosion	Applying
C124.3	Summarize the importance of materials like nano materials, Super conductors, liquid crystals and semiconductors	Understanding
C124.4	Analyze the principles and applications of analytical techniques And different types of nonconventional energy sources	Analyzing
C124.5	Demonstrate the importance of molecular machinesand computational chemistry.	Understanding

CO No.	COURSE : DATA STRUCTURES	BT Level
C125.1	Apply different types of volumetric analysis	Applying
C125.2	Determine hardness of various water samples.	Analyzing
C125.3	Apply different analytical instrumental methods of chemical analysis.	Applying
C125.4	Explain the synthesis of different polymers	Understanding
C125.5	Analyze metal ions present in different food products	Analyzing

CO No.	COURSE :PYTHON LAB	BT Level
C126.1	Develop essential programming skills in computer programming concepts like data types, containers Understanding	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 example	Applying

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CO No.	COURSE : DATA STRUCTURES LAB	BT Level
After going through this course the student 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

CO No.	COURSE: ES	BT 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: R19** **Academic Year: 2020-21** **Sem: I**

CO No.	Course Name: Mathematical Foundation of Computer Science	Taxonomy Level
C211.1	Demonstrate skills in solving mathematical problems.	Understanding
C211.2	Comprehend mathematical principles and logic.	Understanding
C211.3	Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software.	Understanding
C211.4	Manipulate and analyze data numerically and /or graphically using appropriate software.	Applying
C211.5	Communicate effectively mathematical ideas/results verbally or in writing.	Understanding

CO No.	Course Name: Software Engineering	Taxonomy Level
C212.1	Ability to transform an Object-Oriented Design into high quality, executable code.	Applying
C212.2	Skills to design, implement, and execute test cases at the Unit and Integration level.	Applying
C212.3	Compare conventional and agile software methods.	Applying

CO No.	Course Name: Python Programming	Taxonomy Level
C213.1	Develop essential programming skills in computer programming concepts like data types, containers.	Applying
C213.2	Apply the basics of programming in the Python language.	Applying
C213.3	Solve coding tasks related conditional execution, loops.	Applying
C213.4	Solve coding tasks related to the fundamental notions and techniques used in object-oriented programming.	Applying

CO No.	Course Name: Data Structures	Taxonomy Level
C214.1	Summarize the properties, interfaces, and behaviors of basic abstract data types.	Understanding
C214.2	Discuss the computational efficiency of the principal algorithms for sorting & searching.	Understanding
C214.3	Use arrays, records, linked structures, stacks, queues, trees, and Graphs in writing programs.	Applying
C214.4	Demonstrate different methods for traversing trees.	Applying

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CO No.	Course Name: Object-Oriented Programming Through C++	Taxonomy Level
C215.1	Compare the procedural and object-oriented paradigm with concepts of streams, classes, functions, data and objects.	**Understanding**
C215.2	Explain dynamic memory management techniques using pointers, constructors, destructors, etc	**Understanding**
C215.3	Experiment with the concept of function overloading, operator overloading, virtual functions and polymorphism.	**Applying**
C215.4	Use of inheritance with the understanding of early and late binding using pointer object.	**Applying**
C215.5	Demonstrate the use of generic programming, exception handling and Standard Template Library	**Understanding**

CO No.	Course Name: Computer Organization	Taxonomy Level
C216.1	Develop a detailed understanding of computer systems.	**Understanding**
C216.2	Cite different number systems, binary addition and subtraction, standard, floating-point, and micro operations.	**Applying**
C216.3	Develop a detailed understanding of architecture and functionality of central processing unit.	**Understanding**
C216.4	Exemplify in a better way the I/O and memory organization.	**Applying**
C216.5	Illustrate concepts of parallel processing, pipelining and inter processor communication.	**Understanding**

CO No.	Course Name: Python Programming Lab	Taxonomy Level
C217.1	Write, Test and Debug Python Programs.	**Understanding**
C217.2	Use Conditionals and Loops for Python Programs.	**Applying**
C217.3	Use functions and represent Compound data using Lists, Tuples and Dictionaries.	**Applying**
C217.4	Use various applications using python.	**Applying**

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CO No.	Course Name: Data Structures through C++ Lab	Taxonomy Level
C218.1	Apply the various OOPs concepts with the help of programs.	**Applying**
C218.2	Use basic data structures such as arrays and linked list.	**Applying**
C218.3	Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.	**Applying**
C218.4	Use various searching and sorting algorithms.	**Applying**

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Department of Computer Science and Engineering

Year: II **Regulation: R19** **Academic Year: 2020-21** **Sem: II**

CO No.	Course Name: Probability and Statistics	Taxonomy Level
C221.1	Interpret the physical meaning of different operators such as gradient, curl and divergence, estimate the work done against a field, circulation and flux and discuss the relation between line, surface, volume integrals using integral theorems.	**Understanding**
C221.2	Apply the Laplace transform for solving differential equations.	**Applying**
C221.3	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**
C221.4	Formation of partial differential equation and Identify solution methods for first order partial differential equations.	**Applying**
C221.5	Classify higher order partial differential equations and solve heat flow and wave problems.	**Applying**

CO No.	Course Name: Java Programming	Taxonomy Level
C222.1	Able to realize the concept of Object Oriented Programming & Java Programming Constructs.	**Understanding**
C222.2	Able to describe the basic concepts of Java such as operators, classes, objects, inheritance, packages, Enumeration and various keywords.	**Understanding**
C222.3	Apply the concept of exception handling and Input/ Output operations.	**Applying**
C222.4	Able to design the applications of Java & Java applet.	**Applying**
C222.5	Able to Analyze & Design the concept of Event Handling and Abstract Window Toolkit.	**Applying**

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CO No.	Course Name: Operating Systems	Taxonomy Level
C223.1	Describe various generations of Operating System and functions of Operating Systems.	**Remembering**
C223.2	Describe the concept of program, process and thread and analyze various CPU Scheduling Algorithms and compare their performance.	**Understanding**
C223.3	Solve Inter Process Communication problems using Mathematical Equations by various methods.	**Applying**
C223.4	Compare various Memory Management Schemes especially paging and Segmentation in Operating System and apply various Page Replacement Techniques.	**Applying**
C223.5	Outline File Systems in Operating System like UNIX/Linux and Windows.	**Understanding**

CO No.	Course Name: Database Management Systems	Taxonomy Level
C224.1	Describe a relational database and object-oriented database.	**Understanding**
C224.2	Create, maintain and manipulate a relational database using SQL.	**Applying**
C224.3	Describe ER model and normalization for database design.	**Understanding**
C224.4	Examine issues in data storage and query processing and can formulate appropriate solutions.	**Understanding**
C224.5	Outline the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.	**Understanding**

CO No.	Course Name: Formal Language Automata Theory	Taxonomy Level
C225.1	Classify machines by their power to recognize languages.	**Understanding**
C225.2	Summarize language classes & grammars relationship among them with the help of Chomsky hierarchy.	**Remembering**
C225.3	Employ finite state machines to solve problems in computing.	**Applying**
C225.4	Illustrate deterministic and non-deterministic machines.	**Understanding**
C225.5	Quote the hierarchy of problems arising in the computer science.	**Understanding**

Department of Computer Science and Engineering

CO No.	Course Name: Java Programming Lab	Taxonomy Level
C226.1	Evaluate default value of all primitive data type, Operations, Expressions, Control-flow, Strings.	Applying
C226.2	Determine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism.	Applying
C226.3	Illustrating simple inheritance, multi-level inheritance, Exception handling mechanism.	Applying
C226.4	Construct Threads, Event Handling, implement packages, developing applets.	Applying

CO No.	Course Name: Unix Operating Systems Lab	Taxonomy Level
C227.1	To use Unix utilities and perform basic shell control of the utilities.	Applying
C227.2	To use the Unix file system and file access control.	Applying
C227.3	To use of an operating system to develop software.	Applying
C227.4	Students will be able to use Linux environment efficiently.	Applying
C227.5	Solve problems using bash for shell scripting.	Applying

CO No.	Course Name: Database Management Systems Lab	Taxonomy Level
C228.1	Utilize SQL to execute queries for creating database and performing data manipulation operations.	Applying
C228.2	Examine integrity constraints to build efficient databases.	Applying
C228.3	Apply Queries using Advanced Concepts of SQL.	Applying
C228.4	Build PL/SQL programs including stored procedures, functions, cursors and triggers.	Applying

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Department of Computer Science and Engineering

Year: III **Regulation: R16** **Academic Year: 2020-21** **Sem: I**

CO No.	Subject: Compiler Design	Taxonomy Level
C311.1	Demonstrate stages in translators and acquire knowledge of compiler & its Phases.	Understanding
C311.2	Use grammars for specifying the syntax and construct top-down parsing for given grammar.	Understanding
C311.3	Build bottom-up parse table for a given grammar using LR items.	Applying
C311.4	Generate intermediate code for given program.	Applying
C311.5	Understand symbol table management and machine code generation for a given program and use peep hole optimization on machine code.	Understanding
C311.6	Apply machine independent code optimization techniques to improve the performance of a program.	Applying

CO No.	Subject: Unix Programming	Taxonomy Level
C312.1	Define Basic Components and commands in UNIX Operating System.	Remembering
C312.2	Illustrate different File permission in UNIX Operating System.	Understanding
C312.3	Construct Shell Programs using shell commands.	Applying
C312.4	Demonstrate different Grep Family in UNIX Operating system.	Understanding
C312.5	Build and Debug Shell Script in Unix operating.	Understanding
C312.6	Select Different Process Types in UNIX Operating System.	Applying

CO No.	Subject: Object Oriented Analysis and Design using UML	Taxonomy Level
C313.1	Apply complex system using object-oriented approach.	Applying
C313.2	Build the class diagram with responsibilities and state using UML notation.	Applying
C313.3	Identify the events, classes and responsibilities of the problem domain.	Understanding
C313.4	Describe basic Interactions, Use cases of the problem domain.	Understanding
C313.5	Implement various states and advanced behavioural modeling using UML notation.	Applying
C313.6	Classify components and nodes of the problem domain.	Understanding

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CO No.	Subject: Database Management Systems	Taxonomy Level
C314.1	Demonstrate Data Base with different applications of DBMS.	Understanding
C314.2	Identifies the entity, attributes, Relationships and keys in various Data Models.	Understanding
C314.3	Utilize relational algebra concepts like selection, projection, relational calculus which helps in understanding queries.	Applying
C314.4	Experiment ddl, dml commands etc by writing queries in standard language of relational databases.	Applying
C314.5	Develop various advance SQL queries related to Transaction Processing & Locking using concept of Concurrency control.	Applying
C314.6	Analyse indexing mechanisms for efficient retrieval of information from a database.	Analysing

CO No.	Subject: Operating Systems	Taxonomy Level
C315.1	Explain the structure of OS and basic architectural components involved in OS.	Understanding
C315.2	Implement various process scheduling algorithms.	Applying
C315.3	Compare and contrast various memory management schemes.	Remembering
C315.4	Implement deadlock prevention and avoidance algorithms.	Applying
C315.5	Implement prototype file system.	Applying
C315.6	Explain administrative tasks on Linux servers and android internals.	Understanding

CO No.	Subject: Unified Modeling Lab	Taxonomy Level
C316.1	Able to understand the case studies and design the model.	Applying
C316.2	Able to understand how design patterns solve design problems.	Applying
C316.3	Able to develop design solutions using creational patterns.	Applying

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CO No.	Subject: Operating System & Linux Programming Lab	Taxonomy Level
C317.1	Implement various CPU Scheduling algorithms.	Applying
C317.2	Develop Multiprogramming-Memory management Implementation	Applying
C317.3	Construct deadlock, prevention and avoidance algorithms.	Applying
C317.4	Implement Different page replacement algorithms.	Applying
C317.5	Execute basic shell control of the utilities	Applying
C317.6	Solve problems using bash for shell scripting	Applying

CO No.	Subject: Database Management System Lab	Taxonomy Level
C318.1	Able to Understand, appreciate and effectively explain the underlying concepts of database technologies.	Understanding
C318.2	Able to Design and implement a database schema for a given problem-domain.	Applying
C318.3	Able to Normalize a database.	Understanding
C318.4	Able to Populate and query a database using SQL DML/DDL commands.	Applying
C318.5	Able to Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.	Applying
C318.6	Able to use Programming, PL/SQL including stored procedures, stored functions, cursors, packages.	Applying

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Department of Computer Science and Engineering

Year: III **Regulation: R16** **Academic Year: 2020-21** **Sem: II**

CO No.	Subject: Computer Networks	Taxonomy Level
C321.1	Outline the basic concepts of reference models and Identify the functionality of physical layer in computer communications.	Understanding
C321.2	Explain various physical layer transmission techniques.	Understanding
C321.3	Examine the data link layer design issues.	Understanding
C321.4	list various data link access methods and network layer functions.	Understanding
C321.5	outline the IEEE 802.11 standards.	Understanding
C321.6	Examine various application layer functionalities.	Understanding

CO No.	Subject: Data Warehousing and Mining	Taxonomy Level
C322.1	Understand the data warehouse principles, data mining concepts and working.	Understanding
C322.2	Understand various data pre-processing procedures and their application.	Understanding
C322.3	Discuss the general approach to solve Classification problem.	Applying
C322.4	Understand the alternative techniques of Classification.	Understanding
C322.5	Discuss basic concepts and algorithms of Association analysis.	Applying
C322.6	Understand the basic concepts and algorithms of Cluster Analysis.	Understanding

CO No.	Subject: Design and Analysis of Algorithms	Taxonomy Level
C323.1	Explain the fundamentals for analysing time and space complexity of algorithms.	Remembering
C323.2	Apply divide and conquer technique to solve real time problems related to computing.	Applying
C323.3	Use greedy technique to solve problems on optimization like minimum spanning tree.	Applying
C323.4	Make use of dynamic programming paradigm for solving problems like knapsack, matrix multiplication and optimal binary search tree.	Applying
C323.5	Illustrate backtracking with applications on n-queen problem sum of subsets problem, and graph colouring.	Understanding
C323.6	Explain branch and bound paradigm with Travelling sales person problem and 0/1 knapsack problem.	Applying

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CO No.	Subject: Software Testing Methodologies	Taxonomy Level
C324.1	Understand the basic testing procedure for Path testing.	Understanding
C324.2	Understand the basic testing procedures for Dataflow testing and Transaction Flow.	Understanding
C324.3	Understand the basic testing procedures for Domain testing.	Understanding
C324.4	Understand the basic testing procedures for syntax testing.	Understanding
C324.5	Understand the basic testing procedures for Logic based Testing.	Understanding
C324.6	Apply tools to resolve the problems in Real Time Environment.	Applying

CO No.	Subject: Internet of Things	Taxonomy Level
C325.1	Interpret the concepts of Internet of Things.	Understanding
C325.2	Determine the market perspective of IOT.	Understanding
C325.3	Analyze basic protocols in Web Communication.	Analysing
C325.4	Analyze and evaluate protocols used in IOT.	Analysing
C325.5	Design IOT applications in different domain and be able to analyze their performance.	Applying
C325.6	Implement basic IOT applications on embedded platform.	Applying

CO No.	Subject: Network Programming Lab	Taxonomy Level
C326.1	Able to understand and explain the basic concepts of Grid Computing	Understanding
C326.2	Able to explain the advantages of using Grid Computing within a given environment.	Understanding
C326.3	Able to prepare for any upcoming Grid deployments and be able to get started with a potentially available Grid setup.	Applying
C326.4	Able to discuss some of the enabling technologies e.g. high-speed links and storage area networks.	Understanding
C326.5	Able to build computer grids.	Applying

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CO No.	Subject: Software Testing Lab	Taxonomy Level
C327.1	Able to find practical solutions to the problems.	Applying
C327.2	Able to solve specific problems alone or in teams.	Applying
C327.3	Able to manage a project from beginning to end.	Applying
C327.4	Able to work independently as well as in teams.	Applying
C327.5	Able to define, formulate and analyze a problem.	Understanding

CO No.	Subject: Data Warehousing and Mining Lab	Taxonomy Level
C328.1	Able to understand the data mining process and important issues around data cleaning, pre-processing and integration.	Applying
C328.2	Able to understand the principle algorithms and techniques used in data mining such as Clustering, association mining, classification and prediction.	Applying

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Department of Computer Science and Engineering

Year: IV **Regulation: R16** **Academic Year: 2020-21** **Sem: I**

CO No.	Subject: Cryptography and Network Security	Taxonomy Level
C411.1	Able to understand the basic security goals of cryptography and security networks.	Understanding
C411.2	Able to understand issues in symmetric key and cryptography.	Understanding
C411.3	Able to think and analyze the different techniques in asymmetric encryption.	Analyzing
C411.4	Able to understand the basics of data integrity and digital signature key management.	Understanding
C411.5	Apply the knowledge of data integrity.	Applying
C411.6	Able to learn management of key functions.	Understanding

CO No.	Subject: Software Architecture & Design Patterns	Taxonomy Level
C412.1	To understand interrelationships, principles and guidelines governing architecture and evolution over time.	Understanding
C412.2	To understand various architectural styles of software systems.	Understanding
C412.3	To understand design patterns and their underlying object-oriented concepts.	Understanding
C412.4	To understand implementation of design patterns and providing solutions to real-world software design problems.	Understanding
C412.5	To understand patterns with each other and understanding the consequences of combining patterns on the overall quality of a system.	Understanding
C412.6	Implement basic applications of SADP.	Applying

CO No.	Subject: Web Technologies	Taxonomy Level
C413.1	Analyze a web page and identify its elements and attributes.	Analyzing
C413.2	Create web pages using XHTML and Cascading Style Sheets.	Applying
C413.3	Build Dynamic Web pages.	Understanding
C413.4	Write simple client-side scripts using AJAX.	Applying
C413.5	Build web applications using PHP.	Applying
C413.6	Programming through PERL and Ruby.	Applying

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CO No.	Subject: Managerial Economics and Financial Analysis	Taxonomy Level
C414.1	Relate economic principles with business practices for getting successful outcomes.	Remembering
C414.2	Make use of cost analysis to find Break Even Point (BEP) of an enterprise in order to avoid losses.	Applying
C414.3	Compare the Price -- out determinations under different competitions in the markets and pricing strategies.	Understanding
C414.4	Interpret different forms of business organizations and the new economic environment in the real business.	Understanding
C414.5	Make use of the financial statements and relevant ratios for evaluating company's financial performance to make optimal decisions.	Applying
C414.6	Illustrate different capital budgeting methods to estimate the best investment decision in business practices.	Understanding

CO No.	Subject: Mobile Computing	Taxonomy Level
C415.1	Able to understand the basics of mobile computing, radio interface, GSM & GPRS.	Understanding
C415.2	Able to understand issues in MAC Layer.	Understanding
C415.3	Able to think and analysis the different techniques in Network Layer.	Analyzing
C415.4	Able to think and analyze the different techniques mobile transport layer and data base issues.	Analyzing
C415.5	Able to understand the basics of Data Delivery Mechanism in Mobile computing.	Understanding
C415.6	Able to think and develop new mobile applications.	Applying

Department of Computer Science and Engineering

CO No.	Subject: Cloud Computing	Taxonomy Level
C416.1	Interpret the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing.	Understanding
C416.2	Build the levels of virtualization, structure, memory and I/O devices and data centres.	Understanding
C416.3	Apply the architecture and infrastructure of cloud computing, including Saas, PaaS,IaaS, public cloud, private cloud and hybrid cloud to different problems.	Applying
C416.4	Analyze case studies to derive the best practice model to apply when developing and deploying cloud based applications.	Analyzing
C416.5	Apply the resource management skills in theory and applications related to cloud computing.	Applying
C416.6	Explain the storage technologies in File system in Cloud environment.	Understanding

CO No.	Subject: Software Architecture & Design Patterns Lab	Taxonomy Level
C417.1	Able to understand interrelationships, principles and guidelines governing architecture and evolution over time.	Understanding
C417.2	Able to analyze the architecture and build the system from the components.	Analyzing
C417.3	Able to prepare creational patterns that deal with object creation mechanisms, trying to create objects in a manner suitable to the situation.	Applying
C417.4	Able to prepare structural patterns that ease the design by identifying a simple way to realize relationships among entities.	Understanding
C417.5	Able to learn behavioral patterns that identify common communication patterns between objects and realize these patterns.	Understanding
C417.6	Able to classify various case studies.	Understanding

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CO No.	Subject: Web Technologies Lab	Taxonomy Level
C418.1	Students will be able to develop static web sites using XHTML and Java Scripts.	Applying
C418.2	Students can implement XML and XSLT for web applications.	Applying
C418.3	Students can develop Dynamic web content using Java Servlets and JSP.	Applying
C418.4	Student will be to develop JDBC connections and implement a complete Dynamic Web Application.	Applying

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Department of Computer Science and Engineering

Year: IV **Regulation: R16** **Academic Year: 2020-21** **Sem: II**

CO No.	Subject: Distributed Systems	Taxonomy Level
C421.1	Explain the building blocks of distributed system.	Understanding
C421.2	Implement the inter process communication using java programs.	Understanding
C421.3	Implement the RMI communication for distributed environment.	Understanding
C421.4	Explain the OS supports, process and threading.	Understanding
C421.5	Explain the distributed file system.	Understanding
C421.6	Explain distributed deadlock transaction and replication.	Understanding

CO No.	Subject: Management Science	Taxonomy Level
C422.1	Understand the basic concepts of management science.	Understanding
C422.2	Distinguish all functional management.	Remembering
C422.3	Analyze operations management.	Analyzing
C422.4	Analyze real project management and solve PERT and CPM.	Analyzing
C422.5	Understand the management strategic management.	Understanding
C422.6	Discuss contemporary management practices.	Understanding

CO No.	Subject: Machine Learning	Taxonomy Level
C423.1	Recognize the characteristics of machine learning that make it useful to real-world problems.	Applying
C423.2	Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.	Understanding
C423.3	Choose Tree models in Machine Learning.	Applying
C423.4	Choose Linear Models in Machine Learning Like classification, Clustering Algorithms.	Applying
C423.5	Schedule Probabilistic models for categorical data in Machine Learning like regularized regression algorithms.	Applying
C423.6	Describe the concept behind neural networks for learning non-linear functions.	Understanding

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CO No.	Subject: Concurrent and Parallel Programming	Taxonomy Level
C424.1	Recall the concurrent and sequential programming constructs.	Remembering
C424.2	Interpret about processes, threads and the issues of concurrent programming and current trends.	Analyzing
C424.3	Experiment with parallel algorithms such as sorting, ranking, searching and traversals.	Applying
C424.4	Interpret parallel programming paradigms using GPGPU, P threads and STM to develop applications.	Analyzing
C424.5	Implement multi-threaded programs supported by cilk++ that runs across heterogeneous platforms.	Applying
C424.6	Implement c++ massive parallel applications using c++ AMP and GPU.	Applying

CO No.	Subject: Project	Taxonomy Level
C425.1	Summarize the contemporary scholarly literature, activities, and explored tools for hands-on in the respective project area.	Understanding
C425.2	List out the specific requirements to develop the workable solution for the identified computing problem.	Analyzing
C425.3	Develop a workable computing solution for the identified problem.	Applying
C425.4	Evaluate the performance of the developed solution.	Evaluating
C425.5	Compile the results and findings of the project in written and verbal formats.	Creating
C425.6	Summarize the contemporary scholarly literature, activities, and explored tools for hands-on in the respective project area.	Understanding

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Department of CSE – DATA SCIENCE

Year: I **Regulation: R20** **Academic Year: 2020-21** **Sem: I**

CO No.	Course Name: Communicative English Students can,	Taxonomy Level
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 Students can,	Taxonomy Level
C112.1	Utilize mean value theorems to real life problems	Understanding
C112.2	Solve the differential equations related to various engineering fields	Solving
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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CO No.	Course Name: Applied Chemistry	Taxonomy Level
Students can,		
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	

CO No.	Course Name: Programming forproblem solvingusing C	Taxonomy Level
Students can,		
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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CO No.	Course Name: COMPUTER ENGINEERING WORKSHOP	Taxonomy Level
Students can,		
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
Students can,		
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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CO No.	Course Name: Applied Chemistry Lab	Taxonomy Level
Students can,		
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
Students can,		
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.	
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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Year: I **Regulation: R20** **Academic Year: 2020-21** **Sem: II**

CO No.	Course Name: Mathematics-II	Taxonomy Level
	Students can,	
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
	Students can,	
C112.1	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
C112.2	Explore radiation emission types and identify fiber applications in medical, communication, and diverse fields ; Apply fiber optic concepts across various domains .	Solving
C112.3	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
C112.4	plain the applications of dielectric and magnetic materials ;Apply the concept of magnetism to magnetic devices	Applying
C112.5	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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CO No.	Course Name: Digital Logic Design	Taxonomy Level
	Students can,	
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.	

CO No.	Course Name: Python Programming	Taxonomy Level
	Students can,	
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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CO No.	Course Name: Data Structures	Taxonomy Level
	Students can,	
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	

CO No.	Course Name: Applied Physics Lab	Taxonomy Level
	Students can,	
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.	
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.	

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CO No.	Course Name: Python Programming Lab	Taxonomy Level
	Students can,	
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.	
C127.3	Use various applications using python.	Applying

CO No.	Course Name: Data Structures Lab	Taxonomy Level
	Students can,	
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.	

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