3.1.1 Course Outcomes(COs) 2023-24

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Department of Electronics & Communication Engineering

VCET/ECE/C3/2023-24/CO-PO/PSO

Program level PO & PSO mapping

PROGRAM OUTCOMES (POs):

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design / development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1. The ability to absorb and apply fundamental knowledge of core Electronics and Communication Engineering subjects in the analysis, design and development of various types of integrated electronic systems.

PSO2: To analyse, design and develop solutions for the real time problems and to apply the technical Knowledge for developing quality products for Electronics and Communication based Industry.

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Department of Electronics & Communication Engineering

VCET/ECE/C3/2023-24/CO-PO

Course Name: M-I(C101) for academic year 2023-24(I YEAR)

Items	Course Outcomes
C101.1	WRITE THE MATRIX REPRESERNTATION OF LINEAR EQUATIONS
C101.2	FIND THE EIGEN VALUES AND EIGEN VECTORS
C101.3	ANALIZE THE NATURE OF SEQUENCE AND SERIES
C101.4	EVALUATE THE MEAN VALUE THEOREMS AND IMPROPER INTEGRALS
C101.5	FIND THE EXTREME VALUES OF FUNCTIONS

Course Name: APPLIED PHYSICS (C102) for academic year 2023-24 (I YEAR)

Items	Course Outcomes
C102.1	The student would be able to learn the fundamental concepts on Quantum behaviour of matter in its micro state.
C102.2	The knowledge of fundamentals of Semiconductor physics, Optoelectronics, Lasers and fibre optics enable the students to apply to various systems like communications, solar cell, photo cells
C102.3	Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
C102.4	The course also helps the students to be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.
C102.5	lasers and fibre optics in systems of solar cell

Course Name: C Programming for Engineers (C103) for academic year 2023-24 (I YEAR)

Items	Course Outcomes
C103.1	PROBLEM ANALYSIS TO WRITE ALGORITHMS AND TO DRAW FLOWCHARTS AND CONVERT C PROGRAMS FOR SOLVING PROBLEMS.
C103.2	DESIGN CODE AND TEST A GIVEN LOGIC IN C PROGRAMMING LANGUAGE.
C103.3	DESIGN USE ARRAYS, POINTERS, STRINGS AND STRUCTURES TO WRITE C PROGRAMS.
C 103.4	DEVELOP A PROBLEM INTO FUNCTIONS AND TO DEVELOP MODULAR REUSABLE CODE.
C103.5	Modularize the code with functions so that .They can be reused

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Course Name: AP LAB **(C107) for academic year 2023-24 (I YEAR)**

Items	Course Outcomes
C107.1	Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.
C107.2	Appreciate quantum physics in semiconductor devices and optoelectronics.
C107.3	Gain the knowledge of applications of dielectric constant.
C107.4	Understand the variation of magnetic field and behavior of hysteresis curve.
C107.5	Carried out data analysis.

Course Name: C Programming for Engineers Laboratory **C108 for academic year 2023-24 (I YEAR)**

Items	Course Outcomes
C108.1	Write algorithms and to draw flowcharts for solving problems and translate the algorithms/flowcharts to programs (in C language).
C108.2	Use functions to develop modular reusable code.
C108.3	Use arrays, pointers, strings and structures to formulate algorithms and programs.
C108.4	Understand Autonomous systems, the application of artificial intelligence.
C108.5	Understand Searching and sorting algorithms

Course Name: English Language and Communication Skills Laboratory **C109 for academic year 2023-24 (I YEAR)**

Items	Course Outcomes
C109.1	Understand the nuances of English language through audio- visual experience and group activities
C109.2	Neutralise their accent for intelligibility
C109.3	Understand the importance of vocabulary and sentence structures.
C109.4	Develop comprehension skills from the known and unknown passages.
C109.5	Speak with clarity and confidence which in turn enhances their employability skills

Course Name: Computer Aided Engineering Graphics **(C113) for academic year 2023-24 (I YEAR)**

Items	Course Outcomes
C113.1	Apply computer aided drafting tools to create 2D and 3D objects
C113..2	sketch conics and different types of solids
C113..3	Appreciate the need of Sectional views of solids and Development of surfaces of solids
C113..4	**Read and interpret engineering drawings**
C113..5	Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

Course Name: Basic Electrical Engineering **(C114) for academic year 2023-24 (I YEAR)**

Items	Course Outcomes
C114.1	Understand and analyze basic Electrical circuits Study the working principles of Electrical Machines and Transformers
C114.2	Introduce components of Low Voltage Electrical Installations.
C114.3	Introduce components of Low Voltage Electrical Installations
C114.4	Practice on machine tools and their operations
C114.5	Apply basic electrical engineering knowledge for house wiring practice.

Course Name: Electronic Devices and Circuits **(C115) for academic year 2023-24 (I YEAR)**

Items	Course Outcomes
C115.1	Acquire the knowledge of various electronic devices and their use on real life.
C115.2	Know the applications of various devices.
C115.3	Acquire the knowledge about the role of special purpose devices and their applications.
C115.4	Know the applications of various devices.
C115.5	Acquire the knowledge about the role of special purpose devices and their applications.

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Course Name: Basic Electrical Engineering lab (C119) for academic year 2023-24 (I YEAR)

Items	Course Outcomes
C119.1	Verify the basic Electrical circuits through different experiments.
C119.2	Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.
C119.3	Analyze the transient responses of R, L and C circuits for different input conditions.
C119.4	the transient responses of R, L and C circuits for different input conditions.
C119.5	Transformers through various testing methods.

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Course Name: NUMERICAL METHODS AND COMPLEX VARIABLES **(C205) for academic year 2023-24(II-I)**

Items	Course Outcomes
C205.1	Express any periodic function in terms of sine and cosine
C205.2	Find the root of a given polynomial and transcendental equations.
C205.3	Find the numerical solutions for a given first order ODE's .
C205.4	Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems
C205.5	Taylor's and Laurent's series expansions in complex function

Course Name: ANALOG CIRCUITS LAB **(C206) for academic year 2023-24(II-I)**

Items	Course Outcomes
C206.1	Design amplifiers with required Q point and analyse amplifier characteristics
C206.2	Design amplifiers CE,CB,CC with Q-point analysis
C206.3	Design amplifiers with frequency and calculate gain bandwidth
C206.4	obtain drain transfer characteristics of FET,MOSFET
C206.5	Investigate feedback concept in amplifiers and oscillator

Course Name: DIGITAL SLOGIC DESIGN LAB **(C207) for academic year 2023-24(II-I)**

Items	Course Outcomes
C207.1	1. Acquire the knowledge on numerical information in different forms and Boolean Algebra theorem
C207.2	Define Postulates of Boolean algebra and to minimize combinational functions, and design the combinational circuits.
C207.3	Design and analyze sequential circuits for various cyclic functions
C207.4	Characterize logic families and analyze them for the purpose of AC and DC parameters
C207.5	Realize all logic gates with TTL logic.

Course Name: ANALOG AND DIGITALCOMMUNICATIONS (C212) for academic year 2023-24(II-II)

Items	Course Outcomes
C212.1	Design and analyze various Analog and Digital Modulation and Demodulation techniques.
C212.2	Understand the effect of noise present in continuous wave and angle modulation techniques
C212.3	Attain the knowledge about AM , FM Transmitters and Receivers
C212.4	Analyze and design the base band Transmission
C212.5	Understand the concepts of Digital Modulation Techniques

Course Name: LINEAR AND DIGITAL IC APPLICAITONS (C213) for academic year 2023-24(II-II)

Items	Course Outcomes
C213.1	A thorough understanding of operational amplifiers with linear integrated circuits.
C213.2	Attain the knowledge of functional diagrams and design applications of IC555 and IC565
C213.3	Acquire the knowledge and design the Data converters.
C213.4	Acquire the knowledge of combinational logic
C213.5	Choose the proper digital integrated circuits by knowing their characteristics..

Course Name: ELECTRONIC CIRCUIT ANALYSIS (C214) for academic year 2023-24(II-II)s

1Items	Course Outcomes
C214.1	Design the power amplifiers.
C214.2	Design the tuned amplifiers and analyse is frequency response
C214.3	Design Multivibrators and sweep circuits for various applications.
C214.4	Design time base generators.
C214.5	Utilize the concepts of synchronization, frequency division and sampling gates

Course Name: MICROPROCESSORS AND MICROCONTROLLERS **(C301) for academic year 2023-24(III-I)**

Items	Course Outcomes
C301.1	Understands the internal architecture, organization and assembly language programming of 8086 processors.
C301.2	Understands the internal architecture, organization and assembly language programming of 8051 microcontrollers
C301.3	Understands the interfacing techniques to 8086 and 8051 based systems.
C301.4	Understands the internal architecture of ARM processors and basic concepts of advanced ARM
C301.5	Design ARM and cortex processors

Course Name: DATA COMMUNICATIONS AND NETWORKS **(C302) for academic year 2023-24 (III-I)**

Items	Course Outcomes
C302.1	Know the Categories and functions of various Data communication Networks
C302.2	Design and analyze various error detection techniques.
C302.3	Demonstrate the mechanism of routing the data in network layer
C302.4	Know the significance of various Flow control and Congestion control Mechanisms
C302.5	Know the Functioning of various Application layer Protocols.

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Course Name: MICROPROCESSORS AND MICROCONTROLLS LAB (C306) for academic year 2023-24 (III-I)
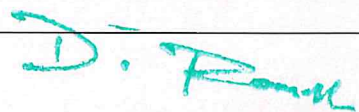
Items	Course Outcomes
C306.1	Set up programming strategies for Microprocessor, microcontrollers and select proper mnemonics and run their program on the training boards.
C306.2	Practice different types of programming keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison
C306.3	Develop testing and experimental procedures on Microprocessor analyze their operation
C306.4	Prepare professional quality textual and computational results using assembly language programming
C306.5	Develop testing and experimental procedures on Microcontroller analyze their operation under different cases.

Course Name: : DATA COMMUNICATIONS AND NETWORKS LAB. (C307) for academic year 2023-24 (III-I)

Items	Course Outcomes
C307.1	Student will be able to understand network communication using the layered concept, Open System Interconnect (OSI) and the Internet Model
C30.2	Student will be able to understand various types of transmission media, network devices; and parameters of evaluation of performance for each media and device.
C307.3	Student will be able to understand the concept of flow control, error control and LAN protocols; to explain the design of, and algorithms used in, the physical, data link layers.
C307.4	Student will understand the working principles of LAN and network management system
C307.5	To learn the concepts behind physical and logical addressing, subnetting and supernetting with respect to TCP protocol

Course Name: Advanced Communication Skills Lab (C308) for academic year 2023-24 (III-I)

Items	Course Outcomes
C308.1	The student will develop listening skills with clarity of understanding to perform better they will be able to develop skills debates, group discussions & progress with presentation objects
C308.2	The students will be able to write formal letters for reaching higher authority for permission or change of request for development of organization.
C308.3	The students will be able to talk fluently & confidently to get into MNC and job prospects issues will be minimized thus enhancing recruitment numbers
C308.4	The students gets improvised accomplished of sound vocabulary & its proper use contextually
C308.5	The students will be able to take part in social profession communication and also able to give oral presentation

Course Name: DISASTER PREPARENESS PLANNING & MANAGEMENT **(C314) for academic year 2023-24 (III-II)**

Items	Course Outcomes
C314.1	THE APPLICATION OF DISASTER CONCEPTS TO MANAGEMENT
C314.2	.ANALYZING RELATIONSHIP BETWEEN DEVELOPMENT AND DISASTERS
C314.3	ABILITY TO UNDERSTAND CATEGORIES OF DISASTERS
C314.4	REALIZATION OF THE RESPONSIBILITIES TO SOCIETY
C314.5	UNDERSTAND THE DISASTERS AND REMEDIES

Course Name: : DIGITAL SIGNAL PROCESSING LAB **(C315) for academic year 2023-24 (III-II)**

Items	Course Outcomes
C315.1	Design entry and simulation of combinational &sequential circuits and functional verification
C315.2	Synthesis, p&r and post P & R simulation for combinational and sequential circuits
C315.3	Implementation of the combinational &sequential circuits on FPGA hardware
C315.4	Write verilog and VHDL code for sequential circuits and understanding design styles
C315.5	Write verilog and VHDL code for different combinational circuits

Course Name: E-CAD LAB **(C316) for academic year 2023-24 (III-II)**

Items	Course Outcomes
C316.1	Design entry and simulation of combinational &sequential circuits and functional verification
C316.2	Synthesis, p&r and post P & R simulation for combinational and sequential circuits
C316.3	Implementation of the combinational &sequential circuits on FPGA hardware
C316.4	Write verilog and VHDL code for sequential circuits and understanding design styles
C316.5	Write verilog and VHDL code for different combinational circuits

Course Name: SCRIPTING LANGUAGES LAB **(C317) for academic year 2023-24 (III-II)**

Items	Course Outcomes
C317.1	Ability to understand the differences between Scripting languages and programming languages
C317.2	Able to gain some fluency programming in Ruby, Perl, TCL
C317.3	To implement the concepts of Ruby objects in C
C317.4	To gain more knowledge of data structures and packages and perl programming security issues
C317.5	To gain more knowledge of perl programming security issues.

Course Name: PROFESSIONAL PRACTICE LAW AND ETHICS **(C404) for academic year 2023-24 (IV-I)**

Items	Course Outcomes
C404.1	The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers. The students will learn the rights and responsibilities as an employee, team member and a global citizen..
C404.2	Understanding basic purpose of profession, professional ethics and various moral and social issues
C404.3	Awareness of professional rights and responsibilities of a Engineer, safety and risk benefit analysis of a Engineer..
C404.4	Acquiring knowledge of various roles of Enbgineer In applying ethical principles at various professional levels
C404.5	Professional Ethical values and contemporary issues

Course Name: POE **(C405) for academic year 2023-24(IV-I)**

Items	Course Outcomes
C405.1	The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers. The students will learn the rights and responsibilities as an employee, team member and a global citizen..
C405.2	Understanding basic purpose of profession, professional ethics and various moral and social issues
C405.3	Awareness of professional rights and responsibilities of a Engineer, safety and risk benefit analysis of a Engineer..
C405.4	Acquiring knowledge of various roles of Enbgineer In applying ethical principles at various professional levels
C405.5	Professional Ethical values and contemporary issues

Course Name: MICROWAVE AND OPTICAL COMMUNICATION LAB **(C406) for academic year 2023-24 (IV-I)**

Items	Course Outcomes
C406.1	Verify characteristics of Reflex Klystron.
C406.2	Estimate the power measurements of RF Components such as directional Couplers.
C406.3	Analyze various parameters of Waveguide Components
C406.4	Demonstrate characteristics of various optical sources.
C406.5	Measure data Rate, Numerical Aperture and Losses in Optical Link.

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Course Name: WIRELESS SENSOR NETWORKS   (C410) for academic year 2023-24 (IV-II)

Items	Course Outcomes
C410.1	Describe the overview of wireless sensor networks and enabling technologies for wireless sensor networks
C410.2	Apply the design principles of WSN architectures and operating systems for simulating environment situations
C410.3	Apply various concepts for assignment of MAC addresses
C410.4	Select the appropriate infrastructure, topology, joint routing and information aggregation for wireless sensor networks
C410.5	Analyse the sensor network platform and tools state-centric programming

Course Name: SYSTEM ON CHIP ARCHITECTURE   (C411) for academic year 2023-24 (IV-II)

Items	Course Outcomes
C410.1	Upon successful completion of this course student should be able to: understand about SoC Design Methodology
C410.2	Ability to understand the design of different embedded memories.
C410.3	Validation and Testing Concepts can be understood.
C410.4	Select the appropriate infrastructure, topology, joint routing and information aggregation for wireless sensor networks
C410.5	Investigate new techniques for future systems.

Course Name: ENVIRONMENTAL IMPACT ASSESMENT   (C412) for academic year 2023-24 (IV-II)

Items	Course Outcomes
C412.1	Acquire basic knowledge and practical knowledge to implement towards industries.
C412.2	Design and testing of electrical components
C412.3	Apply project management skills (scheduling work, procuring parts, and documenting expenditures and working within the confines of a deadline).
C412.4	Develop and demonstrate troubleshooting ability in Electrical technology.
C412.5	Communicate technical information by means of written and oral reports.

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PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

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PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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PROGRAM SPECIFIC OUTCOMES (PSOs)

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PSO2: To analyse, design and develop solutions for the real time problems and to apply the technical Knowledge for developing quality products for Electronics and Communication based Industry.

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Category	Number	Description
Criterion	3.1.1	Course Outcomes of all courses
Program File	14	Records of Course Outcomes of all courses

Category	Description
DEPARTMENT	COMPUTER SCIENCE AND ENGINEERING
ACADEMIC YEAR	2023-24
REGULATIONS	R18, R22

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Incharge

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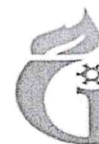
1 II Year – I Semester

1.1 C201 - DIGITAL ELECTRONICS

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:		Digital Electronics
A.Y.	2023-24	Year:	II	Semester:	I	Regulation:	R22	Code:	C201

1.1.1 Course Outcomes

CO#	Course Outcome
C201.1	"Acquire the knowledge on numerical information in different forms and Boolean Algebra theorems.
C201.2	Define Postulates of Boolean algebra and to minimize combinational functions and design the combinational circuits.
C201.3	Analyze the operation of medium complexity standard combinational circuits Design and analyze sequential circuits for various cyclic functions.
C201.4	To understand the concepts of registers and counters.
C201.5	Acquire the knowledge on FSM.

1.2 C202 - DATA STRUCTURES

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:		Data Structures
A.Y.	2023-24	Year:	II	Semester:	I	Regulation:	R22	Code:	C202

1.2.1 Course Outcomes

CO#	Course Outcome
C202.1	Ability to select the data structures that efficiently model the information in a problem.
C202.2	Ability to assess efficiency trade-offs among different data structure implementations or combinations.
C202.3	Implement and know the application of algorithms for sorting and pattern matching.
C202.4	Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.
C202.5	Learn the basic types for data structure, implementation and application

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1.3 C203 - COMPUTER ORIENTED STATISTICAL METHODS

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering			Subject:		Computer Oriented Statistical Methods	
A.Y.	2023-24	Year:	II	Semester:	I	Regulation:	R22 Code:	C203

1.3.1 Course Outcomes

CO#	Course Outcome
C203.1	Understand the concepts of probability and distributions to some case studies.
C203.2	Evaluate Mathematical Expectation and Discrete Probability Distributions.
C203.3	Apply Continuous Normal Distribution and Fundamental Sampling Distributions.
C203.4	Analyze testing hypothesis of Sample Mean and Sample Proportion.
C203.5	Understand the concept of Stochastic Processes and Markov Chains

1.4 C204 - COMPUTER ORGANIZATION AND ARCHITECTURE

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering			Subject:		Computer Organization And Architecture	
A.Y.	2023-24	Year:	II	Semester:	I	Regulation:	R22 Code:	C204

1.4.1 Course Outcomes

CO#	Course Outcome
C204.1	Understand the basics of instruction sets and their impact on processor design.
C204.2	Demonstrate an understanding of the design of the functional units of a digital computer system.
C204.3	Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
C204.4	Design a pipeline for consistent execution of instructions with minimum hazards.
C204.5	Recognize and manipulate representations of numbers stored in digital computers

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1.5 C205 - OBJECT ORIENTED PROGRAMMING THROUGH JAVA

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering			Subject:		Object Oriented Programming through JAVA	
A.Y.	2023-24	Year:	II	Semester:	I	Regulation:	R22	Code:	C205

1.5.1 Course Outcomes

CO#	Course Outcome
C205.1	Able to solve real world problems using OOP techniques.
C205.2	Able to solve problems using java collection framework and I/o classes.
C205.3	Able to develop multithreaded applications with synchronization.
C205.4	Able to develop applets for web applications.
C205.5	Able to design GUI based applications.

1.6 C206 – OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering			Subject:		Object oriented programming through Java Lab	
A.Y.	2023-24	Year:	II	Semester:	I	Regulation:	R22	Code:	C206

1.6.1 Course Outcomes

CO#	Course Outcome
C206.1	Students will demonstrate the ability to summarize the strengths and weaknesses of Java programming and the basic concepts of object-oriented programming
C206.2	Able to write programs for solving real world problems using java collection framework.
C206.3	Able to write programs using abstract classes.
C206.4	Able to write multithreaded programs
C206.5	Able to write GUI programs using swing controls in Java

1.7 C207 - DATA STRUCTURES LAB

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering			Subject:		Data Structures Lab	
A.Y.	2023-24	Year:	II	Semester:	I	Regulation:	R22	Code:	C207

1.7.1 Course Outcomes

CO#	Course Outcome
C207.1	Understand the concept of data structures, python and apply algorithm for solving problems like Sorting, searching, insertion and deletion of data.
C207.2	Understand linear data structures for processing of ordered or unordered data.
C207.3	Explore various operations on dynamic data structures like single linked list, circular linked list and doubly linked list.
C207.4	Explore the concept of nonlinear data structures such as trees and graphs.
C207.5	Understand the binary search trees, hash function, and concepts of collision and its resolution methods.

1.8 C208 - DATA VISUALIZATION WITH R PROGRAMING

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering			Subject:		Data Visualization with R Programing	
A.Y.	2023-24	Year:	II	Semester:	I	Regulation:	R18	Code:	C208

1.8.1 Course Outcomes

CO#	Course Outcome
C208.1	Understand How to import data into Tableau
C208.2	Understand Tableau concepts of Dimensions and Measures
C208.3	Develop Programs and understand how to map Visual Layouts and Graphical Properties.
C208.4	Create a Dashboard that links multiple visualizations.
C208.5	"Use graphical user interfaces to create Frames for providing solutions to real world

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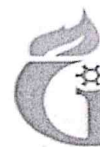
2 II Year - II Semester

2.1 C209 - DISCRETE MATHEMATICS

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:	Computer Science & Engineering				Subject:	Discrete Mathematics		
A.Y.	2023-24	Year:	II	Semester:	II	Regulation:	R22	Code:	C209

2.1.1 Course Outcomes

CO#	Course Outcome
C209.1	Ability to understand and construct precise mathematical proofs.
C209.2	Ability to use logic and set theory to formulate precise statements.
C209.3	Ability to analyze and solve counting problems on finite and discrete structures
C209.4	Ability to describe and manipulate sequences.
C209.5	Ability to apply graph theory in solving computing problems.

2.2 C210 - BUSINESS ECONOMICS & FINANCIAL ANALYSIS

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:	Computer Science & Engineering				Subject:	Business Economics & Financial Analysis		
A.Y.	2023-24	Year:	II	Semester:	II	Regulation:	R22	Code:	C212

2.2.1 Course Outcomes

CO#	Course Outcome
C210.1	Understand microeconomic factors in related to demand analysis and its forecasting
C210.2	Apply the theory of production function and Cost concepts to determine the Break Even Analysis.
C210.3	Remember different market structures, pricing strategies and different forms business organization
C210.4	Determine the investment decisions of organizations by applying capital budgeting methods and Strategies
C210.5	Interpret the financial statement by using Fundamental accounting concepts and Ratio analysis

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2.3 C211 - OPERATING SYSTEMS

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:	Operating Systems	
A.Y.	2023-24	Year:	II	Semester:	II	Regulation:	R22	Code: C212

2.3.1 Course Outcomes

CO#	Course Outcome
C211.1	Will be able to control access to a computer and the files that may be shared.
C211.2	Demonstrate the knowledge of the components of computer and their respective roles in computing.
C211.3	Ability to recognize and resolve user problems with standard operating environments.
C211.4	Gain practical knowledge of how programming languages ,operating systems, and architectures interact and how to use Each effectively.
C211.5	To learn secondary memory management

2.4 C212 - DATABASE MANAGEMENT SYSTEMS

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:	Database Management Systems	
A.Y.	2023-24	Year:	II	Semester:	II	Regulation:	R22	Code: C212

2.4.1 Course Outcomes

CO#	Course Outcome
C212.1	Identify the basic elements of a relational database management system
C212.2	Examine the data models and apply to solve the relevant problems associated with it
C212.3	Design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.
C212.4	Correlate normalization for the development of application software and the use of SQL for database creation and maintenance.
C212.5	Compare different storage structures.

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2.5   C213 – SOFTWARE ENGINEERING

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:		Software Engineering
A.Y.	2023-24	Year:	II	Semester:	II	Regulation:	R22	Code:	C213

2.5.1   Course Outcomes

CO#	Course Outcome
C213.1	Students will be able to decompose the given project in various phases of a life cycle.
C213.2	Students will be able to choose appropriate process model depending on the user requirements.
C213.3	Students will be able perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.
C213.4	Students will be able to know various processes used in all the phases of the product.
C213.5	Students can apply the knowledge, techniques, and skills in the development of a software product.

2.6   C214 - OPERATING SYSTEMS LAB

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:		Operating Systems Lab
A.Y.	2023-24	Year:	II	Semester:	II	Regulation:	R22	Code:	C214

2.6.1   Course Outcomes

CO#	Course Outcome
C214.1	Experiment with Unix commands and shell programming memory management.
C214.2	Build 'C' program for process and file system management using system calls
C214.3	Choose the best CPU scheduling algorithm for a given problem instance
C214.4	Identify the performance of various page replacement algorithms
C214.5	Develop algorithm for deadlock avoidance, detection and file allocation strategies

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2.7   C215 - DATABASE MANAGEMENT SYSTEMS LAB

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering			Subject:		Database Management Systems Lab	
A.Y.	2023-24	Year:	II	Semester:	II	Regulation:	R22	Code:	C215

2.7.1   Course Outcomes

CO#	Course Outcome
C216.1	Identify the basic elements of a relational database management system
C216.2	Acquire skills in using SQL commands for data definition and data manipulation.
C216.3	Design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.
C216.4	Design database schema for a given application and apply normalization
C216.5	Develop solutions for database applications Using procedures, cursors and triggers

2.8   C217 – NODE JS

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering			Subject:		Node JS	
A.Y.	2023-24	Year:	II	Semester:	II	Regulation:	R22	Code:	C216

2.8.1   Course Outcomes

CO#	Course Outcome
C216.1	Build a custom website with HTML, CSS, and Bootstrap and little JavaScript.
C216.2	Demonstrate Advanced features of JavaScript and learn about JDBC
C216.3	Develop Server – side implementation using Java technologies
C216.4	Develop the server – side implementation using Node JS
C216.5	Design a Single Page Application using React.

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2.9   C217 – REAL TIME PROJECTS

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering			Subject:	Real Time Projects		
A.Y.	2023-24	Year:	II	Semester:	II	Regulation:	R22	Code:	C217

2.9.1   Course Outcomes

CO#	Course Outcome
C217.1	Demonstrate a sound technical knowledge of their selected project topic.
C217.2	Design engineering solutions to complex problems utilizing a systems approach
C217.3	Conduct experiments in the engineering project and analysis the data results
C217.4	Communicate with engineers and the community at large in written an oral form.
C217.5	Demonstrate the knowledge, skills and attitudes of a professional engineer

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3 III Year - I Semester

3.1 C301 - FORMAL LANGUAGES & AUTOMATA THEORY

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:	Computer Science & Engineering			Subject:	Business Economics & Financial Analysis			
A.Y.	2023-24	Year:	III	Semester:	I	Regulation:	R18	Code: C301

3.1.1 Course Outcomes
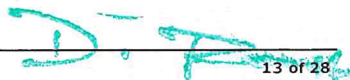
CO#	Course Outcome
C301.1	Able to understand the concept of abstract machines and their power to recognize the languages
C301.2	Able to employ finite state machines for modeling and solving computing problems.
C301.3	Able to design context free grammars for formal languages.
C301.4	Able to distinguish between decidability and undecidability.
C301.5	Able to gain proficiency with mathematical tools and formal methods.

3.2 C302 - SOFTWARE ENGINEERING

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:	Computer Science & Engineering			Subject:	Software Engineering			
A.Y.	2023-24	Year:	III	Semester:	I	Regulation:	R18	Code: C302

3.2.1 Course Outcomes

CO#	Course Outcome
C302.1	Students will be able to decompose the given project in various phases of a life cycle.
C302.2	Students will be able to choose appropriate process model depending on the user requirements.
C302.3	Students will be able perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.
C302.4	Students will be able to know various processes used in all the phases of the product.
C302.5	Students can apply the knowledge, techniques, and skills in the development of a software product.

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3.3   C303 - COMPUTER NETWORKS

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:	Computer Networks	
A.Y.	2023-24	Year:	III	Semester:	I	Regulation:	R18	Code:	C303

3.3.1   Course Outcomes

CO#	Course Outcome
C303.1	Gain the knowledge of the basic computer network technology and Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
C303.2	Familiarize with the Transmission Media, Flow Control and Error Detection & Correction.
C303.3	Understand fundamental concepts in Routing, Addressing & working of Transport Protocols.
C303.4	Gain familiarity with common networking & Application Protocols.
C303.5	Wireless LANs & Wireless Sensor Networks Operation.

3.4   C304 - WEB TECHNOLOGIES

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:	Web Technologies	
A.Y.	2023-24	Year:	III	Semester:	I	Regulation:	R18	Code:	C304

3.4.1   Course Outcomes

CO#	Course Outcome
C304.1	gain knowledge of client-side scripting, validation of forms and AJAX programming
C304.2	understand server-side scripting with PHP language
C304.3	understand what XML is and how to parse and use XML Data with Java
C304.4	To introduce Server-side programming with Java Servlets
C304.5	To introduce Server-side programming with Java Server Page

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3.5 C305 – DATA ANALYTICS

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY									
Department:		Computer Science & Engineering				Subject:		Data Analytics (Professional Elective-I)	
A.Y.	2023-24	Year:	III	Semester:	I	Regulation:	R18	Code:	C305

3.5.1 Course Outcomes

CO#	Course Outcome
C305.1	Understand the impact of data analytics for business decisions and strategy
C305.2	Carry out data analysis/statistical analysis.
C305.3	To carry out standard data visualization and formal inference procedures.
C305.4	Design Data Architecture.
C305.5	Understand various Data Sources.

3.6 C306 – DISTRIBUTED DATABASE

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY									
Department:		Computer Science & Engineering				Subject:		Distributed Database (Professional Elective-II)	
A.Y.	2023-24	Year:	III	Semester:	I	Regulation:	R18	Code:	C306

3.6.1 Course Outcomes

CO#	Course Outcome
C306.1	Understand distributed database systems architecture and design
C306.2	Be able to apply methods and techniques for distributed quey processing and optimization
C306.3	Understand the broad concepts of distributed transaction process
C306.4	Understand the basic concepts of Data warehousing and OLAP technology
C306.5	Be able to apply methods and techniques for association analysis, data classification and clustering

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3.7 C307 - SOFTWARE ENGINEERING LAB

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:	Computer Science & Engineering				Subject:	Software Engineering Lab		
A.Y.	2023-24	Year:	III	Semester:	I	Regulation:	R18	Code:	C301

3.7.1 Course Outcomes

CO#	Course Outcome
C307.1	Understand and describe basic concept of UML, design, implementation of test cases and OOP concepts using java
C307.2	Discuss and Analyses how to develop software requirements specifications for a given problem.
C307.3	Explain and build DFD models
C307.4	Understand and develop various structure and behavior UML diagrams.
C307.5	Explain the knowledge of project management tool Demonstrate how to manage file using Project Libre project management tool.

3.8 C308 - COMPUTER NETWORKS & WEB TECHNOLOGIES LAB

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:	Computer Science & Engineering				Subject:	Computer Networks & Web Technologies Lab		
A.Y.	2023-24	Year:	III	Semester:	I	Regulation:	R18	Code:	C308

3.8.1 Course Outcomes

CO#	Course Outcome
C308.1	Implement data link layer farming methods.
C308.2	Analyze error detection and error correction codes.
C308.3	Implement and analyze routing and congestion issues in network design.
C308.4	Implement Encoding and Decoding techniques used in presentation layer.
C308.5	To be able to work with different network tools.

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3.9   C309 – ADVANCED COMMUNICATION SKILLS LAB

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:	**Computer Science & Engineering**				**Subject:**	**Advanced Communication Skills Lab**		
A.Y.	**2023-24**	**Year:**	**III**	**Semester:**	**I**	**Regulation:**	**R18**	**Code:**	**C309**

3.9.1   Course Outcomes

CO#	Course Outcome
C309.1	To improve fluency in English through a well-developed vocabulary and enable them to listen at normal conservational speed by educated English speakers and respond appropriately in different socio cultural and professional context.
C309.2	Further, they would be required to communicate the ideas relevantly and coherently in writing.
C309.3	To prepare all the students for their Placements.
C309.4	Learn to overcome stage fear and make presentations with ease
C309.5	Learn how to pronounce words using the rules they have been taught.

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4 III Year - II Semester

4.1 C310 - MACHINE LEARNING

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:	Machine Learning	
A.Y.	2023-24	Year:	III	Semester:	II	Regulation:	R18	Code: C310

4.1.1 Course Outcomes

CO#	Course Outcome
C310.1	Understand the concepts of computational intelligence like machine learning.
C310.2	Ability to get the skill to apply machine learning techniques .
C310.3	Machine learning techniques to address the real time problems in different areas.
C310.4	Understand the Neural Networks in machine learning application.
C310.5	Neural Networks usage in machine learning application.

4.2 C311 - COMPILER DESIGN

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:	Compiler Design	
A.Y.	2023-24	Year:	III	Semester:	II	Regulation:	R18	Code: C311

4.2.1 Course Outcomes

CO#	Course Outcome
C311.1	Demonstrate the ability to design a compiler given a set of language features
C311.2	Identify the knowledge of patterns, tokens & regular expressions for lexical analysis.
C311.3	Evaluate Acquire skills in using lex tool & yacc tool for developing a scanner and parser. Design and implement LL and LR parsers.
C311.4	Develop syntax directed translation.
C311.5	Analyze Design algorithms to generate machine code.

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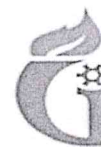
4.3   C312 - DESIGN AND ANALYSIS OF ALGORITHMS

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY									
Department:		Computer Science & Engineering				Subject:		Design and Analysis of Algorithms	
A.Y.	2023-24	Year:	III	Semester:	II	Regulation:	R18	Code:	C312

4.3.1   Course Outcomes

CO#	Course Outcome
C312.1	Ability to analyze the performance of algorithms.
C312.2	Ability to choose appropriate algorithm design techniques for solving problems.
C312.3	Design methods impact the performance of programs
C312.4	Apply important algorithmic design paradigms and methods of analysis.
C312.5	Synthesize efficient algorithms in common engineering design situations.

4.4   C313 – SOFTWARE TESTING METHODOLOGIES

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY									
Department:		Computer Science & Engineering				Subject:		Software Testing Methodologies (Professional Elective-III)	
A.Y.	2023-24	Year:	III	Semester:	II	Regulation:	R18	Code:	C313

4.4.1   Course Outcomes

CO#	Course Outcome
C313.1	List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects.
C313.2	Distinguish characteristics of structural testing methods.
C313.3	Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible.
C313.4	Discuss about the functional and system testing methods.
C313.5	Demonstrate various issues for object oriented testing.

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4.5 C314 - DISASTER PREPAREDNESS AND PLANNING MANAGEMENT

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY									
Department:		Computer Science & Engineering				Subject:		Disaster Preparedness and Planning Management (Open Elective-I)	
A.Y.	2023-24	Year:	III	Semester:	II	Regulation:	R18	Code:	C314

4.5.1 Course Outcomes

CO#	Course Outcome
C314.1	To Understand basic concepts in Disaster Management
C314.2	To Understand Definitions and Terminologies used in Disaster Management
C314.3	To Understand Types and Categories of Disasters
C314.4	To Understand the Challenges posed by Disasters
C314.5	To understand Impacts of Disasters Key Skills

4.6 C315 - MACHINE LEARNING LAB

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY									
Department:		Computer Science & Engineering				Subject:		Machine Learning Lab	
A.Y.	2023-24	Year:	III	Semester:	II	Regulation:	R18	Code:	C315

4.6.1 Course Outcomes

CO#	Course Outcome
C315.1	Understand complexity of Machine Learning algorithms
C315.2	Machine Learning algorithms limitations.
C315.3	Understand modern notions in data analysis-oriented computing.
C315.4	Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own.
C315.5	Be capable of performing experiments in Machine Learning using real-world data.

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4.7 C316 - COMPILER DESIGN LAB

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY									
Department:		Computer Science & Engineering				Subject:		Compiler Design Lab	
A.Y.	2023-24	Year:	III	Semester:	II	Regulation:	R18	Code:	C316

4.7.1 Course Outcomes

CO#	Course Outcome
C316.1	Design and develop interactive and dynamic web applications using HTML, CSS, JavaScript and XML
C316.2	Apply client-server principles to develop scalable and enterprise web applications.
C316.3	Ability to design, develop, and implement a compiler for any language.
C316.4	Able to use lex and yacc tools for developing a scanner and a parser
C316.5	Able to design and implement LL and LR parsers.

4.8 C317 – SOFTWARE TESTING METHODOLOGIES LAB

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY									
Department:		Computer Science & Engineering				Subject:		Software Testing Methodologies Lab (Professional Elective-III)	
A.Y.	2023-24	Year:	III	Semester:	II	Regulation:	R18	Code:	C313

4.8.1 Course Outcomes

CO#	Course Outcome
C317.1	Understand the concept and need of software testing
C317.2	Understand the need and usage of software tools required for manual and automated testing
C317.3	Design and develop the best test strategies in accordance to the development model.
C317.4	Write and test a program to login a specific web page.
C317.5	A good test case is one that has a high probability of finding an as yet undiscovered error.

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5 IV Year - I Semester

5.1 C401 - CRYPTOGRAPHY & NETWORK SECURITY

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:	Computer Science & Engineering			Subject:	Cryptography & Network Security			
A.Y.	2023-24	Year:	IV	Semester:	I	Regulation:	R18	Code:	C401

5.1.1 Course Outcomes

CO#	Course Outcome
C401.1	Ability to understand basic cryptographic algorithms ,message and web authentication and security issues.
C401.2	Ability to identify information system requirements for both of them such as client and server.
C401.3	Ability to understand the current legal issues towards information security.
C401.4	Ability to understand about PGP key pair and use the PGP package to send an encrypted email message.
C401.5	Ability to understand Web security and Firewalls

5.2 C402 - DATA MINING

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:	Computer Science & Engineering			Subject:	Data Mining			
A.Y.	2023-24	Year:	IV	Semester:	I	Regulation:	R18	Code:	C402

5.2.1 Course Outcomes

CO#	Course Outcome
C402.1	Ability to understand the types of the data to be mined and present a general classification of tasks and primitives to integrate a data mining system
C402.2	Apply preprocessing methods for any given raw data.
C402.3	Extract interesting patterns from large amounts of data.
C402.4	Discover the role played by data mining in various fields.
C402.5	Choose and employ suitable data mining algorithms to build analytical applications

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5.3   C403 – CLOUD COMPUTING

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:	Cloud Computing (Professional Elective-IV)	
A.Y.	2023-24	Year:	IV	Semester:	I	Regulation:	R18	Code: C403

5.3.1   Course Outcomes

CO#	Course Outcome
C403.1	Understand the concepts of computing paradigms
C403.2	Ability to understand the concepts of cloud computing and Deployment Models
C403.3	Ability to understand various service of a network connectivity and managing cloud.
C403.4	Understanding cloud service providers.
C403.5	Understand the concepts of real time applications.

5.4   C404 – SOFTWARE PROCESS AND PROJECT MANAGEMENT

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:	Software Process and Project Management	
A.Y.	2023-24	Year:	IV	Semester:	I	Regulation:	R18	Code: C404

5.4.1   Course Outcomes

CO#	Course Outcome
C404.1	Gain knowledge of software economics, phases in the life cycle of software development
C404.2	Gain knowledge on project organization
C404.3	Gain knowledge on project control and process instrumentation
C404.4	Analyze the major and minor milestones, artifacts and metrics from management and technical perspective
C404.5	Design and develop software product using conventional and modern principles of software project management

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5.5 C405 - PRINCIPLES OF ENTREPRENEURSHIP

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:	Principles of Entrepreneurship	
A.Y.	2023-24	Year:	IV	Semester:	I	Regulation:	R18	Code:	C405

5.5.1 Course Outcomes

CO#	Course Outcome
C405.1	Recognize and explain how the scientific method is used to solve problems
C405.2	Understand key principles of user driven innovation and product development
C405.3	Develop students' personal, professional and entrepreneurial skills
C405.4	To promote Entrepreneurship as life-skills to improve quality of life, skills of creation and management of entrepreneurial pursuits.
C405.5	To acquaint the students about the role of Entrepreneurship in the growth and economic development of the nation.

5.6 C406 - CRYPTOGRAPHY & NETWORK SECURITY LAB

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:	Cryptography & Network Security Lab	
A.Y.	2023-24	Year:	IV	Semester:	I	Regulation:	R18	Code:	C406

5.6.1 Course Outcomes

CO#	Course Outcome
C406.1	Understand basic cryptographic algorithms, message and web authentication and security issues.
C406.2	Identify information system requirements for both of them such as client and server.
C406.3	Understand the current legal issues towards information security.
C406.4	Understand various cryptographic algorithms.
C406.5	Application of each of confidentiality, integrity, authentication

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5.7 C407 - INDUSTRIAL ORIENTED MINI PROJECT / SUMMER INTERNSHIP

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:		Industrial Oriented Mini Project / Summer Internship
A.Y.	2023-24	Year:	IV	Semester:	I	Regulation:	R18	Code: C407

5.7.1 Course Outcomes

CO#	Course Outcome
C407.1	To create an Industrial environment and culture within the institution.
C407.2	Understand, plan and execute a Mini Project with team
C407.3	Student is able to test the theoretical learning in practical situations by accomplishing the tasks assigned during the internship period.
C407.4	Prepare a technical report based on the Mini project
C407.5	Deliver seminar based on the Mini Project work carried out

5.8 C408 - SEMINAR

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:		Seminar
A.Y.	2023-24	Year:	IV	Semester:	I	Regulation:	R18	Code: C408

5.8.1 Course Outcomes

CO#	Course Outcome
C408.1	Establish motivation for any topic of interest and develop a thought process for technical presentation.
C408.2	Analyze the applicability of modern software tools and technology.
C408.3	Communicate with engineers and the community at large.
C408.4	Develop Presentation and Communication skills.
C408.5	Technical report preparation skills.

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5.9   C409 - PROJECT STAGE-I

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Department:		Computer Science & Engineering				Subject:		Project Stage-I
A.Y.	2023-24	Year:	IV	Semester:	I	Regulation:	R18	Code:	C409

5.9.1   Course Outcomes

CO#	Course Outcome
C409.1	Student can able to Demonstrate a sound technical knowledge of their selected project topic.
C409.2	Undertake problem identification, formulation and solution.
C409.3	Able to Design engineering solutions to complex problems utilizing a systems approach.
C409.4	Communicate with engineers and the community at large in written an oral forms.
C409.5	Demonstrate the knowledge, skills and attitudes of a professional engineer.

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6 IV Year - II Semester

6.1 C410 - ORGANIZATIONAL BEHAVIOUR

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:		Organizational Behaviour
A.Y.	2023-24	Year:	IV	Semester:	II	Regulation:	R18	Code:	C410

6.1.1 Course Outcomes

CO#	Course Outcome
C410.1	Recognize and explain how the scientific method is used to solve problems
C410.2	Understand key principles of user driven innovation and product development
C410.3	Develop students' personal, professional and entrepreneurial skills
C410.4	Students will be able to identify the components of Individual Behaviour and apply the concept of Learning, Perception, Attitudes and values.
C410.5	The students will be able to justify how organizational change and conflict affect working relationships within organizations and demonstrate how to apply relevant theories to solve problems of change and conflict within organizations.

6.2 C411 – DISTRIBUTED SYSTEMS

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:		Distributed Systems (Professional Elective-VI)
A.Y.	2023-24	Year:	IV	Semester:	II	Regulation:	R18	Code:	C410

6.2.1 Course Outcomes

CO#	Course Outcome
C411.1	Define the characterization of Distributed Systems, Theoretical Foundation for Distributed System and Concepts in Message Passing Systems.
C411.2	Understanding Distributed shared memory
C411.3	Analyze the Failure Recovery in Distributed Systems and Fault Tolerance
C411.4	Ability to understand Transactions and Concurrency control.
C411.5	Design the distributed systems.

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6.3   C412 – ENVIRONMENTAL IMPACT ASSESSMENT

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:		Environmental Impact Assessment (Open Elective-III)
A.Y.	2023-24	Year:	IV	Semester:	II	Regulation:	R18	Code: C412

6.3.1   Course Outcomes

CO#	Course Outcome
C412.1	Identify the environmental attributes to be considered for the EIA study
C412.2	Formulate objectives of the EIA studies
C412.3	Identify the methodology to prepare rapid EIA
C412.4	Prepare EIA reports and environmental management plans
C412.5	To identify and explore impact assessment fields and approaches.

6.4   C413 - PROJECT STAGE-II

VISVESVARAYA COLLEGE OF ENGINEERING & TECHNOOGY								
Department:		Computer Science & Engineering				Subject:		Project Stage - II
A.Y.	2023-24	Year:	IV	Semester:	II	Regulation:	R18	Code: C413

6.4.1   Course Outcomes

CO#	Course Outcome
C413.1	Able to identify and formulate research problem
C413.2	Able to design and develop solution to the problem
C413.3	Able to analyze and solve the complex problems
C413.4	Able to plan, implement and execute the project
C413.5	Able to write effective technical report and demonstrate through presentation

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

3.1. Establish the correlation between the courses and the POs & PSOs (20)

3.1.1. Course Outcomes (6)

A. Evidence of COs being defined for every course (5)

The course outcomes are statements describing the expected depth of understanding of the disciplinary subject and the essential abilities related to the subject upon completion of the course. The courses outcomes for each course are mentioned in the syllabi of the program. Course outcome formed to meet the following guidelines:

- Follows Bloom's taxonomy.
- Reflects the whole syllabus prescribed by University for each course.
- A key topic of each unit is taken as the one-course outcome.
- The number of COs for each course should be a maximum of five.

I & II Sem Course Outcomes for the Academic Year 2023-24

S. No	Year/ Sem	Course Name	Course Outcomes
1	II-I	Numerical Methods and Complex variables	CO1: **Express** any periodic function in terms of sine and cosine
			CO2: **Find** the root of a given polynomial and transcendental equations and **Estimate** the value for the given data using interpolation.
			CO3: **Find** the numerical solutions for a given first order ODE's.
			CO4: **Analyze** the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.
			CO5: **Analyze** Taylor's and Laurent's series expansions in complex function.
2	II-I	**ELECTRICAL MACHINES - I**	CO1: **Identify** different parts of a DC machine & understand its operation
			CO2: **To Carry out** different testing methods to predetermine the efficiency of DC machines.
			CO3: **To Understand** different excitation and starting methods of

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			DC machines.
			CO4: **Control** the voltage and speed of a DC machines.
			CO5: **Analyze** single phase and three phase transformers circuits.
3	II-I	ANALOG ELECTRONICS	CO1: **Know** the characteristics, utilization of various components.
			CO2: **Understand** the biasing techniques
			CO3: **Design and analyze** various rectifiers, small signal amplifier circuits.
			CO4: **Design** sinusoidal and non-sinusoidal oscillators.
			CO5: A thorough **understanding**, functioning of OP-AMP, design OP-AMP based circuits
4	II-I	POWER SYSTEM - I	CO1: **Understand** the operation of conventional generating stations and renewable sources of electrical power.
			CO2: **Evaluate** the power tariff methods.
			CO3: **Determine** the electrical circuit parameters of transmission lines.
			CO4: **Analyze** the operations of AIS & GIS
			CO5: **Analyze** Insulators and Distribution systems.
5	II-I	ELECTROMAGNETIC FIELDS	CO1:**Understand** the Basic laws of Electromagnetism.
			CO2:**Obtain** the Electric and Magnetic fields for simple configurations
			CO3: **Analyze** the Time varying electric and magnetic fields.
			CO4: **Understand** the Maxwell's Equations in Different Forms and Different media
			CO5: **Understand** the Propagation of EM waves
6	II-I	ELECTRICAL MACHINES LAB - I	CO1: **Observe** Start and control the Different DC Machines.
			CO2: **Assess** the performance of different machines using different testing methods.
			CO3: **Identify** different conditions required to be satisfied for self - excitation of DC Generators..
			CO4: **Separate** iron losses of DC machines into different components.
			CO5: **Calculating** different parameters in Machines .
7	II-I	ANALOG ELECTRONICS LAB	CO1: **Analyze** the diode and transistor characteristics.
			CO2: **Understand** the principles of rectifier circuits using diodes and implement them using hardware.
			CO3: **Design** various amplifiers like CE, CC, common source FET amplifiers and implement them using hardware and also observe their frequency responses.
			CO4: **Understand** the concepts of Oscillators and observe its frequency responses.
			CO5: **Understand** the Inverting and non inverting amplifier and observe its characteristics.
		ELECTRICAL	CO1: **Develop** knowledge of software packages to model and program electrical and electronics systems

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8	II-I	SIMULATION TOOLS LABORATORY	CO2: Model different electrical and electronic systems and **analyze** the results
			CO3: **Articulate** importance of software packages used for simulation in laboratory experimentation by analyzing the simulation results
			CO4: To **understand** use and coding in different software tools used in electrical/ electronic circuit design.
			CO5: To **understand** the simulation of electric machines/circuits for performance analysis
9	II-II	SOLID MECHANICS & HYDRAULIC MACHINES	CO 1: **Solve** problems dealing with forces, beam and cable problems and understand distributed force systems
			CO 2: **Solve** friction problems and determine moments of Inertia and centroid of practical shapes
			CO 3: **Apply** knowledge of mechanics in addressing problems in hydraulic machinery and its principles that will be utilized in Hydropower development and for other practical usages.
			CO4: To **Understand** the meaning of centers of gravity, centroids, moments of Inertia and rigid body dynamics
			CO 5: To **Study** the characteristics of hydroelectric power plant and Design of hydraulic machinery.
10	II-II	MEASUREMENTS AND INSTRUMENTATION	CO1: **Understand** Different types of Measuring instruments, construction & Operation
			CO2: **Identify** the Instruments suitable for Typical Measurements.
			CO3: **Analyze** the knowledge about Transducers and instrument transformers to use them effectively
			CO4: **Apply** the knowledge of smart and digital metering for industrial applications
			CO5: **Understand** the construction, working principle and types of oscilloscopes.
11	II-II	ELECTRICAL MACHINES – II	CO 1: **Understand** the concepts of rotating magnetic fields.
			CO 2: **Understand** the operation of ac machines
			CO 3: **Analyze** performance characteristics of ac machine
			CO 4: **Understand** the concept of parallel operation of alternator
			CO 5: **Understand** the concept of regulation and its calculations
12	II-II	DIGITAL ELECTRONICS	CO1: **Understand** working of logic families and logic gates.
			CO2: **Design** and implement Combinational and Sequential logic circuits.
			CO3: **Design** and implement Sequential logic circuits.
			CO4: **Understand** the process of Analog to Digital conversion and Digital to Analog conversion.
			CO5: Be **able** to use PLDs to implement the given logical problem
			CO1: **Analyze** transmission line performance.

13	II-II	POWER SYSTEM-II	**CO2: Apply** load compensation techniques to control reactive power
			CO3: Understand the application of per unit quantities
			CO4: Design over voltage protection and insulation coordination
			CO5: Determine the fault currents for symmetrical and unbalanced faults
14	II-II	DIGITAL ELECTRONICS LAB	**CO1: Learn** the basics of gates.
			CO2: Construct basic combinational circuits and verify their functionalities.
			CO3: Apply the design procedures to design basic sequential circuits.
			CO4: Learn about counters and Shift registers.
			CO5: To **understand** the basic digital circuits and to verify their operation
15	II-II	MEASUREMENTS AND INSTRUMENTATION LAB	**CO1: Understand** to choose instruments
			CO2: Analyze the test any instrument
			CO3: Perform the accuracy of any instrument by performing experiment
			CO4: Calibrate PMMC instrument using D.C potentiometer
			CO5: Understand the concept of measurement& error
16	II-II	ELECTRICAL MACHINES LAB - II	**CO1: Analyze** the performance of different machines using different testing methods
			CO2: Analyze the Phase from three phase to two phase and vice versa
			CO3: Understand the changes in terminal voltages of synchronous generator after estimating the change by different methods
			CO4: Understand Control the active and reactive power flows in synchronous machines
			CO5: Understand the Start different machines and control the speed and power factor
17	II-II	REAL-TIME RESEARCH PROJECT/ FIELD BASED PROJECT	**CO1: Acquire** basic knowledge and practical knowledge to implement towards industries.
			CO2: Design and testing of electrical components
			CO3: Apply project management skills (scheduling work, procuring parts, and documenting expenditures and working within the confines of a deadline).
			CO4: Develop and demonstrate troubleshooting ability in Electrical technology.
			CO5: Communicate technical information by means of written and oral reports.
18	III-I	POWER ELECTRONICS	**CO1: Understand** the differences between signal level and power level devices
			CO2: Analyze controlled rectifier circuits.

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			CO3: **Analyze** the operation of DC-DC choppers.
			CO4: **Analyze** the operation of voltage source inverters.
			CO5: **Analyze** the operation of AC voltage controllers and Cycloconverters
19	III-I	POWER SYSTEM-II	CO1: **Analyze** transmission line performance.
			CO2: **Apply** load compensation techniques to control reactive power
			CO3: **Understand** the application of per unit quantities
			CO4: **Design** over voltage protection and insulation coordination
			CO5: **Determine** the fault currents for symmetrical and unbalanced faults
20	III-I	MEASUREMENTS AND INSTRUMENTATION	CO1: **Understand** Different types of Measuring instruments, construction & Operation
			CO2: **Identify** the Instruments suitable for Typical Measurements.
			CO3: **Analyze** the knowledge about Transducers and instrument transformers to use them effectively
			CO4: **Apply** the knowledge of smart and digital metering for industrial applications
			CO5: **Understand** the construction, working principle and types of oscilloscopes.
21	III-I	HIGH VOLTAGE ENGINEERING (PROFESSIONAL ELECTIVE-I)	CO1: **Understand** the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
			CO2: **Knowledge** of generation and measurement of D. C., A.C., & Impulse voltages.
			CO3: **Knowledge** of tests on H. V. equipment and on insulating materials, as per the standards.
			CO4: **Knowledge** of how over-voltages arise in a power system, and protection against these over voltages.
			CO5: **Compute** the breakdown strength of gas, liquids and solids insulation systems
22	III-I	BUSINESS ECONOMICS AND FINANCIAL ANALYSIS	CO1: **Evaluate** the production function and identifies the least cost combination to control the costs of production.
			CO2: **Understand** the concepts of Business economics and their application in evaluating the demand
			CO3: **Analyze** the structures of various market types and their pricing policies.
			CO4: **Understand** the types of business forms and also be able to evaluate the investments using capital budgeting techniques.
			CO5: **Apply** the basic concepts of ratio analysis
23	III-I	POWER SYSTEM SIMULATION LAB	CO1: **Perform** various transmission line calculations
			CO2: **Understand** Different circuits time constants
			CO3: **Analyze** the experimental data and draw the conclusions
			CO4: **Understand** the high frequency transients
			CO5: **Perform** Tariff Estimation

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24	III-I	POWER ELECTRONICS LAB	**CO1: Understand** the operating principles of various power electronic converters
			CO2: Understand the use power electronic simulation packages & hardware to develop the power converters.
			CO3: Analyze and choose the appropriate converters for various applications
			CO4: Apply the concepts of power electronic converters for efficient conversion/control of power from source to load
			CO5: Design the power converter with suitable switches meeting a specific load requirement.
25	III-I	MEASUREMENTS AND INSTRUMENTATION LAB	**CO1: Understand** to choose instruments
			CO2: Analyze the test any instrument
			CO3: Perform the accuracy of any instrument by performing experiment
			CO4: Calibrate PMMC instrument using D.C potentiometer
			CO5: Understand the concept of measurement& error
26	III-I	ADVANCED COMMUNICATION SKILLS LAB	**CO1: To enable** the students to listen to English conversation thereby improving their fluency.
			CO2: To make students acquire vocabulary and used it contextually.
			CO3: To develop proficiency in academic reading and writing.
			CO4: To increase possibilities of job prospects
			CO5: To communicate confidently in formal and informal context.
27	III-II	DISASTER PREPAREDNESS & PLANNING MANAGEMENT (OPEN ELECTIVE-I)	**CO1:** The **application** of disaster concepts to management.
			CO2: Analyzing relationship between development and disasters
			CO3: Ability to understand categories of disasters.
			CO4: Realization of the responsibilities to society
			CO5: Explain the factors affecting vulnerability such as impact of developmental projects and environmental modifications
28	III-II	WIND AND SOLAR ENERGY SYSTEMS (PROFESSIONAL ELECTIVE-II)	**CO1: Understand** the energy scenario and the consequent growths of the power generate Renewable energy sources
			CO2: Understand the Basic Physics of wind and solar power generation
			CO3: Understand the power electronic interfaces for wind and solar generation
			CO4: Understand the issues Related to the Grid Integration of solar & wind energy system
			CO5: Perform able to Understand the solar energy operation & its characteristics.
29	III-II	SIGNALS AND SYSTEMS	**CO1: Differentiate** various signal functions.
			CO2: Represent any arbitrary signal in time and frequency domain
			CO3: Understand the characteristics of linear time invariant systems.
			CO4: Analyze the signals with different transform technique

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			CO5: Analyze discrete time signals and systems by using appropriate mathematical tools
30	III-II	MICROPROCESSORS & MICROCONTROLLERS	CO1: Understands the internal architecture, organization and assembly language programming of 8086 processors.
			CO2: Understands the internal architecture, organization and assembly language programming of 8051 microcontrollers
			CO3: Understands the interfacing techniques to 8086 and 8051 based systems.
			CO4: Understands the internal architecture of ARM processors and basic concepts of advanced ARM
			CO5 : Design electrical circuitry to the Microprocessor I/O ports
31	III-II	POWER SYSTEM PROTECTION	CO1: Compare and contrast electromagnetic, static and microprocessor-based relays
			CO2: Apply technology to protect power system components.
			CO3: Select relay settings of over current and distance relays.
			CO4: Analyze quenching mechanisms used in air, oil and vacuum circuit breakers
			CO5: Grasp the knowledge of different protection schemes of transformer, bus-bar, generators and motor
32	III-II	POWER SYSTEM OPERATION AND CONTROL	CO1: Understand operation and control of power systems.
			CO2: Analyze various functions of Energy Management System (EMS) functions
			CO3: Analyze whether the machine is in stable or unstable position
			CO4: Understand power system deregulation and restructuring
			CO5: Understand real time control of power systems
33	III-II	POWER SYSTEM LAB	CO1: Analyze sequence impedance of synchronous machine and transformers
			CO2: Understand Different protection methods
			CO3: Analyze the experimental data and draw the conclusions
			CO4: Understand modeling of transmission line
			CO5: Perform various load flow techniques
34	III-II	MICROPROCESSORS & MICROCONTROLLERS LAB	CO1: Set up programming strategies for Microprocessor, microcontrollers and select proper mnemonics and run their program on the training boards.
			CO2: Practice different types of programming keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison
			CO3: Develop testing and experimental procedures on Microprocessor analyze their operation under different
			CO4: Prepare professional quality textual and computational results using assembly language programming
			CO5: Develop testing and experimental procedures on Microcontroller analyze their operation under different cases.
35	III-II	SIGNALS AND	CO1 Understand the concepts of continuous time and discrete

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		SYSTEMS LAB	time systems.
			CO2 **Analyze** systems in complex frequency domain.
			CO3 **Understand** sampling theorem and its implications
			CO4 **Understand** the concepts of continuous time and discrete time systems.
			CO5: **To analyze** sampling principles and various transform techniques.
36	IV-I	PRINCIPLES OF ENTREPRENEURSHIP (OPEN ELECTIVE-II)	CO1: **Understand** the concept and mindset of the entrepreneurs
			CO2: **Understand** the entrepreneurs Personality, journey and Entrepreneurial competencies
			CO3: **Knows** techniques for generating ideas and Launching Entrepreneurial Ventures
			CO4: **Learn** Legal challenges of Entrepreneurship
			CO5: **Evaluate** Strategies for building entrepreneurship
37	IV-I	ELECTRICAL AND HYBRID VEHICLES (PROFESSIONAL ELECTIVE-III)	CO1: **Understand** the models to describe hybrid vehicles and their performance
			CO2: **Understand** the different possible ways of energy storage
			CO3: **Understand** the different strategies related to energy storage systems
			CO4: **Understand** the fundamental concepts, principles, analysis and design of hybrid vehicles
			CO5: **Analyze** the various aspects of hybrid and electric drive train such as their configuration, types of electric machines that can be used energy storage devices, etc.
38	IV-I	HVDC TRANSMISSION (PROFESSIONAL ELECTIVE-IV)	CO1: **Compare** EHV AC and HVDC system and to describe various types of DC links
			CO2: **Analyze** Graetz circuit for rectifier and inverter mode of operation
			CO3: **Describe** various methods for the control of HVDC systems and to perform power flow analysis in AC/DC systems
			CO4: **Describe** various protection methods for HVDC systems and classify Harmonics and design different types of filters
			CO5: **Study** and understand various components, faults and breaker operation in HVDC Systems
39	IV-I	FUNDAMENTALS OF MANAGEMENT FOR ENGINEERS	CO1: **Perform** own leadership style
			CO2: **Understand** HR fundamentals and how to implement them in the workplace
			CO3: **Analyze** Effectively build relationships in the workplace
			CO4: **Understand** and Recognize the key differences between management and individual contributor roles
			CO5: **Acquire** strategic practices for managing employees and their work
40	IV-I	ELECTRICAL & ELECTRONICS	CO1: **Get practical** knowledge related to electrical

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		DESIGN LAB	**CO2: Fabricate** basic electrical circuit elements/networks
			CO3: Get hardware skills such as soldering, winding etc
			CO4: Get hardware skills such as soldering, winding etc
			CO5: Design filter circuit for application
41	IV-I	**INDUSTRIAL ORIENTED MINI PROJECT/ SUMMER INTERNSHIP**	**CO1: Acquire** basic knowledge and practical knowledge to implement towards industries.
			CO2: Design and testing of electrical components
			CO3: Apply project management skills (scheduling work, procuring parts, and documenting expenditures and working within the confines of a deadline).
			CO4: Develop and demonstrate troubleshooting ability in Electrical technology.
			CO5: Communicate technical information by means of written and oral reports.
42	IV-I	**SEMINAR**	**CO1: Spell** for basic concepts of science and technology
			CO2: Contrast the understanding perceptive of techniques applicable to their domain
			CO3: Construct the solutions upon their own knowledge
			CO4: Improve their Presentation and Communication skills
			CO5: Make up them to pursue their placements and higher studies
43	IV-I	**PROJECT STAGE – I**	**CO1: Acquire** basic knowledge and practical knowledge to implement towards industries.
			CO2: Design and testing of electrical components
			CO3: Apply project management skills (scheduling work, procuring parts, and documenting expenditures and working within the confines of a deadline).
			CO4: Develop and demonstrate troubleshooting ability in Electrical technology.
			CO5: Communicate technical information by means of written and oral reports.
44	IV-II	**ENVIRONMENTAL IMPACT ASSESSMENT (OPEN ELECTIVE-III)**	**CO1:** Understanding of the historical evolution of EIA
			CO2: Identify the environmental attributes to be considered for the EIA study
			CO3: Formulate objectives of the EIA studies
			CO4: Identify the methodology to prepare rapid EIA
			CO5: Prepare EIA reports and environmental management plans
45	IV-II	**POWER QUALITY & FACTS (PROFESSIONAL**	**CO1: Understand** the severity of power quality problems in distribution system Concept of improving the power quality to sensitive load by various mitigating custom power devices
			CO2: Understand the concept of voltage sag transformation from

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		ELECTIVE-V)	up-stream (higher voltages) to down-stream (lower voltage)
			CO3: **Understand** various systems thoroughly and their requirements and control circuits of Shunt Controllers SVC STATCOM for various functions viz.
			CO4: **Analyze** the transient stability Enhancement, voltage instability prevention and power oscillation damping
			CO5: **Understand** the Power and control circuits of Series Controllers GCSC, TSSC and TCSC
46	IV-II	**ELECTRICAL DISTRIBUTION SYSTEMS (PROFESSIONAL ELECTIVE-VI)**	CO1: **Distinguish** between transmission, and distribution line and design the feeders
			CO2: **Compute** power loss and voltage drop of the feeders
			CO3: **Design** protection of distribution systems
			CO4: **Understand** the importance of voltage control and power factor improvement
			CO5: **Identify** the best methods for pf improvement and voltage control
47	IV-II	**PROJECT STAGE – II**	CO1: **Acquire** basic knowledge and practical knowledge to implement towards industries.
			CO2: **Design** and testing of electrical components
			CO3: **Apply** project management skills (scheduling work, procuring parts, and documenting expenditures and working within the confines of a deadline).
			CO4: **Develop** and demonstrate troubleshooting ability in Electrical technology.
			CO5: **Communicate** technical information by means of written and oral reports.

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3.1.2. CO-PO/PSOs matrices of courses selected in 3.1.1 (six matrices) (05)

A. Explanation of table to be ascertained (5)

Program Specific Objectives (PSOs)

1. Comprehensive knowledge of electrical systems, components, and processes to address technical and engineering challenges in real life.

2. Aptitude to provide technical solutions to complex electrical engineering problems with the application of modern and appropriate tools for sustainable development.

Program Outcomes (POs)

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem Analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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6. **The Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to professional engineering practice.

7. **Environment and Sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice

9. **Individual and Teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society. Some of them are able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Lifelong Learning:** Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

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A Program level Course-PO/PSO matrix of all courses INCLUDING first year courses

A. Explanation of tables to be ascertained

A.Y. 2023-24

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C101	3	3	2	2.33	2.2	2.4	2.4	2	2.33	2	2.75	2.4
C102	3	3	2.67	2	2.4	2.2	2.2	2	2.5	2.4	2.5	2.2
C103	2.4	2.4	2.67	2.25	2.5	2.25	2.4	2	2.4	2.4	2.25	2.4
C104	3	2.6	2.8	2.4	3	3	2.2	2	2	2.2	1.8	2.6
C105	2.8	2.8	2.5	2.4	2.5	2.4	2.4	2	2.33	2.4	2.6	2.2
C106	3	2.4	1	1	2.4	1.5	-	2	1.6	2	1.6	1.8
C107	2.6	2.4	2.33	2.33	2.25	2.6	2.6	2	2.2	2.5	2	2.6
C108	2.6	2.6	2.33	2.25	2.5	2.2	2.6	2	2.4	2.25	2.4	2.4
C109	2.4	2.4	2.75	2.5	2.4	2.2	2.4	2	2.4	2.6	2.2	2.6
C110	2.8	2.8	2.5	2.67	2.25	2.2	2.25	2	2.6	2.2	2.2	2.2
C111	2.6	2.4	2.5	2.5	2.2	2.25	2.6	2	2.6	2.4	2.5	2.25
C112	2.6	2.4	2.75	2.5	2.4	2.4	2.4	2	2.4	2.2	2.4	2.2
C113	3	2.8	2.8	2.8	3	3	2.6	2	2.2	2.4	1.8	2.2
C114	2.4	2.6	2.6	2.5	2.4	2.25	2.5	2	2.2	2.2	2.6	2.4
C115	2.6	2.6	2.6	2.33	2.4	2.6	2.4	2	2.2	2	2.6	2.4
C116	2	1	2	2	2	2	2	2	1.6	1	2	3
C117	2.4	2.6	2	1.25	1.4	2.2	3	2	2.2	2.5	1.6	1.8
C201	2.6	3	3	3	2.4	2.2	-	2	2	2.8	-	2.6
C202	3	2.6	2.6	2.4	2.2	2.4	-	-	2.4	3	2.4	3
C203	3	2.6	2.2	2.4	2.6	2.6	2	-	2.6	3	2.2	3
C204	3	2.4	2.6	2.2	3	2.2	-	-	2.8	3	2.4	3
C205	3	2.4	2.6	2.4	2.6	-	2	-	2	3	-	3
C206	3	2.6	2.6	2.4	2.2	2.4	-	-	2.4	3	2.4	3
C207	3	2.4	2.6	2.4	3	2	-	-	3	3	-	3
C208	2.6	2.4	2.6	2.6	3	2.6	2.4	-	3	3	2.4	2.8
C209	3	2.6	2.8	2.4	2.6	2.6	2.6	-	2.4	3	2.4	3
C210	3	2.4	2.6	2.4	2.4	2.4	2.4	-	2.4	3	2.4	3

C211	3	2.6	2.6	2.4	2.4	2	2.2	-	3	3	2.4	3
C212	3	2.8	2.6	2.4	2.6	1.6	2	-	2.4	3	1.6	3
C213	3	2.4	2.6	2.4	2.4	2.6	2.6	-	2.4	3	2.2	3
C214	3	2.4	2.6	2.4	2.4	1.8	1.6	-	2.4	3	2.4	3
C215	3	2.4	2.6	2.8	3	2.4	2.4	-	3	3	2.4	2.8
C216	3	2.6	2.6	2.4	2.4	2	2.2	-	3	3	2.4	3
C217	3	2.8	2.6	2.8	2.6	2.6	2.4	2	2.6	3	2.4	3
C301	3	2.4	2.6	2.4	3	2.4	2.4	-	3	3	2.4	3
C302	3	2.4	2.6	2.4	2.4	2.6	2.6	-	2.4	3	2.2	3
C303	3	2.4	2.6	2.4	2.4	2.4	2.4	-	2.4	3	2.4	3
C304	3	2.4	2.6	2.4	2.2	2.4	2.6	2	2.4	3	2.4	3
C305	3	2.4	3	2.4	2.2	2.4	2.6	2	2.4	3	3	3
C306	3	2.4	2.6	2.4	3	2.4	2.2	-	3	3	2.2	3
C307	3	2.4	2.6	2.4	3	2.4	2.4	-	3	3	2.4	3
C308	3	2.4	2.6	2.8	3	2.4	2.4	-	3	3	2.4	2.8
C309	3	2.4	2.6	2.4	3	2.4	2.4	2	3	2.6	-	3
C310	3	2.8	2.4	2.4	2.6	2	2.2	-	2.4	3	2.2	3
C311	3	2.4	2.6	2.4	2.6	2.4	2.4	-	2.4	3	2.4	3
C312	3	3	2.8	3	2.6	2	-	-	2.4	3	-	3
C313	3	2.4	2.6	2.4	3	2.2	2.4	-	3	3	-	3
C314	3	2.4	2.6	2.6	2.4	2.4	2.6	2	2.4	3	2.4	3
C315	3	2.4	2.2	2.4	2.4	2.2	2.4	2	2.4	3	2.4	3
C316	3	2.6	2.6	2.4	3	2.4	2.2	-	3	3	2.4	3
C317	3	2.4	2.6	2.4	3	1.6	2.4	-	3	3	-	3
C318	3	2.4	2.6	2.4	2.4	2.4	-	-	2.4	3	-	3
C401	3	2.6	2.4	2.6	2.6	2.2	2.4	2	2.4	3	2	3
C402	3	2.4	2.4	2.6	2.4	2.2	2.2	2	2.2	3	2.2	3
C403	3	2.4	2.6	2.4	2.4	3	2.4	-	2.6	3	2.8	3
C404	3	2.4	2.6	2.4	2.6	3	2.4	2	3	3	2.4	3
C405	2.6	2.4	2.6	2.6	3	2.4	2.4	-	3	3	2.4	2.8
C406	3	2.8	2.6	2.8	2.6	2.6	2.4	2	2.6	3	2.4	3
C407	3	2.8	2.8	3	2.8	2.4	2.4	2	2.4	3	2.4	2.8

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C408	3	2.4	2.6	2.4	2.4	2.4	2.4	2	2.4	3	2.4	3
C409	3	2.4	2.4	2.6	2.4	2.6	2.2	2	2.6	3	2.2	3
C410	3	2.4	2.6	2.8	2.4	2.4	2.6	2	2.4	3	2.4	3
C411	3	2.4	2.6	2.4	2.4	2.4	2.4	2	2.4	3	2.8	3
C412	3	3	2.8	2.8	2.4	2.6	2.8	2	2.4	3	2.4	3