B.E. (Computer Science and Engineering) Program

Program Outcomes (PO's)

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

PO2: Problem analysis: Identify, formulate, research literature, and analyse 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 public health and safety, and 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 modelling 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 the 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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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: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

R-22

B.E. – Computer Science and Engineering

Department Vision

To be in the frontiers of Computer Science and Engineering with academic excellence and Research.

Department Mission

The mission of the Computer Science and Engineering Department is to:

1. Educate students with the best practices of Computer Science by integrating the latest research into the curriculum
2. Develop professionals with sound knowledge in theory and practice of Computer Science and Engineering
3. Facilitate the development of academia-industry collaboration and societal outreach programs
4. Prepare students for full and ethical participation in a diverse society and encourage lifelong learning

B.E - Computer Science and Engineering Program Educational Objectives (PEO's):

1. **PEO 1:** Graduates will apply their knowledge and skills to succeed in their careers and/or obtain advanced degrees, provide solutions as entrepreneurs.
2. **PEO 2**: Graduates will creatively solve problems, communicate effectively, and successfully function in multi-disciplinary teams with superior work ethics and values.
3. **PEO 3**: Graduates will apply principles and practices of Computer Science, mathematics and Science to successfully complete hardware and/or software-related engineering projects to meet customer business objectives and/or productively engage in research.

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B.E- Computer Science and Engineering Program Specific Outcomes (PSO's):

1. **PSO 1:** Able to acquire knowledge and practical competency for providing solutions to the problems related to Computer Science and Engineering.
2. **PSO 2**: Able to design and develop innovative solutions for complex problems by applying the concepts of emerging domains including AI, ML, IoT, Data Science, security and cloud.
3. **PSO 3**: Able to gain knowledge and skills to develop, deploy and maintain software using modern Software Engineering principles and practices.

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Department of Computer Science and Engineering

Course Outcomes

Academic Year 2023-2024

S.No.	Year/ Sem	Name of the Course	
1	I/I	**22MTC01- Linear Algebra & Calculus**	
		22MTC01.1	Determine the extreme values of functions of two variables
		22MTC01.2	Apply the vector differential operator to scalar and vector functions
		22MTC01.3	Solve line, surface & volume integrals by Greens, Gauss and Stoke's theorems
		22MTC01.4	Determine the basis and dimension of a vector space, compute linear transformation.
		22MTC01.5	Apply the Matrix Methods to solve the system of linear equations
2	I/I	**22PYC01 - Optics and Semiconductor Physics**	
		22PYC01.1	Demonstrate the physical properties of light
		22PYC01.2	Explain characteristic properties of lasers and fiber optics
		22PYC01.3	Find the applications of quantum mechanics
		22PYC01.4	Classify the solids depending upon electrical conductivity
		22PYC01.5	Identify different types of semiconductors
3	I/I	**22CSC01-Problem Solving And Programming**	
		22CSC01.1	Understand real world problems and develop computer solutions for those problems.
		22CSC01.2	Understand the basics of Python
		22CSC01.3	Apply Python for solving basic programming solutions
		22CSC01.4	Create algorithms/flowcharts for solving real-time problems
		22CSC01.5	Build and manage dictionaries to manage data.
		22CSC01.6	Handle data using files
4	I/I	**22EGC01- ENGLISH**	
		22EGC01.1	Illustrate the nature, process and types of communication and communicate effectively without barriers.
		22EGC01.2	Construct and compose coherent paragraphs, emails and adhering to appropriate mobile etiquette.
		22EGC01.3	Apply techniques of precision to write a précis and formal letters by using acceptable grammar and appropriate vocabulary.
		22EGC01.4	Distinguish formal from informal reports and demonstrate advanced writing skills by drafting g formal reports.
		22EGC01.5	Critique passages by applying effective reading techniques
5	I/I	**22PYC03-OPTICS AND SEMICONDUCTOR PHYSICS LAB**	
		22PYC03.1	Interpret the errors in the results of an experiment.
		22PYC03.2	Demonstrate physical properties of light experimentally
		22PYC03.3	Make use of lasers and optical fibers for engineering applications
		22PYC03.4	Explain the V-I characteristics of some optoelectronic and semiconductor devices

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		22PYC03.5	Find the applications of thermistor
6	I/I	**22EGC02- ENGLISH LAB**	
		22EGC02.1	Define the speech sounds in English and understand the nuances of pronunciation in English.
		22EGC02.2	Apply stress correctly and speak with the proper tone, intonation and rhythm.
		22EGC02.3	Analyze IELTS and TOEFL listening comprehension texts to enhance their listening skills.
		22EGC02.4	Determine the context and speak appropriately in various situations.
		22EGC02.5	Design and present effective posters while working in teams, and discuss and participate in Group discussions.
7	I/I	**22CSC02-Problem Solving and Programming Lab**	
		22CSC02.1	Understand various Python program development Environments.
		22CSC02.2	Demonstrate the concepts of Python
		22CSC02.3	Implement algorithms/flowcharts using Python to solve real-world problems
		22CSC02.4	Build and manage dictionaries to manage data
		22CSC02.5	Write Python functions to facilitate code reuse.
		22CSC02.6	Use Python to handle files and memory.
8	I/I	**22MEC01-Cad and Drafting**	
		22MEC01.1	Become conversant with appropriate use of CAD software for drafting.
		22MEC01.2	Recognize BIS, ISO Standards and conventions in Engineering Drafting.
		22MEC01.3	Construct the projections of points, lines, planes, solids
		22MEC01.4	Analyse the internal details of solids through sectional views
		22MEC01.5	Create an isometric projections and views
9	I/I	**22MEC38-Digital Fabrication Lab**	
		22MEC38.1	Understand safety measures to be followed in workshop to avoid accidents.
		22MEC38.2	Identify various tools used in carpentry, house wiring and plumbing.
		22MEC38.3	Make a given model by using workshop trades like carpentry, plumbing, House wiring and 3d modeling using solid works software for Additive Manufacturing.
		22MEC38.4	Perform pre-processing operations on STL filesfor 3D printing, also understand reverse engineering process
		22MEC38.5	Conceptualize and produce simple device/mechanism of their choice.
10	I/II	**22MTC04-Differential Equations & Numerical Methods**	
		22MTC04.1	Calculate the solutions of first order linear differential equations
		22MTC04.2	Calculate the solutions of higher order linear differential equations.
		22MTC04.3	Solve the algebraic, transcendental and system of equations

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		22MTC04.4	Apply interpolation and numerical differentiation techniques for given data.
		22MTC04.5	Test the convergence and divergence of Infinite series.
11	I/II	**22CYC01-Chemistry**	
		22CYC01.1	Identify the microscopic chemistry in terms of molecular orbitals, intermolecular forces and rate of chemical reactions
		22CYC01.2	Discuss the properties and processes using thermodynamic functions, electrochemical cells and their role in batteries and fuel cells.
		22CYC01.3	Illustrate the major chemical reactions that are used in the synthesis of organic molecules
		22CYC01.4	Classify the various methods used in treatment of water for domestic and industrial use.
		22CYC01.5	Outline the synthesis of various Engineering materials & Drugs.
12	I/II	**22EE C01-Basic Electrical Engineering**	
		22EE C01.1	Understand the concepts of Kirchhoff's laws and their application various theorems to get solution of simple dc circuits.
		22EE C01.2	Predict the steady state response of RLC circuits with AC single phase/three phase supply.
		22EE C01.3	Infer the basics of single phase transformer
		22EE C01.4	Describe the construction, working principle of DC machine and 3-phase Induction motor
		22EE C01.5	Acquire the knowledge of electrical wires, cables, earthling, Electrical safety precautions to be followed in electrical installations and electric shock and its safety and energy calculations.
13	I/II	**22CSC03 -Object Oriented Programming**	
		22CSC03.1	Understand the concepts of Object-Oriented features
		22CSC03.2	Apply OOPs concepts and different libraries to solve programming problems.
		22CSC03.3	Understand the advanced concepts of Python
		22CSC03.4	Develop programs to access databases and web data
		22CSC03.5	Understand APIs and third-party libraries to be used with Python.
14	I/II	**22CYC02-Chemistry Lab**	
		22CYC02.1	Identify the basic chemical methods to analyse the substances quantitatively & qualitatively.
		22CYC02.2	Estimate the amount of chemical substances by volumetric analysis.
		22CYC02.3	Determine the rate constants of reactions from concentration of reactants/ products as a function of time
		22CYC02.4	Calculate the concentration and amount of various substances using instrumental techniques
		22CYC02.5	Develop the basic drug molecules and polymeric compounds.
15	I/II	**22MBC02-Community Engagement**	
		22MBC02.1	Gain an understanding of Rural life, Culture and Social realities

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		22MBC02.2	Develop a sense of empathy and bonds of mutuality with Local Communities
		22MBC02.3	Appreciate significant contributions of Local communities to Indian Society and Economy.
		22MBC02.4	Exhibit the knowledge of Rural Institutions and contributing to Community's Socio-Economic improvements.
		22MBC02.5	Utilise the opportunities provided by Rural Development Programmes
16	I/II	**22CSC04-OBJECT ORIENTED PROGRAMMING LAB**	
		22CSC04.1	Demonstrate the features of Object-Oriented Programming.
		22CSC04.2	Understand APIs and third-party libraries to be used with Python.
		22CSC04.3	Use Python libraries to solve real-world problems
		22CSC04.4	Write scripts to solve data science/machine leaning problems using NumPy and Pandas
		22CSC04.5	Develop applications by accessing web data and databases
17	I/II	**22MEC37- ROBOTICS AND DRONES LAB**	
		22MEC37.1	Demonstrate knowledge of the relationship between mechanical structures of robotics and their operational workspace characteristics
		22MEC37.2	Understand mechanical components, motors, sensors and electronic circuits of robots and build robots.
		22MEC37.3	Demonstrate knowledge of robot controllers
		22MEC37.4	Use Linux environment for robotic programming
		22MEC37.5	Write Python scripts to control robots using Python and Open CV
18	I/II	**22EEC02-Basic Electrical Engineering Lab**	
		22EEC02.1	Comprehend the circuit analysis techniques using various circuital laws and theorems.
		22EEC02.2	Analyse the parameters of the given coil and measurement of power and energy in AC circuits
		22EEC02.3	Determine the turns ration/performance parameters of single-phase transformer
		22EEC02.4	Infer the characteristics of DC shunt motor different tests.
		22EEC02.5	Illustrate different parts and their function of electrical components, equipment and machines.
19	II/I	**22CSC05- Data Structures**	
		22CSC05.1	Understand the basic concepts and types of data structures.
		22CSC05.2	Analyse various linear and nonlinear data structures.
		22CSC05.3	Identify the applications of linear and nonlinear data structures and significance of balanced search trees, hashing .
		22CSC05.4	Evaluate various searching and sorting techniques
		22CSC05.5	Use appropriate data structures to design efficient algorithms
20	II/I	**22CSC06- Discrete Structures**	
		22CSC06.1	Describe rules of inference for Propositional and Predicate logic
		22CSC06.2	Demonstrate use of Set Theory, Venn Diagrams, relations, and functions in Real-world scenarios

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		22CSC06.3	Model solutions using Generating Functions and Recurrence Relations
		22CSC06.4	Determine the properties of graphs and trees to solve problems arising in computer science applications.
		22CSC06.5	Distinguish between groups, semi groups and monoids in algebraic systems
21	II/I	**22CSC07-Digital Logic Design**	
		22CSC07.1	Demonstrate the number system conversions and simplify Boolean functions
		22CSC07.2	Recall basic theorems and properties of Boolean algebra to represent logical functions in canonical and standard forms.
		22CSC07.3	Analyze and simplify Boolean expressions using Karnaugh-maps and tabulation method
		22CSC07.4	Analyze and Design various combinational circuits and Sequential circuits using Verilog HDL.
		22CSC07.5	Design different applications using registers and counters by applying state reduction methods.
22	II/I	**22ECC36-Basic Electronics and Sensors**	
		22ECC36.1	Identify various types of semiconductor devices for building electronic circuits
		22ECC36.2	Describe the operation of various sensors, data convertors and actuators
		22ECC36.3	Acquire the data from various sensors.
		22ECC36.4	Analyse usage of sensors/actuators for the development of real-time applications
		22ECC36.5	Apply theoretical learning to implement practical real-time problems for automation
23	II/I	**22EGM01-Indian Constitution and Fundamental Principles**	
		22EGM01.1	Understand the history of framing of the Indian Constitution and its features
		22EGM01.2	Assess the realization of Fundamental Rights and Directive Principles of State Policy
		22EGM01.3	Analyse the challenges to federal system and position of the President and the Prime Minister in the Union Government.
		22EGM01.4	Underline the role of the Legislature and the Judiciary in Union Government and their mutual relations
		22EGM01.5	Evolve the development of the local governments in India and assess the role of Collector in district administration.
24	II/I	**22CSC08- Data Structures and Algorithms Lab**	
		22CSC08.1	Implement the abstract data type.
		22CSC08.2	Implement linear and non-linear data structures.
		22CSC08.3	Analyze various sorting techniques.
		22CSC08.4	Analyze various algorithms of linear and nonlinear data structures.
		22CSC08.5	Design and develop real world problem using suitable data structures.

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25	II/I	**22ECC37- Basic Electronics and Sensors Lab**	
		22ECC37.1	Familiarize with basic electronic components, devices, and systems.
		22ECC37.2	Formulate the research problems associate with Transistor or Op-amp circuits.
		22ECC37.3	Examine the Interfacing of myRIO with various sensors/transducers, Motors.
		22ECC37.4	Examine and Measure the problems encountered in Robotos or sensor related systems.
		22ECC37.5	Justify the solutions related with transistorized circuits for real-time applications.
26	II/I	**22CSC09- Latex Lab**	
		22CSC09.1	Understand the need of documentation tools.
		22CSC09.2	Install the documentation tools
		22CSC09.3	Generate templates for generation report using LaTeX.
		22CSC09.4	Generate templates for presentation reports using Beamer
		22CSC09.5	Explore the utilities of LaTeX.
27	II/I	**22CSV01- Engineering Leadership(MOOCs)**	
		22CSV01.1	Understand engineer-leader roles to be played in professional careers.
		22CSV01.2	Acquire leader skills that are required for professional career
		22CSV01.3	Use assessment tools to identify the strengths and weaknesses and analyze the impact on leadership style.
		22CSV01.4	Develop stress management skills to improve leadership styles.
		22CSV01.5	Develop the attitude of creativity in problem solving.
28	II/I	**22CSI01 - Internship – I**	
		22CSI01.1	Learn new technologies and solve real time projects.
		22CSI01.2	Expose to the industrial environment problems and technologies
		22CSI01.3	Gain knowledge on contemporary technologies industrial requirements
		22CSI01.4	Identify , Design and Develop solutions for real world problems
		22CSI01.5	Communicate their ideas and learning experiences through reports and presentation.
29	II/II	**22CSC10-Computer Organization and Architecture**	
		22CSC10.1	Understand the basics of instructions sets and their impact on processor design.
		22CSC10.2	Demonstrate an understanding of the design of the functional units of a digital computer system.
		22CSC10.3	Evaluate cost performance and design trade-offs in designing and constructing a computer processor.
		22CSC10.4	Design a pipeline for consistent execution of instructions with minimum hazards.
		22CSC10.5	Understand how to perform computer arithmetic operations, pipeline procedures, and multiprocessors.
30	II/II	**22CSC11 -Data Base Management Systems**	

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		22CSC11.1	Design database schema for an application using RDBMS concepts.
		22CSC11.2	Write SQL queries for tasks of various complexities.
		22CSC11.3	Build applications using database system as backend.
		22CSC11.4	Understand internal working of a DBMS including data storage, indexing, query processing, transaction processing, and concurrency control and recovery mechanisms.
		22CSC11.5	Analyze non-relational and parallel/distributed data management systems with a focus on scalability.
31	II/II	**22CSC12-Formal Language and Automata Theory**	
		22CSC12.1	Describe language basics like Alphabet, strings, grammars, productions, derivations, and Chomsky hierarchy.
		22CSC12.2	Recognize regular expressions, formulate, and build equivalent finite automata for various languages.
		22CSC12.3	Identify closure, decision properties of the languages and prove the membership.
		22CSC12.4	Demonstrate context-free grammars, check the ambiguity of the grammars and design equivalent PDA to accept.
		22CSC12.5	Use mathematical tools, abstract machine models to solve complex problems and distinguish decidable and undecidability of a problem.
32	II/II	**22MTC12-PROBABILITY AND STATISTICS**	
		22MTC12.1	Analyze the coefficient of skewness and fitting of the data by various methods
		22MTC12.2	Estimate the marginal probabilities of statistical averages.
		22MTC12.3	Use the basic probability for fitting the Random phenomenon.
		22MTC12.4	Apply various tests for testing the significance of sample data.
		22MTC12.5	Analyze the random phenomena of real world data.
33	II/II	**22ITC17-Web Technologies**	
		22ITC17.1	Create web pages with good aesthetic sense of design using HTML CSS3, Bootstrap and popular themes.
		22ITC17.2	Use JS in Validations and DOM manipulation.
		22ITC17.3	Design Schema and perform CRUD operations from UI components.
		22ITC17.4	Become an agile practitioner with the ability to quickly complete projects using ReactJS.
		22ITC17.5	Build an end-to-end application from scratch using React JS, NODE JS, Express JS and Mongo DB.
34	II/II	**22ECC39-SYSTEMS AND SIGNAL PROCESSING**	
		22ECC39.1	Classify signals, analyse the signals using Transform techniques.
		22ECC39.2	Evaluate signal characteristics in frequency domain.
		22ECC39.3	Assess the system stability and causality using ROC and Pole-Zero Plot.
		22ECC39.4	Classify systems and analyse the signals using Transform techniques.
		22ECC39.5	Describe and analyse the DT Signal/systems using DFT, DCT, DWT, FFT and Z-Transform

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35	II/II	**22ITC18-Web Technologies Lab**	
		22ITC18.1	Build interactive and user-friendly static frontend UI applications using HTML, CSS and JavaScript.
		22ITC18.2	Develop a web page based on Bootstrap.
		22ITC18.3	Use MongoDB concepts in Web Application Development using React JS.
		22ITC18.4	Create Single Page and multi-page Applications using React, Node JS, Express JS and Mongo DB.
		22ITC18.5	Implement MVC and responsive design to scale well across PC, tablet and Mobile Phone.
36	II/II	**22CSC13-Data Base Management Systems Lab**	
		22CSC13.1	Design database schema for an application using MYSQL.
		22CSC13.2	Write SQL queries for tasks of various complexities.
		22CSC13.3	Create indices for query optimization.
		22CSC13.4	Evaluate various database management systems.
		22CSC13.5	Design and develop applications to solve real time problems.
37	III/I	**20CSC19-FORMAL LANGUAGE AND AUTOMATA THEORY**	
		20CSC19.1	Describe language basics like Alphabet, strings, grammars, productions, derivations, and Chomsky hierarchy
		20CSC19.2	Recognize regular expressions, formulate, and build equivalent finite automata for various languages
		20CSC19.3	Identify closure, decision properties of the languages and prove the membership
		20CSC19.4	Demonstrate context-free grammars, check the ambiguity of the grammars and design equivalent PDA to accept
		20CSC19.5	Use mathematical tools and abstract machine models to solve complex problems
		20CSC19.6	Analyze and distinguish between decidable and undecidable problem
38	III/I	**20CSC20-Operating Systems**	
		20CSC20.1	Identify the basics of an operating systems and its major components.
		20CSC20.2	Understand the concepts related to process synchronization and deadlocks.
		20CSC20.3	Distinguish various memory management techniques.
		20CSC20.4	Interpret various threats and defense mechanisms used to protect the system.
		20CSC20.5	Evaluate various file allocation methods.
		20CSC20.6	Apply security as well as recovery features in the design of algorithms.
39	III/I	**20CSC21 -Data Communication and Computer Networks**	
		20CSC21.1	Learn the communication protocol suites like ISO-OSI and TCP/IP.
		20CSC21.2	Illustrate and explain Data Communications System and its components.
		20CSC21.3	Identify and analyze various congestion control algorithms.

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		20CSC21.4	Distinguish the internet protocols like IP, ARP, ICMP, IGMP, routing protocols and DHCP.
		20CSC21.5	Understand the transport layer protocols like TCP, UDP, RTCP.
		20CSC21.6	Identify various application layer protocols like HTTP, WWW, DNS, Email Protocols, FTP and the underlying protocols
40	III/I	**20CSC22 -Software Engineering**	
		20CSC22.1	State the software process and explain perspective process model, evolutionary process models.
		20CSC22.2	Understand the agile Software process models and demonstrate the skills necessary to specify the requirements of software product so as to prepare SRS document.
		20CSC22.3	Recall the modeling concepts and estimate the cost of software using empirical models
		20CSC22.4	Enlist the design principles and construct a product using coding principles and standards.
		20CSC22.5	Develop test cases and apply software testing methods in conventional and O-O approaches and estimates software quality of SW.
41	III/I	**20CSE01-Image Processing and Computer Vision (PE-I)**	
		20CSE01.1	Understand basic principles of image processing and its significance in real world.
		20CSE01.2	Interpret and evaluate various approaches for image. Transformation, segmentation, and restoration.
		20CSE01.3	Determine and compute object, scene recognition and categorization algorithms for real time images.
		20CSE01.4	Analyze images and videos for problems such as tracking and structure from motion.
		20CSE01.5	Appraise recovery of 3D structure of ill-posed scenes.
		20CSE01.6	Apply various techniques to build computer vision applications.
42	III/I	**20CSE02-Advanced Databases (PE-I)**	
		20CSE02.1	Analyze and evaluate modeling and development methods/techniques in Object-based Databases.
		20CSE02.2	Understand and analyze query processing and optimization.
		20CSE02.3	Understand how distributed and parallel databases are implemented, and how applications can be designed for those databases.
		20CSE02.4	Develop applications for mobility and personal databases.
		20CSE02.5	Understand and implement cloud-based databases.
		20CSE02.6	Gain insight into some advanced topics in database such as Performance Tuning, spatial databases, temporal databases.
43	III/I	**20CSE03-System Modelling and Simulation (PE-I)**	
		20CSE03.1	Create a computer simulation based on the physical characteristics of the system.
		20CSE03.2	Solve ordinary and partial differential equations with computational methods.

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		20CSE03.3	Display insight into the uncertainties in a system and how they can be characterized.
		20CSE03.4	Manipulate the data structures of numerical computing; matrices, and vectors, and visually represent data sets coming from computer simulations.
44	III/I	**20CSE04-Free and Open Source Technologies (PE-I)**	
		20CSE04.1	Identify various FOSS tools, platforms, licensing procedures and development models, ethics
		20CSE04.2	Describe various FOSS projects, development models and project management
		20CSE04.3	Adapt to the usage of FOSS tools and technologies.
		20CSE04.4	Distinguish between Proprietary and Open Source tools, development methods
		20CSE04.5	Practice Open Source principles, ethics, and models and to evaluate various Open Source projects like Linux, Apache, GIT, etc.
45	III/I	**20CSE05-Optimization Techniques (PE-I)**	
		20CSE05.1	Calculate the optimum values for given objective function by LPP.
		20CSE05.2	Solve the solution for maximize the profit with minimum cost by Transportation problem.
		20CSE05.3	Determine the optimum feasible solution for assignment and travelling salesman problems and computing the optimal solution for Job sequencing models.
		20CSE05.4	Compute the optimum values for given objective function by IPP and optimal strategy for games.
		20CSE05.5	Identify critical path using network scheduling
46	III/I	**20ECO10 -Fundamentals of Wireless Communication(P.E-2)**	
		20ECO10.1	Understand the overview of Wireless Communication.
		20ECO10.2	Relate the cellular concepts like frequency reuse, hand off, coverage and capacity.
		20ECO10.3	Analyse the mobile radio propagation with large scale and small scale fading.
		20ECO10.4	Select the suitable diversity technique to combat the multipath fading effects.
		20ECO10.5	Compare the multiple access techniques and apply to wireless standards.
47	III/I	**20EEO05 -Waste Management(P.E-2)**	
		20EEO05.1	Categorize the waste based on the physical and chemical properties.
		20EEO05.2	Explain the Hazardous Waste Management and Treatment process.
		20EEO05.3	Illustrate the Environmental Risk Assessment, methods, mitigation and control.
		20EEO05.4	Interpret the Biological Treatment of Solid and Hazardous Waste.
		20EEO05.5	Identify the waste disposal options, describe the design and construction, Operation, Monitoring, Closure of Landfills
48	III/I	**20MEO09-Organizational Behaviour(P.E-2)**	

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		20MEO09.1	Understand Organizational Behavioural principles and practices.
		20MEO09.2	Compare various organizational designs and cultures enabling organizational development.
		20MEO09.3	Apply motivational theories and leadership styles in resolving employees problems and decision making processes.
		20MEO09.4	Understand the group dynamics, communication network, skills needed to resolve organizational conflicts.
		20MEO09.5	Analyze the behaviour, perception and personality of individuals and groups in organizations in terms of the key factors that influence organizational behaviour
49	III/I	**20MTO03-Quantum Computing(P.E-2)**	
		20MTO03.1	Compute basic mathematical operations on Quantum bits.
		20MTO03.2	Execute Quantum operations of Quantum computing
		20MTO03.3	Built quantum programs
		20MTO03.4	Develop quantum Logical gates and circuits.
		20MTO03.5	Develop the quantum algorithm
50	III/I	**20BTO04 -Bioinformatics(P.E-2)**	
		20BTO04.1	Explain the basic concepts of biology and bioinformatics.
		20BTO04.2	Identify various types of biological databases used for the retrieval and analysis of the information
		20BTO04.3	Explain the sequence analysis and data mining.
		20BTO04.4	Discuss the methods used for sequence alignment and construction of the phylogenetic tree.
		20BTO04.5	Describe the methods used for gene and protein structure prediction
51	III/I	**20CSC23-Operating Systems Lab**	
		20CSC23.1	Understand Linux/Unix environment.
		20CSC23.2	Identify and interpret various system programs.
		20CSC23.3	Understand and implement shell programming.
		20CSC23.4	Simulate memory management and file allocation techniques.
		20CSC23.5	Analyze process and file management system calls by creating and/or modifying concurrent programs.
		20CSC23.6	Build network-oriented applications using system calls
52	III/I	**20CSC24-Data Communication and Computer Networks Lab**	
		20CSC24.1	Identify the different types of wiring equipment's used in the networks lab.
		20CSC24.2	Understand the various network devices like repeater, hub, switch, and routers.
		20CSC24.3	Practice the basic network configuration commands like ifconfig, ping, traceroute, nslookup, dig, arp, netstat, nmap.
		20CSC24.4	Design and demonstrate network topologies using GNS3.
		20CSC24.5	Examine the packet transfer using tcpdump.
		20CSC24.6	Analyze the network performance using Wireshark or any tool.
53	III/I	**20CSC25-Case Studies using UML Lab**	
		20CSC25.1	Identify the problem scope and constraints in the problem.

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		20CSC25.2	Prepare software requirements specifications (SRS) for the system according to standards.
		20CSC25.3	Apply the design notations of structured approach to develop ER and Data Flow Diagrams.
		20CSC25.4	Apply/Use the design notations of OO approach to develop UML diagrams using rational tools.
		20CSC25.5	Implement, analyze and prepare the documentation for the proposed system.
54	III/II	**20CSC26-Compiler Design**	
		20CSC26.1	Identify the concepts related to translator, tokens, bootstrapping porting and phases of the compiler.
		20CSC26.2	Use grammar specifications and implement lexical analyzer by the help of compiler tools.
		20CSC26.3	Explore the techniques of Top down, Bottom up Parsers and apply parsing methods for various grammars.
		20CSC26.4	Implement syntax directed translation schemes and relate Symbol table organization
		20CSC26.5	Explain the algorithms to generate code for a target machine code and evaluate.
		20CSC26.6	Recognize the errors and their recovery strategies and understanding advance topics
55	III/II	**20CSC27-Artificial Intelligence**	
		20CSC27.1	Define the role of agents and interaction with the environment to establish goals.
		20CSC27.2	Identify and formulate search strategies to solve problems by applying suitable search strategy.
		20CSC27.3	Understand probabilistic reasoning and Markov decision process to solve real world problems.
		20CSC27.4	Design applications using Reinforcement Learning.
		20CSC27.5	Apply AI concepts to solve the real-world problems
56	III/II	**20CSE06-Soft Computing (P.E.-II)**	
		20CSE06.1	Understand various soft computing concepts and techniques.
		20CSE06.2	Analyze and design various learning models.
		20CSE06.3	Apply the Neural Network Architecture for various Real time applications.
		20CSE06.4	Examine and approximate reasoning using fuzzy logic.
		20CSE06.5	Design Genetic algorithms in different applications.
		20CSE06.6	Develop soft computing techniques to solve different applications
57	III/II	**20CSE07-Internet of Things(P.E.-II)**	
		20CSE07.1	Understand IoT, its hardware and software components.
		20CSE07.2	Comprehend I/O interface and programming APIs.
		20CSE07.3	Analyze the use of communication protocols in IoT.
		20CSE07.4	Explore Solution framework for IoT applications.
		20CSE07.5	Illustrate unstructured data storage.
		20CSE07.6	Develop real time IoT based projects.

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58	III/II	**20CSE08 -Enterprise Application Development (P.E.-II)**	
		20CSE08.1	Understand the database connectivity and application servers.
		20CSE08.2	Explore the type of forms with validations using ReactJS.
		20CSE08.3	Utilize Express framework to develop responsive web applications.
		20CSE08.4	Demonstrate the architecture and file system of NodeJs.
		20CSE08.5	Identify the significance of component intercommunication with Angular2.
		20CSE08.6	Adapt MEAN or MERN stack to implement a real-time web application.
59	III/II	**20CSE09-Machine Learning (P.E.-II)**	
		20CSE09.1	Define the basic concepts related to Machine Learning.
		20CSE09.2	Recognize the underlying mathematical relationships across ML algorithms and their paradigms.
		20CSE09.3	Determine the various applications of Machine Learning.
		20CSE09.4	Model, design and develop solutions to real world problems using Machine Learning Algorithms.
		20CSE09.5	Evaluate and interpret the results of the various machine learning tools
60	III/II	**20CSE10-DevOps (P.E.-II)**	
		20CSE10.1	Identify components of Devops environment.
		20CSE10.2	Describe Software development models and architectures of DevOps.
		20CSE10.3	Apply different project management, integration, testing and code deployment tools.
		20CSE10.4	Investigate different DevOps Software development models.
		20CSE10.5	Assess various Devops practices.
		20CSE10.6	Collaborate and adopt Devops in real-time projects
61	III/II	**20CSE11- Natural Language Processing (P.E.-III)**	
		20CSE11.1	Understand the basic concepts of Natural language processing pipeline and applications of NLP.
		20CSE11.2	Illustrate various text representation techniques in NLP.
		20CSE11.3	Analyse text classification techniques and deep learning basics to process natural language text.
		20CSE11.4	Explore text summarization methods and example systems.
		20CSE11.5	Demonstrate levels of NLP for several case studies.
		20CSE11.6	Apply NLP Pipe lines to solve real world applications.
62	III/II	**20CSE12-Embedded Systems (P.E.-III)**	
		20CSE12.1	Understand the basics of embedded systems.
		20CSE12.2	Analyze the core concepts of Embedded System and Embedded System Architecture.
		20CSE12.3	Design and develop Embedded System hardware and software using Embedded C.
		20CSE12.4	Analyze the operating system for embedded systems.
		20CSE12.5	Analyze the embedded system development environment and tools used in embedded software development process

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63	III/II	**20CAE04 -Algorithmic Game Theory (P.E.-III)**	
		20CAE04.1	Acquire knowledge about the real world problems and formulate mathematical models of these problems.
		20CAE04.2	Identifying the algorithmic Models for finding the optimal solutions for real world examples.
		20CAE04.3	Analyze the major limitations and capabilities of game theory problems.
		20CAE04.4	Design and analyze problems using game theory approaches.
		20CAE04.5	Explore the real world scenarios of economic and algorithmic interactions using game theory solutions
64	III/II	**20CSE13-Adhoc Sensor Networks (P.E.-III)**	
		20CSE13.1	Explain the concepts, network architectures and applications of ad hoc and WSN.
		20CSE13.2	Identify different issues in wireless adhoc and sensor networks.
		20CSE13.3	Analyze the protocol design issues of adhoc and sensor networks
		20CSE13.4	Design routing protocols for adhoc and WSN with respect to protocol design issues.
		20CSE13.5	Evaluate the QoS related performance measurements of adhoc and sensor networks.
65	III/II	**20CSE14-Software Quality Testing (P.E.-III)**	
		20CSE14.1	Perform white-box and black-box tests in the life cycle of the software product.
		20CSE14.2	Understand system testing and significance of software reliability.
		20CSE14.3	Identify defect prevention techniques and SQA metrics.
		20CSE14.4	Apply various techniques and standards of SQA.
		20CSE14.5	Reduce potential risks to an acceptable level before they occur
66	III/II	**20ECO01-Remote Sensing and GIS (O.E.-II)**	
		20ECO01.1	Demonstrate the understanding of basic concepts of remote sensing and interpret energy interactions.
		20ECO01.2	Choose an appropriate technique for a given scenario by appreciating the types of remote sensing.
		20ECO01.3	Distinguish the principle behind the working of microwave and LiDAR sensing.
		20ECO01.4	Apply Microwave remote sensing techniques
		20ECO01.5	Explain the procedure for encoding data and geospatial data analysis
67	III/II	**20MTO01-Financial Mathematics (O.E.-II)**	
		20MTO01.1	Calculate the internal rate of return, annuity and amortization.
		20MTO01.2	Apply the portfolio theory.
		20MTO01.3	Examine the binomial model of pricing.
		20MTO01.4	Analyze the stochastic differential equations.
		20MTO01.5	Solve the BSM partial differential equations
68	III/II	**20EEO02-Energy Management Systems (O.E.-II)**	
		20EEO02.1	Know the current Energy Scenario and importance of Energy Conservation.

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		20EEO02.2	Understand the concepts of Energy Management, Energy Auditing.
		20EEO02.3	Interpret the Energy Management methodology, Energy security and Energy Strategy.
		20EEO02.4	Identify the importance of Energy Efficiency for Engineers and explore the methods of improving Energy Efficiency in mechanical systems, Electrical Engineering systems.
		20EEO02.5	Illustrate the Energy Efficient Technologies in Civil and Chemical engineering systems
69	III/II	**20EGO01-Technical Writing Skills (O.E.-II)**	
		20EGO01.1	Communicate effectively, without barriers and understand aspects of technical communication.
		20EGO01.2	Differentiate between general writing and technical writing and write error free sentences using technology specific words
		20EGO01.3	Apply techniques of writing in business correspondence and in writing articles.
		20EGO01.4	Draft technical reports and technical proposals.
		20EGO01.5	Prepare agenda and minutes of a meeting and demonstrate effective technical presentation
70	III/II	**20CEO02-Disaster Risk Reduction And Managemen (O.E.-II)**	
		20CEO02.1	Identify and understand the concepts of hazards, causes and impacts of disasters.
		20CEO02.2	Develop a critical capacity to evaluate the principles and practices of disaster risk reduction and management.
		20CEO02.3	Develop a deep awareness of disaster resilience, risk mitigation, and recovery policies as they arise from natural hazards around the globe.
		20CEO02.4	Apply knowledge about existing global frameworks and existing agreements and role of community in successful Disaster Risk Reduction.
		20CEO02.5	Evaluate DM study including data search, analysis and presentation as a case study
71	III/II	**20CHO04-Environmental and Sustainable Development (O.E.-II)**	
		20CHO04.1	To relate sustainability concepts and ethical principles towards environment.
		20CHO04.2	To understand the different types of environmental pollution problems and their respect sustainable solutions.
		20CHO04.3	To become aware of concepts, analytical methods/models, and resources for evaluating and comparing sustainability implications of engineering activities.
		20CHO04.4	To critically evaluate existing and new methods.
		20CHO04.5	To develop sustainable engineering solutions by applying methods and tools to research a specific system design.
		20CHO04.6	To apply concepts of sustainable development to address sustainability challenges in a global context.
72	III/II	**20EGM03-Universal Human Values 2.0**	

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		20EGM03.1	Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
		20EGM03.2	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
		20EGM03.3	They would have better critical ability.
		20EGM03.4	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
		20EGM03.5	It is hoped that they would be able to apply what they have learnt to their own self in different day-to- day settings in real life, at least a beginning would be made in this direction.
73	III/II	**20CSC28-Compiler Design Lab**	
		20CSC28.1	Implement the rules for the analyzing phases of a compiler.
		20CSC28.2	Apply various Syntax techniques on grammars to build the parsers.
		20CSC28.3	Generate various intermediate code representations for source code.
		20CSC28.4	Explore error recovery strategies and implement code optimization, code generation phases.
		20CSC28.5	Examine the concepts of compiler tools: Lex, FlexVision, Yacc, Turbo C.
74	III/II	**20CSC29-Artificial Intelligence Lab**	
		20CSC29.1	Understand the basic components of library environment and installations.
		20CSC29.2	Analyze the design heuristics and apply various techniques to solve real world problems.
		20CSC29.3	Apply variety of algorithms to solve problems.
		20CSC29.4	Identify how to use GitHub and submit back genuine contributions.
		20CSC29.5	Implement problems using game search algorithms.
75	III/II	**20CSE15-Soft Computing Lab**	
		20CSE15.1	Implement McCulloh-Pitts model for Boolean operations.
		20CSE15.2	Apply perceptron learning algorithm for a given problem.
		20CSE15.3	Design and analyze various Neural Networks Architectures.
		20CSE15.4	Apply concepts of fuzzy sets on real-time applications.
		20CSE15.5	Implement Genetic Algorithms with its operators.
		20CSE15.6	Apply soft computing strategies for various real time applications
76	III/II	**20CSE16-Internet of Things Lab**	
		20CSE16.1	Use of various hardware and software IoT components.
		20CSE16.2	Perform experiments by Interfacing I/O devices, sensors to Raspberry Pi/Arduino.
		20CSE16.3	Understand and analyze communication protocols in IoT.
		20CSE16.4	Monitor data and controlling of devices.
		20CSE16.5	Develop Real time IoT based projects
77	III/II	**20CSE17-Enterprise Application Development Lab**	
		20CSE17.1	Prepare database connections with application servers.

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		20CSE17.2	Design user interfaces using ReactJS.
		20CSE17.3	Construct strong expertise on Express framework to develop responsive web applications.
		20CSE17.4	Create server side applications using Node.js
		20CSE17.5	Develop SPA using Angular 2.
		20CSE17.6	Invent next culture-shifting web applications.
78	III/II	**20CSE18-Machine Learning Lab**	
		20CSE18.1	Identify the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
		20CSE18.2	Identify and utilize modern tools that are useful for data analysis.
		20CSE18.3	Recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.
		20CSE18.4	Implement and evaluate various Machine Learning approaches on real world problems
		20CSE18.5	Apply Keras and Tensorflow to implement ML techniques.
79	III/II	**20CSE19-DevOps Lab**	
		20CSE19.1	Understand the phases of the software development life cycle.
		20CSE19.2	Examine the different version control systems.
		20CSE19.3	Recognize the importance of the build and deployment tools and test the software application.
		20CSE19.4	Deployment of application in production environment.
		20CSE19.5	Summaries the software configuration management.
		20CSE19.6	Synchronize and provisioning using Puppet and Ansible
80	III/II	**20EGC03 -Employability Skills**	
		20EGC03.1	Become effective communicators, participate in group discussions with confidence and be able to make presentations in a professional context.
		20EGC03.2	Write resumes, prepare and face interviews confidently.
		20EGC03.3	Be assertive and set short term and long term goals, learn to manage time effectively and deal with stress.
		20EGC03.4	Make the transition smoothly from campus to work, use media with etiquette and understand the academic ethics.
		20EGC03.5	Enrich their vocabulary, frame accurate sentences and comprehend passages confidently.
81	IV/I	**20CSC30-Cryptography and Network Security**	
		20CSC30.1	Analyze and design classical encryption techniques and block ciphers.
		20CSC30.2	Analyze and design hash and MAC algorithms, and digital signatures.
		20CSC30.3	Design network application security schemes like PGP, S/MIME, IPSec, SSL, TLS, HTTPS, SSH, etc.
		20CSC30.4	Evaluate the authentication and hash algorithms.
		20CSC30.5	Create and configure simple firewall architectures.
		20CSC30.6	Understand digital sign in emails and files.
82	IV/I	**20CSE21-Deep Learning (P.E.-IV)**	

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		20CSE21.1	Understand various learning models.
		20CSE21.2	Design and develop various Neural Network Architectures.
		20CSE21.3	Understand approximate reasoning using Convolution Neural Networks.
		20CSE21.4	Analyze and design Deep learning algorithms in different applications.
		20CSE21.5	Ability to apply CNN and RNN techniques to solve different applications.
		20CSE21.6	Evaluate the Performance of different models of Deep learning networks.
83	IV/I	**20CSE22 -Big Data Analytics (P.E.-IV)**	
		20CSE22.1	Demonstrate knowledge of Big Data, Data Analytics, challenges and their solutions in Big Data.
		20CSE22.2	Discuss about Hadoop Framework and eco systems.
		20CSE22.3	Understand and work on NoSQL environment and MongoDB.
		20CSE22.4	Explain and Analyse the Big Data using Map-reduce programming in Both Hadoop and Spark framework.
		20CSE22.5	Demonstrate spark programming with Python/R programming languages.
		20CSE22.6	Explain and Analyse the data Analytics algorithms in Spark
84	IV/I	**20CSE23 - Mobile Application Development (P.E.-IV)**	
		20CSE23.1	Interpret and analyze Android platform architecture and features to learn best practices in android programming.
		20CSE23.2	Design the User Interface for mobile applications.
		20CSE23.3	Apply Intents, Broadcast receivers and Internet services in Android App.
		20CSE23.4	Develop database management system to retrieve and/or store data for mobile application.
		20CSE23.5	Evaluate and select appropriate android solutions to the mobile computing platform.
		20CSE23.6	Build Flutter applications for complex problems.
85	IV/I	**20CSE24 -Blockchain Technology (P.E.-IV)**	
		20CSE24.1	Understand the significance of Blockchain technology and its associated components.
		20CSE24.2	Understand the need for consensus protocols in Blockchain.
		20CSE24.3	Experience the Ethereum and Hyperledger Fabric Platforms.
		20CSE24.4	Incorporate Blockchain in financial software Systems and supply chain environments.
		20CSE24.5	Devise the need for Blockchain in Government sectors.
		20CSE24.6	Understand the significance of blockchain security.
86	IV/I	**20CAE09-Planning and Estimation of Autonomous Systems (P.E.-IV)**	
		20CAE09.1	Identify different motion planning schemas under different environments.
		20CAE09.2	Define different states and have mathematical knowledge on drop-off and estimation algorithms.

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		20CAE09.3	Analyze different planning and decision techniques.
		20CAE09.4	Appraise different methods to solve finite Markov decision problem.
		20CAE09.5	Distinguish different decision making techniques under uncertain environment.
		20CAE09.6	Apply different information gathering techniques and associate Human-robot interaction
87	IV/I	**20CSE25-Social Computing (P.E.-V)**	
		20CSE25.1	Identify the significance of social networks, representation, ranking techniques and challenges.
		20CSE25.2	Understand a broad range of social networks concepts and theories.
		20CSE25.3	Ascertain the network analysis knowledge in a diversified aspect of society.
		20CSE25.4	Analyze social network links and web search.
		20CSE25.5	Differentiate between centralized and decentralized search models.
		20CSE25.6	Generate and communicate the analysis results and impact of social networks.
88	IV/I	**20CSE26-Human Computer Interaction (P.E.-V)**	
		20CSE26.1	Understand the structure of models and theories of human computer interaction.
		20CSE26.2	Understand the vision of a computer user.
		20CSE26.3	Understand the recognition and remembrance limitations of a computer user.
		20CSE26.4	Understand and analyze the mobile ecosystem and tools for mobile design.
		20CSE26.5	Design an interactive mobile interfaces for mobile applications and widgets.
		20CSE26.6	Design an interactive web interface for web applications.
89	IV/I	**20CAE10-Computational Neuroscience (P.E.-V)**	
		20CAE10.1	Understand the fundamentals of computational neuroscience.
		20CAE10.2	Analyse the Neural Encoding Models.
		20CAE10.3	Make use of Neurons & Neural coding to extract information.
		20CAE10.4	Analyse the Computing in Carbon and Computing with Networks.
		20CAE10.5	Analyse the various learning methodologies.
		20CAE10.6	Evaluate the Performance of different neurological models
90	IV/I	**20CSE27-Distributed Systems (P.E.-V)**	
		20CSE27.1	Understand the basic elements and concepts related to distributed systems.
		20CSE27.2	Illustrate the middleware technologies such as RPC, RMI and Object based middleware that support distributed applications.
		20CSE27.3	Analyze the various techniques used for clock synchronization and mutual exclusion.

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		20CSE27.4	Demonstrate the concepts of resource and process management and synchronization algorithms, consistency and replication management.
		20CSE27.5	Apply the knowledge of distributed file system for analysing various file systems like NFS, AFS and the experience in building large-scale distributed applications
91	IV/I	**20CSE28-Software Project Management (P.E.-V)**	
		20CSE28.1	Apply suitable CMM for specific scenarios and determine the effectiveness.
		20CSE28.2	Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
		20CSE28.3	Compare and differentiate organization and project structures.
		20CSE28.4	Implement a project to manage project schedule, expenses and resource with the application of suitable project management tools.
		20CSE28.5	Identify and analyze SPM practices.
92	IV/I	**20CSE29-Design Patterns (P.E.-V)**	
		20CSE29.1	Apply formal notations of C++ and develop patterns of user choice to accomplish user interface design.
		20CSE29.2	Interpret document structure, formatting, look and feel standards and Multiple Window Systems to design document editor for a case study.
		20CSE29.3	Demonstrate abstract factory to design and develop catalog pattern and Adapter, Bridge, Composite, Decorator of Structural Patterns.
		20CSE29.4	Outline Façade, Flyweight, Proxy of behavioral patterns.
		20CSE29.5	Discuss the Iterator, Mediator, Observer, State, Strategy, Template Method, Visitor of Behavioral Patterns-2 and its consequences.
		20CSE29.6	State, Strategy, Template Method, Visitor of Behavioral Patterns-3 and its consequences
93	IV/I	**20PYO01-History of Science and Technology (O.E.-III)**	
		20PYO01.1	Demonstrate the process of beginning of science and civilization, knowledge acquisition and philosophical approach of science and its advancements in the Stone Ages and Antiquity period.
		20PYO01.2	Illustrate the advancements in science and technology in the medieval period across Asia and Arab countries and decline and revival of science in Europe.
		20PYO01.3	Explain the scientific approach and its advances of the Europeans and how the role of engineer during the industrial revolution and the major advancements.
		20PYO01.4	Make use of the advancements in the field of science and technology by adopting new philosophies of 19th and first half of 20th century in finding ethical solutions to the societal problems.
		20PYO01.5	Interpret the changes in specializations of science and the technology and build the relation between information and society from second half of 20th century onwards.

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94	IV/I	**20MEO03-Research Methodologies (O.E.-III)**	
		20MEO03.1	Define research problem.
		20MEO03.2	Review and assess the quality of literature from various sources.
		20MEO03.3	Understand and develp various sresearch designs.
		20MEO03.4	Analyze problem by sttistical techniques: ANOVA, F-test, Chi-square.
		20MEO03.5	Improve the style and ormat of writing a report for technical paper/Journal report
95	IV/I	**20MEO04-Entrepreneurship (O.E.-III)**	
		20MEO04.1	Understand the concept and essence of entrepreneurship.
		20MEO04.2	Identify business opportunities and nature of enterprise.
		20MEO04.3	Analyze the feasibility of new business plan.
		20MEO04.4	Apply project management techniques like PERT and CPM for effective planning and execution of projects.
		20MEO04.5	Use behavioral, leadership and time management aspects in entrepreneurial journey.
96	IV/I	**20ECO05-Systems Automation and Control (O.E.-III)**	
		20ECO05.1	Understand the features of various automatic and process control systems.
		20ECO05.2	Define and analyze various measuring parameters in the industry.
		20ECO05.3	Compare performance of various controllers (P, PD, PI, and PID).
		20ECO05.4	Illustrate the role of digital computers in automation.
		20ECO05.5	Develop various robot structures for different applications
97	IV/I	**20EEO03-Energy Auditing(O.E.-III)**	
		20EEO03.1	Know the current energy scenario and various energy sources.
		20EEO03.2	Understand the concepts of energy auditing.
		20EEO03.3	Evaluate the performance of existing engineering systems.
		20EEO03.4	Explore the methods of improving energy efficiency in different engineering systems
		20EEO03.5	Design different energy efficient appliances
98	IV/I	**20EGM01-Indian Constitution and Fundamental Principles Principles**	
		20EGM01.1	Understand the making of the Indian Constitution and its features.
		20EGM01.2	Identify the difference among Right To equality, Right To freedom and Right to Liberty.
		20EGM01.3	Analyze the structuring of the Indian Union and differentiate the powers between Union and States.
		20EGM01.4	Distinguish between the functioning of Lok Sabha and Rajya Sabha while appreciating the importance of Judiciary.
		20EGM01.5	Differentiate between the functions underlying Municipalities, Panchayats and Co-operative Societies
99	IV/I	**20CSC31-Cryptography and Network Security Lab**	
		20CSC31.1	Identify basic security attacks and services
		20CSC31.2	Design symmetric and asymmetric key algorithms for cryptography

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		20CSC31.3	Create and use of Authentication functions
		20CSC31.4	Identify and investigate network security threat
		20CSC31.5	Analyze and design network security protocols
100	IV/I	**20CSE30-Deep Learning Lab**	
		20CSE30.1	Implement various learning models.
		20CSE30.2	Design and develop various Neural Network Architectures.
		20CSE30.3	Analyze various Optimization and Regularizations techniques of deep learning.
		20CSE30.4	Analyze various pretrained models using Convolution Neural Networks.
		20CSE30.5	Ability to apply RNN techniques to solve different applications.
		20CSE30.6	Evaluate the Performance of different models of Deep learning networks.
101	IV/I	**20CSE31-Big Data Analytics Lab**	
		20CSE31.1	Understand Configuration of various big data Frame Works.
		20CSE31.2	Apply various visualization techniques to explore data.
		20CSE31.3	Demonstrate data base operations using MongoDB.
		20CSE31.4	Process big data using Hadoop framework.
		20CSE31.5	Build and apply Map-Reduce & NoSQL Concepts.
		20CSE31.6	Perform data analysis with machine learning methods.
102	IV/I	**20CSE32-Mobile Application Development Lab**	
		20CSE32.1	Analyze all the components and their properties of various Emulators for selecting suitable emulator.
		20CSE32.2	Apply essential Android programming concepts for developing efficient mobile app.
		20CSE32.3	Develop Android applications related to various layouts.
		20CSE32.4	Design Flutter applications with rich user interactive interfaces.
		20CSE32.5	Develop Android applications related to mobile related server-less database like SQLite.
		20CSE32.6	Extend event handling to develop various mobile applications.
103	IV/I	**20CSE33-Blockchain Technology Lab**	
		20CSE33.1	Understand the fundamental primitives of Blockchain and consensus protocols.
		20CSE33.2	Explore various blockchain platforms such as ethereum, fabric.
		20CSE33.3	Identify the significance and working of Ethereum Platform.
		20CSE33.4	Work with the smart contracts.
		20CSE33.5	Implement the blockchain applications with Hyperledger Fabric.S
		20CSE33.6	Apply blockchain in different application domains such as financial and supply chain sectors.
104	IV/I	**20CAE14-Planning and Estimation of Autonomous Systems Lab 20CAE14**	
		20CAE14.1	Identify different motion planning schemas under different environments.
		20CAE14.2	Implement different planning and decision techniques.

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		20CAE14.3	Appraise and implement methods to solve finite Markov decision problem under uncertain situation.
		20CAE14.4	Understand different decision making techniques under uncertain environment.
		20CAE14.5	Programming different autonomous system and interaction with environment.
		20CAE14.6	Identify and explore autonomous system in real-life situations.
105	IV/I	**20CSC32-Technical Seminar**	
		20CSC32.1	Study and review research papers of new field/areas and summarize them.
		20CSC32.2	Identify promising new directions of various cutting edge technologies in Computer Science and Engineering
		20CSC32.3	Impart skills to prepare detailed report describing the selected topic/area.
		20CSC32.4	Acquire skills to write technical papers/articles for publication.
		20CSC32.5	Effectively communicate by making an oral presentation before the evaluating committee.
106	IV/I	**20CSC33-Project Part- 1**	
		20CSC33.1	Review the literature related to the problem area / selected topic.
		20CSC33.2	Undertake problem identification, formulation and solution.
		20CSC33.3	Prepare synopsis of the selected topic.
		20CSC33.4	Gather the required data and Set up the environment for the implementation.
		20CSC33.5	Conduct preliminary analysis/modelling/simulation experiment.
		20CSC33.6	Communicate the work effectively in both oral and written forms.
107	IV/I	**20CAE05-Multi Agent Intelligent Systems (P.E.-VI)**	
		20CAE05.1	Understand various aspects of multi agent systems and architecture of intelligent agents.
		20CAE05.2	Understand of various types of reasoning Agents.
		20CAE05.3	Acquire knowledge of multi agent systems communication and cooperation methods.
		20CAE05.4	Classify various types of decision making processes for multi agent systems.
		20CAE05.5	Use appropriate framework for agent communication and information sharing processes.
		20CAE05.6	Explore different kinds of Auctions for multi agent environment and applications.
108	IV/I	**20CSE34-Cloud Computing (P.E.-VI)**	
		20CSE34.1	Understand the need of cloud technology and terminology.
		20CSE34.2	Identify and understand the cloud infrastructure.
		20CSE34.3	Write scripts for the automation of infrastructure and software deployment
		20CSE34.4	Design solutions for the automation and migration of manual data centers.

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		20CSE34.5	Develop scripts for the automation of cloud services
109	IV/I	**20CSE35-Augmented Reality and Virtual Reality (P.E.-VI)**	
		20CSE35.1	Explain how the humans interact with computers.
		20CSE35.2	Understand the design and implementation of the technologies for AR and VR systems.
		20CSE35.3	Apply technical and creative approaches to make successful applications and experiences.
		20CSE35.4	Design audio and video interaction paradigms.
		20CSE35.5	Understand AR and VR best practices.
		20CSE35.6	Apply VR/MR/AR in various fields in industry
110	IV/I	**20CSE36-Cyber Security (P.E.-VI)**	
		20CSE36.1	List the different types of cybercrimes and analyze legal frameworks to handle cybercrimes.
		20CSE36.2	Discuss the cyber offence and vulnerabilities in programming languages.
		20CSE36.3	Identify the Tools and Methods used in cybercrimes.
		20CSE36.4	Analyze and resolve cyber security issues and laws governing Cyberspace.
		20CSE36.5	Describe the need of Digital Forensics and the importance of digital evidence in prosecution.
		20CSE36.6	Interpret the commercial activities in the event of significant information security incidents in the Organization.
111	IV/I	**20CSE37-High Performance Computing**	
		20CSE37.1	Understand different parallel computing architectures and networks.
		20CSE37.2	Ability to design parallel algorithms and measure their performance.
		20CSE37.3	Understand vector processing, memory bottlenecks, data and thread-level parallelism.
		20CSE37.4	Understand the various programming frameworks like MPI, OpenMP and CUDA.
		20CSE37.5	Understand cache coherence protocols and read-write semantics of parallel programs.
		20CSE37.6	Gain knowledge of writing efficient parallel programs.
112	IV/I	**20EGM04-Gender sensitization**	
		20EGM04.1	Understand the difference between "Sex" and "Gender" and be able to explain socially constructed theories of identity.
		20EGM04.2	Recognize shifting definitions of "Man" and "Women" in relation to evolving notions of "Masculinity" and "Femininity".
		20EGM04.3	Appreciate women"s contributions to society historically, culturally and politically.
		20EGM04.4	Analyze the contemporary system of privilege and oppressions, with special attention to the ways gender intersects with race, class, sexuality, ethnicity, ability, religion, and nationality.

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		20EGM04.5	Demonstrate an understanding of personal life, the workplace, the community and active civic engagement through classroom learning.
113	IV/II	**20CEM01-Environmental Science**	
		20CEM01.1	Identify the natural resources and realise the importance of water, food, forest, mineral, energy, land resources and affects of over utilisation.
		20CEM01.2	Understand the concept of ecosystems and realise the importance of interlinking of food chains.
		20CEM01.3	Contribute for the conservation of bio-diversity.
		20CEM01.4	Suggest suitable remedial measure for the problems of environmental pollution and contribute for the framing of legislation for protection of environment.
		20CEM01.5	Follow the environmental ethics and contribute to the mitigation and management of environmental disasters.
114	IV/II	**20CSC39-Project Part - 2**	
		20CSC39.1	Demonstrate a sound technical knowledge of their selected topic.
		20CSC39.2	Design engineering solutions to complex problems utilizing a systematic approach.
		20CSC39.3	Conduct investigations by using research-based knowledge and methods to provide valid conclusions.
		20CSC39.4	Create/select/use modern tools for the modelling, prediction and understanding the limitation of complex engineering solutions.
		20CSC39.5	Communicate with engineers and the community at large in written and oral forms.
		20CSC39.6	Demonstrate the knowledge, skills and attitudes of a professional engineer

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