B.E (CSE – AIML) Program

B.E. 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.

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PO9: Individual and teamwork: 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.

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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R-20

DEPARTMENT OF CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

DEPARTMENT VISION AND MISSION:

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

Mission: The mission of 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

PROGRAM EDUCATION OBJECTIVES (PEOS):

1. Graduates will apply their knowledge and skills to succeed in their careers and/or obtain advanced degrees, provide solutions as entrepreneurs
2. Graduates will creatively solve problems, communicate effectively, and successfully function in multi-disciplinary teams with superior work ethics and values
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
4. Graduates will have the ability to adapt, contribute and innovates ideas in the field of Artificial Intelligence and Machine Learning or productively engage in research

PROGRAM SPECIFIC OUTCOMES (PSOS): At the end of the program,

1. Graduates will acquire the practical competency with emerging technologies and open-source platforms related to the areas of Artificial Intelligence and Machine Learning
2. Graduates will have the ability to adapt, contribute and innovates ideas in the field of Artificial Intelligence and Machine Learning

3. Graduates will be able to successfully pursue higher education in reputed institutions and provide solutions as entrepreneurs

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Department of CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

Course Outcomes
Academic Year 2022-2023

S.No.	Year/ Sem	Name of the Course	
1	I / I	**20MT C01-LINEAR ALGEBRA & CALCULUS**	
		20MT C01.1	Apply the Matrix Methods to solve the system of linear equations
		20MT C01.2	Test the convergence and divergence of the infinite Series.
		20MT C01.3	Determine the extreme values of functions of two variables.
		20MT C01.4	Apply the vector differential operator to scalar and vector functions
		20MT C01.5	Solve line, surface & volume integrals by Greens, Gauss and Stoke's theorems.
2	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 formal reports.
		22EGC01.5	Critique passages by applying effective reading techniques
3	I / I	**20PY C01- OPTICS AND SEMICONDUCTOR PHYSICS**	
		20PY C01.1	Demonstrate the physical properties of light.
		20PY C01.2	Explain characteristic properties of lasers and fiber optics
		20PY C01.3	Find the applications of quantum mechanics
		20PY C01.4	Classify the solids depending upon electrical conductivity
		20PY C01.5	Identify different types of semiconductors
4	I / I	**22CSC01- PROGRAMMING FOR PROBLEM SOLVING**	
		22CSC01.1	Identify and understand the computing environments for scientific and mathematical problems.
		22CSC01.2	Formulate solutions to problems with alternate approaches and represent them using algorithms / Flowcharts.
		22CSC01.3	Choose data types and control structures to solve mathematical and scientific problem.
		22CSC01.4	Decompose a problem into modules and use functions to implement the modules.
		22CSC01.5	Apply arrays, pointers, structures, and unions to solve mathematical and scientific problems.
		22CSC01.6	Develop applications using file I/O.
5	I / I	**20MT C02- LINEAR ALGEBRA & CALCULUS LAB**	
		20MT C02.1	Apply the Matrix operations in executing various programmes.
		20MT C02.2	Test the convergence and divergence of the infinite Series.
		20MT C02.3	Explore the extreme values of functions of two variables.
		20MT C02.4	Determine the gradient, divergent and curl of scalar and vector point functions.
		20MT C02.5	Solve line, surface & volume integrals by Greens, Gauss and Stoke's theorems
6	I / I	**20EG C02- ENGLISH LAB**	
		20EG C02.1	Define the speech sounds in English and understand the nuances of pronunciation in English

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		20EG C02.2	Apply stress correctly and speak with the proper tone, intonation and rhythm.
		20EG C02.3	Analyze IELTS and TOEFL listening comprehension texts to enhance their listening skills.
		20EG C02.4	Determine the context and speak appropriately in various situations.
		20EG C02.5	Design and present effective posters while working in teams, and discuss and participate in Group discussions.
7	I / I	**20PY C03 - OPTICS AND SEMICONDUCTOR PHYSICS LAB**	
		20PY C03 .1	Interpret the errors in the results of an experiment.
		20PY C03 .2	Demonstrate physical properties of light experimentally
		20PY C03 .3	Make use of lasers and optical fibers for engineering applications
		20PY C03 .4	Explain the V-I characteristics of some optoelectronic and semiconductor devices
		20PY C03 .5	Find the applications thermistor
8	I / I	**20CS C02- PROGRAMMING FOR PROBLEM SOLVING LAB**	
		20CS C02.1	Identify and setup program development environment.
		20CS C02.2	Design and test programs to solve mathematical and scientific problems.
		20CS C02.3	Identify and rectify the syntax errors and debug program for semantic errors
		20CS C02.4	Implement modular programs using functions.
		20CS C02.5	Represent data in arrays, pointers, structures and manipulate them through a program.
		20CS C02.6	Create, read, and write to and from simple text files.
9	I / I	**20ME C01- CAD AND DRAFTING**	
		20ME C01.1	Become conversant with appropriate use of CAD software for drafting.
		20ME C01.2	Recognize BIS, ISO Standards and conventions in Engineering Drafting.
		20ME C01.3	Construct the projections of points, lines, planes, solids
		20ME C01.4	Analyse the internal details of solids through sectional views
		20ME C01.5	Create an isometric projections and views
10	I / I	**20MBC02- COMMUNITY ENGAGEMENT**	
		20MBC02.1	Gain an understanding of Rural life, Culture and Social realities.
		20MBC02.2	Develop a sense of empathy and bonds of mutuality with Local Communities.
		20MBC02.3	Appreciate significant contributions of Local communities to Indian Society and Economy.
		20MBC02.4	Exhibit the knowledge of Rural Institutions and contributing to Community's Socio-Economic improvements.
		20MBC02.5	Utilise the opportunities provided by Rural Development Programmes.
11	I / II	**20MT C03- DIFFERENTIAL EQUATIONS &TRANSFORM THEORY**	
		20MT C03.1	Calculate the solutions of first order linear differential equations.
		20MT C03.2	Calculate the solutions of higher order linear differential equations
		20MT C03.3	Examine the series solutions for higher order differential equations.
		20MT C03.4	Evaluate the Improper integrals by Fourier Transform.
		20MT C03.5	Solve the difference equations byZ-transforms.
12	I / II	**20CY C01- CHEMISTRY**	
		20CY C01.1	Identify the microscopic chemistry in terms of molecular orbitals, intermolecular forces and rate of chemical reactions.
		20CY C01.2	Discuss the properties and processes using thermodynamic functions, electrochemical cells and their role in batteries and fuel cells.
		20CY C01.3	Illustrate the major chemical reactions that are used in the synthesis of organic molecules.
		20CY C01.4	Classify the various methods used in treatment of water for domestic and

			industrial use.
		20CY C01.5	Outline the synthesis of various Engineering materials & Drugs.
13	I / II	**20CS C05- INDUSTRY 4.0**	
		20CS C05.1	Identify the key drivers and enablers of Industry 4.0
		20CS C05.2	Describe the smartness in smart factories, smart cities, smart products, ad smart services
		20CS C05.3	Determine various systems used in manufacturing plants, and their role in an Industry 4.0 world
		20CS C05.4	Illustrate the power of Cloud Computing in a networked economy
		20CS C05.5	Understand the opportunities, challenges, brought about by Industry 4.0 and how organizations and individuals should prepare to reap the benefits
14	I / II	**20CS C03 - OBJECT ORIENTED PROGRAMMING**	
		20CS C03.1	Demonstrate the concepts of Object-Oriented Programming languages to solve problems.
		20CS C03.2	Apply the constructs like selection, repetition, functions and packages to modularize the programs.
		20CS C03.3	Design and build applications with classes/modules.
		20CS C03.4	Find and rectify coding errors in a program to assess and improve performance.
		20CS C03.5	Develop packages for solving simple real world problems.
15	I / II	**20MT C04 - DIFFERENTIAL EQUATIONS &TRANSFORM THEORY LAB**	
		20MT C04.1	Explore all the possible solutions of first order differential equation.
		20MT C04.2	Analyse the solutions of higher order linear differential equations.
		20MT C04.3	Examine the series solutions for higher order differential equations.
		20MT C04.4	Evaluate the Improper integrals by Fourier Transform.
		20MT C04.5	Apply the Z-transform to solve the difference equations.
16	I / II	**20CY C02- CHEMISTRY LAB**	
		20CS C04.1	Inspect and identify suitable programming environment to work with Python.
		20CS C04.2	Choose appropriate control constructs, data structures to build the solutions.
		20CS C04.3	Develop the solutions with modular approach using functions, packages to enhance the code efficiency.
		20CS C04.4	Analyze and debug the programs to verify and validate code.
		20CS C04.5	Demonstrate use of STLs and modules to build graphical interfaces, mathematical software.
		20CS C04.6	Determine the requirements of real-world problems and use appropriate modules to develop solutions.
17	I / II	**20CS C04- OBJECT ORIENTED PROGRAMMING LAB**	
		20CS C04.1	Inspect and identify suitable programming environment to work with Python.
		20CS C04.2	Choose appropriate control constructs, data structures to build the solutions.
		20CS C04.3	Develop the solutions with modular approach using functions, packages to enhance the code efficiency.
		20CS C04.4	Analyze and debug the programs to verify and validate code.
		20CS C04.5	Demonstrate use of STLs and modules to build graphical interfaces, mathematical software.
		20CS C04.6	Determine the requirements of real-world problems and use appropriate modules to develop solutions.
18	I / II	**20ME C02- WORKSHOP / MANUFACTURING PRACTICE**	
		20ME C02.1	Understand safety measures to be followed in workshop to avoid accidents.
		20ME C02.2	Identify various tools used in fitting, carpentry, tin smithy, house wiring, welding, casting and machining processes.
		20ME C02.3	Make a given model by using workshop trades including fitting, carpentry, tinsmithy and House wiring.
		20ME C02.4	Perform various operations in welding, machining and casting processes.
		20ME C02.5	Conceptualize and produce simple device/mechanism of their choice.

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19	I / II	**20ME C03 – ENGINEERING EXPLORATION(PRACTICAL)**	
		20ME C03.1	Understand the role of an engineer as a problem solver.
		20ME C03.2	Identify multi-disciplinary approaches in solving an engineering problem.
		20ME C03.3	Build simple systems using engineering design process.
		20ME C03.4	Analyze engineering solutions from ethical and sustainability perspectives.
		20ME C03.5	Use basics of engineering project management skills in doing projects.
20	II / I	**20EEC01- BASIC ELECTRICAL ENGINEERING**	
		20EEC01.1	Understand the concepts of Kirchhoff's laws and to apply them in superposition, Thevenin's and Norton's theorems to get the solution of simple dc circuits
		20EEC01.2	Obtain the steady state response of RLC circuits with AC input and to acquire the basics, relationship between voltage and current in three phase circuits.
		20EEC01.3	Understand the principle of operation, the emf and torque equations and classification of AC and DC machines
		20EEC01.4	Explain various tests and speed control methods to determine the characteristic of DC and AC machines.
		20EEC01.5	Acquire the knowledge of electrical wiring, types of wires, cables used and Electrical safety precautions to be followed in electrical installations.
		20EEC01.6	Recognize importance of earthing, methods of earthing and various low-tension switchgear used in electrical installations
21	II / I	**20ECC35- BASIC ELECTRONICS**	
		20ECC35.1	Interpret the usage of semiconductor devices in making circuits like rectifiers, filters, regulators etc
		20ECC35.2	Design and Analyse the characteristics of electronic circuits and systems
		20ECC35.3	Make use of various types of small and large signal amplifiers for electronic control systems.
		20ECC35.4	Model a prototype module using the operational amplifier for real time applications.
		20ECC35.5	Evaluate the performance of various semiconductor devices
22	II / I	**20CSC08- DATA STRUCTURES**	
		20CSC08.1	Understand the basic concepts of data structures and sorting techniques.
		20CSC08.2	Analyze the performance of algorithms.
		20CSC08.3	Distinguish between linear and non-linear data structures.
		20CSC08.4	Apply linear and non-linear data structures.
		20CSC08.5	Identify the significance of balanced search trees, graphs and hashing.
23	II / I	**20CSC09- DISCRETE MATHEMATICS**	
		20CSC09.1	Describe rules of inference for Propositional and Predicate logic.
		20CSC09.2	Demonstrate use of Set Theory, Venn Diagrams, relations, functions in Real-world scenarios.
		20CSC09.3	Model solutions using Generating Functions and Recurrence Relations.
		20CSC09.4	Determine the properties of graphs and trees to solve problems arising in computer science applications.
		20CSC09.5	Distinguish between groups, semi groups and monoids in algebraic systems.
		20CSC09.6	Formulate solutions to a variety of real world problems.
24	II / I	**20CSC10- DIGITAL LOGIC DESIGN**	
		20CSC10.1	Demonstrate the number system conversions and simplify Boolean functions.
		20CSC10.2	Recall basic theorems and properties of Boolean algebra to represent logical functions in canonical and standard forms.
		20CSC10.3	Analyze and simplify Boolean expressions using karnaugh-maps and tabulation method.
		20CSC10.4	Analyze and Design various combinational circuits and Sequential circuits used in Computer Hardware.

		20CSC10.5	Understand the designs of Combinational and Sequential circuits using Verilog HDL.
		20CSC10.6	Develop different applications by configuring registers, counters and memories.
25	II / I	**20CAC01- FUNDAMENTALS OF DATA SCIENCE**	
		20CAC01.1	Understand the significance of data science tools and techniques.
		20CAC01.2	Apply data cleaning, transformation and discretization techniques.
		20CAC01.3	Analyze various inferential statistics and time-series methods.
		20CAC01.4	Understand and apply data visualization techniques.
		20CAC01.5	Understand predictive analytics and its applications.
		20CAC01.6	Apply data science techniques to deal with the real-world problems.
26	II / I	**20EEC02- BASIC ELECTRICAL ENGINEERING LAB**	
		20EEC02.1	Get an exposure to common electrical components, their ratings and basic electrical measuring equipment.
		20EEC02.2	Make electrical connections by wires of appropriate ratings and able to measure electric power and energy.
		20EEC02.3	Comprehend the circuit analysis techniques using various circuital laws and theorems.
		20EEC02.4	Determine the parameters of the given coil and calculate the time response of RL & RC series circuits.
		20EEC02.5	Recognize the basic characteristics of transformer and components of switchgear.
		20EEC02.6	Understand the basic characteristics of dc and ac machine by conducting different types of tests on them.
27	II / I	**20ECC36- BASIC ELECTRONICS LAB**	
		20ECC36.1	Demonstrate the concepts of basic electronic components, devices, and systems.
		20ECC36.2	Analyze the measurements of time period, amplitude and phase of different waveforms.
		20ECC36.3	Design and analyze the behavior of the diode and transistor circuits
		20ECC36.4	Develop various types of feedback and power amplifiers
		20ECC36.5	Examine the functionality of various analog and digital circuits
28	II / I	**20CSC11- DATA STRUCTURES LAB**	
		20CSC11	Implement the abstract data type.
		20CSC11	Implement linear data structures such as stacks, queues using array and linked list.
		20CSC11	Implement non-linear data structures such as trees, graphs.
		20CSC11	Analyze various sorting techniques.
		20CSC11	Analyze various algorithms of linear and nonlinear data structures.
		20CSC11	Design and develop real world problem using suitable data structures.
29	II / I	**20CAC02- FUNDAMENTALS OF DATA SCIENCE LAB**	
		20CAC02.1	Understand the significance of data science tools.
		20CAC02.2	Apply statistical methods to implement functionalities in Numpy, Scipy, Pandas packages.
		20CAC02.3	Analyze the significance of Inferential Statistics.
		20CAC02.4	Apply Exploratory Data Analytical Techniques to visualize Single variable.
		20CAC02.5	Apply Exploratory Data Analytical Techniques to visualize Multiple variables.
		20CAC02.6	Analyze the significance of Time Series Forecasting.
30	II / II	**20MTC13- Mathematical Foundation for Data Science & Security**	
		20MTC13.1	Analyze the coefficient ofskewness and fitting of the data by various methods.
		20MTC13.2	Apply properties of Mathematical Expectations and analyse the various distributions.
		20MTC13.3	Evaluate areas of curves by using various distributions.

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		20MTC13.4	Apply various technics of Number Theory for solving problems
		20MTC13.5	Apply RSA –PKC for solving security issues.
31	II / II	**20CSC13- Computer Architecture and Microprocessor**	
		20CSC13.1	Understand the functional block diagram of single bus architecture of a computer and describe the function of the instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.
		20CSC13.2	Design assembly language program for specified computing 16 bit multiplication, division and I/O device interface.
		20CSC13.3	Derive flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.
		20CSC13.4	Design a memory module and analyze its operation by interfacing with the CPU.
		20CSC13.5	Applydesign techniques to enhance performance using pipelining, parallelism and RISC methodology.
		20CSC13.6	Develop testing and experimental procedures on Microprocessor and analyze their operation under different cases.
32	II / II	**20CSC14- Data Base Management Systems**	
		20CSC14.1	Classify the difference between FMS and DBMS; describe the roles of different users and the structure of the DBMS .Design the database logically using ER modeling.
		20CSC14.2	Outline the schema of the relational database and key constraints. Develop queries using fundamental ,extended operators of relational algebra and DDL, DML and DCL of SQL.
		20CSC14.3	Explore the inference rules for functional dependencies and apply the principles of normal forms to decompose the relations in a database.
		20CSC14.4	Summarize the concepts of dense, sparse, ISAM and B+ tree indexing and get familiar with static and extendable techniques of hashing.
		20CSC14.5	Explain the states and properties of transaction. Interpret the locking, time stamp, graph and validation based protocols for concurrency control.
		20CSC14.6	Relate log based, ARIES recovery techniques to increase the robustness of the database, identify to resolve the deadlocks in the transaction.
33	II / II	**20CSC15- INTERNET AND WEB TECHNOLOGIES**	
		20CSC15.1	Understand the technologies required for developing web application.
		20CSC15.2	Identify and choose XHTML tags, CSS and java scripts to develop well structured and easily maintained web pages
		20CSC15.3	Design and Develop interactive and innovative web pages using various platforms/technologies like XHTML, CSS, XML, JAVASCRIPT.
		20CSC15.4	Create and deploy web applications in web server by using server-side programming concepts like Python.
		20CSC15.5	Build a data driven web site using different frameworks and Databases.
		20CSC15.6	Evaluate different web applicationsto implement optimal solutions for real time problems.
34	II / II	**20CAC03- ARTIFICIAL INTELLIGENCE**	
		20CAC03.1	Explain the role of agents and interaction with the environment to establish goals.
		20CAC03.2	Identify and formulate search strategies to solve problems by applying suitable search strategy.
		20CAC03.3	Compare and contrast the various knowledge representation schemes of AI.
		20CAC03.4	Appraise probabilistic reasoning and Markov decision process to solve real world problems.
		20CAC03.5	Apply the AI concepts to build an expert system to solve the real-world problems.
		20CAC03.6	Describe learning paradigms in machine learning.
35	II / II	**20MBC01- ENGINEERING ECONOMICS AND ACCOUNTANCY**	

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		20MBC01.1	Apply fundamental knowledge of Managerial Economics concepts and tools.
		20MBC01.2	Analyze various aspects of Demand Analysis, Supply and Demand Forecasting.
		20MBC01.3	Understand Production and Cost relationshipsto make best use of resources available.
		20MBC01.4	ApplyAccountancy Concepts and Conventions and preparation of Final Accounts.
		20MBC01.5	Evaluate Capital and Capital Budgeting decision based on any technique.
36	II / II	**20MTC14- Mathematical Foundation for Data Science & Security (Lab)**	
		20MTC14.1	Create graphs and charts for the statistical data.
		20MTC14.2	Analyze the data set using measures of central tendency and dispersion.
		20MTC14.3	Develop the linear and non-linear regression models for the statistical data
		20MTC14.4	Evaluate the probabilities of various discrete and continuous distributions.
		20MTC14.5	Demonstrate RSA – PKC technique of number theory for solving security issues.
37	II / II	**20CSC17- DATA BASE MANAGEMENT SYSTEMS LAB**	
		20CSC17.1	Outline the built-in functions of SQL and apply these functions to write simple and complex queries using SQL operators.
		20CSC17.2	Demonstrate Queries to Retrieve and Change Data using Select, Insert, Delete and Update. Construct Queries using Group By, Order By and Having Clauses.
		20CSC17.3	Demonstrate Commit, Rollback , Save point commands , SQL Plus Reports and formulate the Queries for Creating, Dropping and Altering Tables, Views, constraints.
		20CSC17.4	Develop queries using Joins, Sub-Queries and Working with Index, Sequence, Synonym, Controlling Access and Locking Rows for Update, Creating Password and Security features.
		20CSC17.5	Demonstrate the usage of data types , Bind and Substitution Variables , Anchored, Declarations , Assignment Operation and PL/SQL code using Control Structures .
		20CSC17.6	Develop PL/SQL code using Cursors, Exception, Composite Data Types and Procedures, Functions and Packages.
38	II / II	**20CSC18- INTERNET AND WEBTECHNOLOGIES LAB**	
		20CSC18.1	Identify and install web development tools.
		20CSC18.2	Develop client side web pages using XHTML , CSS and XML.
		20CSC18.3	Create dynamic, interactive web applications using java script.
		20CSC18.4	Develop server side web application using Django Frame work.
		20CSC18.5	Understanding working of Ajax, Node.js and JSON.
		20CSC18.6	Identify and explore different frame works for web applications.
39	III / I	**20CSC12- DESIGN AND ANALYSIS OF ALGORITHMS**	
		20CSC12.1	Identify and apply asymptotic notations to measure the performance of algorithms.
		20CSC12.2	Describe the algorithmic design techniques of divide and conquer, greedy, dynamic programming, backtracking and branch and bound to solve problems.
		20CSC12.3	Apply suitable algorithmic design techniques to solve problems to get optimal solution.
		20CSC12.4	Analyze the performance of algorithmic design techniques.
		20CSC12.5	Evaluate the efficiency of alternative solutions derived for a problem by applying various algorithmic design techniques.
		20CSC12.6	Understand P, NP, NP-Hard, NP-Completeness and Reducibility.
40	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.

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		20CSC20.6	Apply security as well as recovery features in the design of algorithms.
41	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.
42	III / I	**20CAC04- MACHINE LEARNING**	
		20CAC04.1	Define the basic concepts related to Machine Learning.
		20CAC04.2	Recognize the underlying mathematical relationships across ML algorithms and their paradigms
		20CAC04.3	Determine the various applications of Machine Learning.
		20CAC04.4	Model, design and develop solutions to real world problems using Machine Learning Algorithms.
		20CAC04.5	Evaluate and interpret the results of the various machine learning tools.
43	III / I	**20CSE03- SYSTEM MODELLING AND SIMULATION**	
		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
		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	**20CSE12- EMBEDDED SYSTEMS**	
		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.
45	III / I	**20CSE24- BLOCK CHAIN TECHNOLOGY**	
		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.
46	III / I	**20CSE26- HUMAN COMPUTER INTERACTION**	
		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.

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		20CSE26.5	Design an interactive mobile interfaces for mobile applications and widgets.
		20CSE26.6	Design an interactive web interface for web applications.
47	III / I	**20CAE01- REINFORCEMENT LEARNING**	
		20CAE01.1	Illustrates various elements of reinforcement techniques.
		20CAE01.2	Define the key features of reinforcement learning that distinguishes it from AI and non-interactive machine learning.
		20CAE01.3	Analyze any given application; decide if it is formulated as reinforcement learning problem.
		20CAE01.4	Apply Monte Carlo method and Temporal-Difference(TD) learning for prediction.
		20CAE01.5	Apply Planning and Learning with Tabular Methods.
		20CAE01.6	Use Value Prediction with Function Approximation concepts.
48	III / I	**20CAE02- DIGITAL IMAGE PROCESSING**	
		20CAE02.1	Explain the basic principles of image processing and its significance in real world.
		20CAE02.2	Interpret various types of images and applies image transformations.
		20CAE02.3	Evaluate various approaches for image segmentation and image restoration
		20CAE02.4	Define image processing methods and recognize morphological image processing techniques.
		20CAE02.5	Recognize image compression and comprehend image compression techniques in both domains.
		20CAE02.6	Apply image processing algorithms for real world problems.
49	III / I	**20ECO10- FUNDAMENTALS OF WIRELESS COMMUNICATION**	
		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.
50	III / I	**20EEO05- WASTE MANAGEMENT**	
		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.
51	III / I	**20MEO09- ORGANIZATIONAL BEHAVIOUR**	
		20MEO09.1	Understand Organizational Behavioral principles and practices
		20MEO09.2	Compare various organizational designs and cultures enabling organizational development.
		20MEO09.3	Apply motivational theories and leadership styles in resolving employee„s problems and decision makingprocesses.
		20MEO09.4	Understand the group dynamics, communication network, skills needed to resolve organizational conflicts.
		20MEO09.5	Analyze the behavior, perception and personality of individuals and groups in organizations in terms of the key factors that influence organizational behavior.
52	III / I	**20MTO03- QUANTUM COMPUTING**	
		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
53	III / I	**20BTO04- BIOINFORMATICS**	

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		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.
54	III / I	**20CSC16- DESIGN AND ANALYSIS OF ALGORITHMS LAB**	
		20CSC16.1	Implement greedy, dynamic programming, backtracking and branch and bound techniques.
		20CSC16.2	Demonstrate various algorithmic design techniques.
		20CSC16.3	Analyze the performance of various algorithms.
		20CSC16.4	Compare various design strategies.
		20CSC16.5	Formulate solutions to solve real world problems use acquired knowledge.
55	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.
56	III / I	**20CSC25- CASE STUDIES USING UML LAB**	
		20CSC25.1	Identify the problem scope and constraints in the problem.
		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
57	III / I	**20CAC05- MACHINE LEARNING LAB**	
		20CAC05.1	Identify the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
		20CAC05.2	Identify and utilize modern tools that are useful for data analysis.
		20CAC05.3	Recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.
		20CAC05.4	Implement and evaluate various Machine Learning approaches.
		20CAC05.5	Apply Keras and Tensorflow to implement ML techniques.
58	III / II	**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.
		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.
59	III / II	**20CAC06- DEEP LEARNING FOR COMPUTER VISION**	
		20CAC06.1	Understand various optimization techniques used in deep learning.
		20CAC06.2	Analyze various Autoencoders and Regularization Techniques.
		20CAC06.3	Design and Develop various Convolution Neural Networks architectures.
		20CAC06.4	Design various RNNs and Encoder Decoder Models.

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		20CAC06.5	Understand the importance of GANs to develop real-time applications.
		20CAC06.6	Evaluate the Performance of different models for deep neural network training.
60	III / II	**20CIC07- THEORY OF COMPUTATION AND COMPILERS**	
		20CIC07.1	Understand formal language basics and the power of automata to recognize the languages.
		20CIC07.2	Analyze the concept compilation Process and data structures of a compiler.
		20CIC07.3	Attains the knowledge of context free grammars and able to implement parsers.
		20CIC07.4	Design Syntax directed translation scheme for a given Context free grammar and generation of intermediate code.
		20CIC07.5	Apply Optimization to intermediate code and machine code
		20CIC07.6	Illustrate various object forms, error recovery and tools of a compiler.
61	III / II	**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.
62	III / II	**20CSE06- SOFT COMPUTING**	
		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 for various applications.
		20CSE06.6	Develop soft computing techniques to solve different applications.
63	III / II	**20CSE07- INTERNET OF THINGS**	
		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.
64	III / II	**20CSE11- NATURAL LANGUAGE PROCESSING**	
		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.
65	III / II	**20CAE03- COMPUTER VISION**	
		20CAE03.1	Recognize the basics of computer vision and its challenging issues.
		20CAE03.2	Develop algorithms to analyze feature detection and alignment.
		20CAE03.3	Interpret images and videos for problems such as tracking and structure from motions.
		20CAE03.4	Identify object, scene recognition and categorization algorithms for real time images.
		20CAE03.5	Analyze recovery of 3D structure of ill-posed scenes.
		20CAE03.6	Apply various techniques to build computer vision applications.
66	III / II	**20CSE05- OPTIMIZATION TECHNIQUES**	
		20CSE05.1	Calculate the optimum values for given objective function by LPP.

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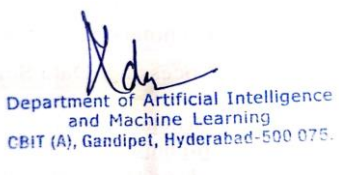
		20CSE05.2	Solve the solution for maximize the profit with minimum cost by Transportation problem.
		20CSE05.3	. Determine the optimum feasible solution for assignment and travelling salesman problems and computing the optimal solution for Job sequencing models.
		20CSE05.4	Compute the optimum values for given objective function by IPP and optimal strategy for games.
		20CSE05.5	Identify critical path using network scheduling.
67	III / II	**20CSE25- SOCIAL COMPUTING**	
		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.
68	III / II	**20CAE04- ALGORITHMIC GAME THEORY**	
		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.
69	III / II	**20CAE05- MULTI AGENT INTELLIGENT SYSTEMS**	
		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.
70	III / II	**20CAE06- DATA AND VISUAL ANALYTICS**	
		20CAE06.1	Understand the key techniques and theory used in visualization, including data models, graphical perception.
		20CAE06.2	Analyze techniques for visual encoding and interaction.
		20CAE06.3	Apply knowledge to a number of common data domains and corresponding analysis tasks, including multivariate data, networks, text, and cartography.
		20CAE06.4	Describe big data and use cases from selected business domains.
		20CAE06.5	Explain NoSQL big data management and other technologies such as Hadoop and HDFS
71	III / II	**20ECO01- REMOTE SENSING AND GIS**	
		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.



72	III / II	**20MTO01- FINANCIAL MATHEMATICS**	
		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.
73	III / II	**20EEO02- ENERGY MANAGEMENT SYSTEMS**	
		20EEO02.1	Know the current Energy Scenario and importance of Energy Conservation.
		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.
74	III / II	**20EGO01- TECHNICAL WRITING SKILLS**	
		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 skills.
75	III / II	**20CEO02- DISASTER RISK REDUCTION AND MANAGEMENT**	
		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.
76	III / II	**20CHO04- ENVIRONMENTAL AND SUSTAINABLE DEVELOPMENT**	
		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.
77	III / II	**20EGMO3- UNIVERSAL HUMAN VALUES-II: UNDERSTANDING HARMONY**	
		20EGMO3.1	Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
		20EGMO3.2	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

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		20EGMO3.3	They would have better critical ability.
		20EGMO3.4	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
		20EGMO3.5	It is hoped that they would be able to apply what they have learnt to their own self in different day-today settings in real life, at least a beginning would be made in this direction.
78	III / II	**20CAC07- DEEP LEARNING FOR COMPUTER VISION LAB**	
		20CAC07.1	Evaluate the performance various optimization techniques used in deep learning.
		20CAC07.2	Analyze various Autoencoders and Regularization Techniques.
		20CAC07.3	Design and Develop various Convolution Neural Networks architectures.
		20CAC07.4	Analyze various RNNs and Encoder Decoder Models.
		20CAC07.5	Understand the importance of Transformers and GANs to develop real-time applications.
		20CAC07.6	Evaluate the Performance of different models for deep neural network training.
79	III / II	**20CSC31- CRYPTOGRAPHY AND NETWORK SECURITY LAB**	
		20CSC31.1	Identify basic security attacks and services
		20CSC31.2	Design symmetric and asymmetric key algorithms for cryptography
		20CSC31.3	Create and use of Authentication functions
		20CSC31.4	Identify and investigate network security threat
		20CSC31.5	.Analyze and design network security protocols
80	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
81	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.
82	III / II	**20CSE20- NATURAL LANGUAGE PROCESSING LAB**	
		20CSE20.1	Understand the basic concepts of Natural language processing pipeline
		20CSE20.2	Implement various feature engineering and text representation techniques in NLP
		20CSE20.3	Illustrate text classification techniques to build NLP models
		20CSE20.4	Explore text summarization methods and example systems
		20CSE20.5	Demonstrate levels of NLP deep learning basics to process natural language text.
		20CSE20.6	Implement NLP Pipe lines used to solve real world applications
83	III / II	**20CAE07- COMPUTER VISION LAB**	
		20CAE07.1	Recognise the fundamental issues and challenges of computer vision.
		20CAE07.2	Interpret edges using various kernels and transformations.
		20CAE07.3	Analyse images and videos for problems such as tracking and structure from motion
		20CAE07.4	Identify object, scene recognition and categorization algorithms for real time images
		20CAE07.5	Evaluate computer vision system for real world problems
84	III / II	**20EGCO3- EMPLOYABILITY SKILLS**	

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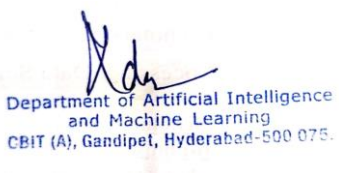
		20EGCO3.1	Become effective communicators, participate in group discussions with confidence and be able to make presentations in a professional context.
		20EGCO3.2	Write resumes, prepare and face interviews confidently.
		20EGCO3.3	Be assertive and set short term and long term goals, learn to manage time effectively and deal with stress.
		20EGCO3.4	Make the transition smoothly from campus to work, use media with etiquette and understand the academic ethics.
		20EGCO3.5	Enrich their vocabulary, frame accurate sentences and comprehend passages confidently.
85	IV / I	**20CAC08- CLOUD TECHNOLOGIES**	
		20CAC08.1	Define the main concepts, technologies, strengths, and limitations of cloud computing.
		20CAC08.2	Identify the key and enabling technologies that help in the development of the cloud.
		20CAC08.3	Develop the ability to understand and use the architecture of compute, cloud storage, service and delivery models.
		20CAC08.4	Explain the core issues of cloud computing such as resource management and security.
		20CAC08.5	Evaluate and choose the appropriate technologies, and approaches for implementation, and use of the cloud.
86	IV / I	**20CSE10- DEVOPS**	
		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.
87	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.
88	IV / I	**20CSE36- CYBER SECURITY**	
		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.
89	IV / I	**20CSE08- ENTERPRISE APPLICATION DEVELOPMENT**	
		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.
90	IV / I	**20CAE08- BIG DATA FRAMEWORKS**	
		20CAE08.1	Understand the significance of bigdata and frameworks associated with it.
		20CAE08.2	Deploy hadoop framework and map reduce programming
		20CAE08.3	Understand the significance of Apache Spark.
		20CAE08.4	Analyze various NoSQL databases, their characteristics and challenges.
		20CAE08.5	Implement real world applications using NoSQL databases such as MongoDB.
91	IV / I	**20PYO01- HISTORY OF SCIENCE AND TECHNOLOGY**	
		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.
92	IV / I	**20MEO03- RESEARCH METHODOLOGIES**	
		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.
93	IV / I	**20MEO04- ENTREPRENEURSHIP**	
		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.
94	IV / I	**20ECO05- SYSTEMS AUTOMATION AND CONTROL**	
		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.
95	IV / I	**20EEO03- ENERGY AUDITING**	
		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.
96	IV / I	**20EGM01- INDIAN CONSTITUTION AND FUNDAMENTAL 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.
97	IV / I	**20EGM02- INDIAN TRADITIONAL KNOWELDGE**	
		20EGM02.1	Understand philosophy of Indian culture
		20EGM02.2	Distinguish the Indian languages and literature
		20EGM02.3	Learn the philosophy of ancient, medieval and modern India
		20EGM02.4	Acquire the information about the fine arts in India
		20EGM02.5	Know the contribution of scientists of different eras.
98	IV / I	**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.
99	IV / I	**20CSE40- HIGH PERFORMANCE COMPUTING LAB**	
		20CSE40.1	Apply System Commands and Networking commands of Linux.
		20CSE40.2	Describe OpenMP constructs and functions.
		20CSE40.3	Design and implement parallel programs using OpenMP.
		20CSE40.4	Apply the APIs in MPI programming.
		20CSE40.5	Design and implement parallel programs using CUDA.
100	IV / I	**20CSE39- CYBER SECURITY LAB**	
		20CSE39.1	Identify the Foot Printing Tools for Information Gathering.
		20CSE39.2	Explore the Tools for scanning and scrutinizing the gathered information .
		20CSE39.3	Demonstrate the usage of Sniffer Tools.
		20CSE39.4	Examine Attack Launching Tools.
		20CSE39.5	Analyze the security issues and vulnerability in Email system.
101	IV / I	**20CSE17- ENTERPRISE APPLICATION DEVELOPMENT LAB**	
		20CSE17.1	Prepare database connections with application servers.
		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.
102	IV / I	**20CAE13- BIG DATA FRAMEWORKS LAB**	
		20CAE13.1	Understand the significance of bigdata and frameworks associated with it.
		20CAE13.2	Implement real-world use cases through hadoop framework.
		20CAE13.3	Implement Map reduce programming model.
		20CAE13.4	Deploy Sqoop and Hive queries.
		20CAE13.5	Deploy Apache Spark and Apache SQL functionalities.
		20CAE13.6	Implement real world applications using NoSQL databases such as MongoDB.
103	IV / I	**20CAC09- TECHNICAL SEMINAR**	
		20CAC09.1	Study and review research papers of new field/areas and summarize them.
		20CAC09.2	Identify promising new directions of various cutting edge technologies in Computer Science and Engineering
		20CAC09.3	Impart skills to prepare detailed report describing the selected topic/area.

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		20CAC09.4	Acquire skills to write technical papers/articles for publication.
		20CAC09.5	Effectively communicate by making an oral presentation before the evaluating committee.
104	IV / I	**20CAC10- PROJECT PART- 1**	
		20CAC10.1	Review the literature related to the problem area / selected topic.
		20CAC10.2	Undertake problem identification, formulation and solution.
		20CAC10.3	Prepare synopsis of the selected topic.
		20CAC10.4	Gather the required data and Set up the environment for the implementation.
		20CAC10.5	Conduct preliminary analysis/modelling/simulation experiment.
		20CAC10.6	Communicate the work effectively in both oral and written forms.
105	IV / II	**20CAE09- PLANNING AND ESTIMATION OF AUTONOMOUS SYSTEMS**	
		20CAE09.1	Identify different motion planning schemas under different environments
		20CAE09.2	Define different states and have mathematical knowledge on different techniques for drop-off and estimation algorithms
		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
106	IV / II	**20CAE10- COMPUTATIONAL NEUROSCIENCE**	
		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	Analyze the various learning methodologies.
		20CAE10.6	Evaluate the Performance of different neurological models
107	IV / II	**20CSE35- AUGMENTED REALITY AND VIRTUAL REALITY**	
		20CSE35.1	Explain how the humans interact with computers.
		20CSE35.2	Understand the design and implementation of the technologies for AR & 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&VR best practices.
		20CSE35.6	Apply VR/MR/AR in various fields in industry.
108	IV / II	**20CAE11- NETWORK AND SYSTEM ADMINISTRATION**	
		20CAE11.1	Identify and examine the system and networking administration tools and commands
		20CAE11.2	Describe different addressing and configure DHCP server
		20CAE11.3	Configure various services like mail, ftp, web hosting, and security, and use remote administration tools
		20CAE11.4	Analyze the DNS server and illustrate the web and proxy server
		20CAE11.5	Evaluate and configure the User and system security tools
		20CAE11.6	Write scripts to automate the system administration process
109	IV / II	**20CAE11- PARALLEL COMPUTING**	
		20CAE11.1	Describe the models and techniques for parallelization.
		20CAE11.2	Make use of list ranking and graph coloring parallel Algorithms.
		20CAE11.3	Analyze parallel algorithms and compute their complexity measures.
		20CAE11.4	Develop parallel programs for search and matrix multiplication using open MP.
		20CAE11.5	Choose a parallel algorithm that makes good use of the target Architecture.
		20CAE11.6	Describe the distributed Algorithms to learn its models and complexity measures.

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110	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 utilization.
		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.
111	IV / II	**20EGMO4- GENDER SENSITIZATION**	
		20EGMO4.1	Understand the difference between "Sex" and "Gender" and be able to explain socially constructed theories of identity.
		20EGMO4.2	Recognize shifting definitions of "Man" and "Women" in relation to evolving notions of "Masculinity" and "Femininity"
		20EGMO4.3	Appreciate women‟s contributions to society historically, culturally and politically.
		20EGMO4.4	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.
		20EGMO4.5	Demonstrate an understanding of personal life, the workplace, the community and active civic engagement through classroom learning.
112	IV / II	**20CAC11- PROJECT:PART – 2**	
		20CAC11.1	Demonstrate a sound technical knowledge of their selected topic.
		20CAC11.2	Design engineering solutions to complex problems utilizing a systematic approach.
		20CAC11.3	Conduct investigations by using research-based knowledge and methods to provide valid conclusions.
		20CAC11.4	Create/select/use modern tools for the modelling, prediction and understanding the limitation of complex engineering solutions.
		20CAC11.5	Communicate with engineers and the community at large in written and oral forms.
		20CAC11.6	Demonstrate the knowledge, skills and attitudes of a professional engineer.

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