B.E (CSE-IoT & CSBT) Program

B.E. Program Outcomes (PO's)

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

Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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.

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.

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.

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.

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.

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

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

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.

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.

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.

Program Education Objectives (PEOs): After the completion of the program, our:

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, innovates modern technologies and systems in the domain of Cyber Security, IoT or productively engage in research

Program Specific Outcomes (PSOs): At the end of the program

1. Acquire the practical competency through emerging technologies and open-source platforms related to the areas of Cyber Security, IoT, and Blockchain
2. Assess the hardware and software aspects necessary for the development of solutions to secure critical IT infrastructure and prepare collaborative plans for any incidence response
3. Provide diversified solutions in product development using standard engineering Practices

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Gandipet, Hyderabad -75
Department of Computer Science and Engineering
Course Outcomes Statements for BE (CSE - IOT&CSBT)-R20

S.No	Course		Course Outcomes Statements
	Code	Name	
1.	20MT C01	Linear Algebra & Calculus	Apply the Matrix Methods to solve the system of linearequations
			Test the convergence and divergence of the infinite Series.
			Determine the extreme values of functions of two variables.
			Apply the vector differential operator to scalar and vectorfunctions
			Solve line, surface & volume integrals by Greens, Gauss andStoke's theorems.
2.	20EG C01	English	Illustrate the nature, process and types of communication and communicate effectively without barriers.
			Construct and compose coherent paragraphs, emails and adhering to appropriate mobile etiquette.
			Apply techniques of precision to write a précis and formal letters by using acceptable grammar and appropriate vocabulary.
			Distinguish formal from informal reports and demonstrate advanced writing skills by drafting formal reports.
			Critique passages by applying effective reading techniques
3.	20PY C01	Optics and SemiconductorPhysics	Demonstrate the physical properties of light.
			Explain characteristic properties of lasers and fiber optics
			Find the applications of quantum mechanics
			Classify the solids depending upon electrical conductivity
			Identify different types of semiconductors
4.	20CS C01	Programming for Problem Solving	Identify and understand the computing environments for scientific and mathematical problems.
			Formulate solutions to problems with alternate approaches and represent them using algorithms / Flowcharts.
			Choose data types and control structures to solve mathematical and scientific problem.
			Decompose a problem into modules and use functions to implement the modules.
			Apply arrays, pointers, structures, and unions to solve mathematical and scientific problems.
			Develop applications using file I/O.
5.	20MT C02	Linear Algebra & Calculus Lab	Apply the Matrix operations in executing various programmes.
			Test the convergence and divergence of the infinite Series.
			Explore the extreme values of functions of two variables.
			Determine the gradient, divergent and curl of scalar and vector point functions.

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			Solve line, surface & volume integrals by Greens, Gauss and Stoke's theorems.
6.	20EG C02	English lab	Define the speech sounds in English and understand the nuances of pronunciation in English
			Apply stress correctly and speak with the proper tone, intonation and rhythm.
			Analyze IELTS and TOEFL listening comprehension texts to enhance their listening skills.
			Determine the context and speak appropriately in various situations.
			Design and present effective posters while working in teams, and discuss and participate in Group discussions.
7.	20PY C03	Optics and SemiconductorPhysics Lab	Interpret the errors in the results of an experiment.
			Demonstrate physical properties of light experimentally
			Make use of lasers and optical fibers for engineering applications
			Explain the V-I characteristics of some optoelectronic and semiconductor devices
			Find the applications thermistor
8.	20CS C02	Programming for problem Solving Lab	Identify and setup program development environment.
			Design and test programs to solve mathematical and scientific problems.
			Identify and rectify the syntax errors and debug program for semantic errors
			Implement modular programs using functions.
			Represent data in arrays, pointers, structures and manipulate them through a program.
			Create, read, and write to and from simple text files.
9.	20ME C01	CAD AND DRAFTING	Become conversant with appropriate use of CAD software for drafting.
			Recognize BIS, ISO Standards and conventions in Engineering Drafting.
			Construct the projections of points, lines, planes, solids
			Analyse the internal details of solids through sectional views
			Create an isometric projections and views
10.	20MB C02	Community Engagement	Gain an understanding of Rural life, Culture and Social realities.
			Develop a sense of empathy and bonds of mutuality with Local Communities.
			Appreciate significant contributions of Local communities to Indian Society and Economy.
			Exhibit the knowledge of Rural Institutions and contributing to Community's Socio-Economic improvements.
			Utilise the opportunities provided by Rural Development Programmes.
11.	20MT C03	Differential Equations& Transform Theory	Calculate the solutions of first order linear differential equations.
			Calculate the solutions of higher order linear differential equations.
			Examine the series solutions for higher order differential equations.
			Evaluate the Improper integrals by Fourier Transform.

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			Solve the difference equations byZ-transforms.
12.	20CYC01	Chemistry	Identify the microscopic chemistry in terms of molecular orbitals, intermolecular forces and rate of chemical reactions.
			Discuss the properties and processes using thermodynamic functions, electrochemical cells and their role in batteries and fuel cells.
			Illustrate the major chemical reactions that are used in the synthesis of organic molecules.
			Classify the various methods used in treatment of water for domestic and industrial use.
			Outline the synthesis of various Engineering materials & Drugs.
13.	20CS C05	Industry 4.0	Identify the key drivers and enablers of Industry4.0
			Describe the smartness in smart factories, smart cities, smart products, ad smart services
			Determine various systems used in manufacturing plants, and their role in an Industry 4.0world
			Illustrate the power of Cloud Computing in a networked economy
			Understand the opportunities, challenges, brought about by Industry 4.0 and how organizations and individuals should prepare to reap the benefits
14.	20CS C03	Object Oriented Programming	Demonstrate the concepts of Object-Oriented Programming languages to solve problems.
			Apply the constructs like selection, repetition, functions and packages to modularize the programs.
			Design and build applications with classes/modules.
			Find and rectify coding errors in a program to assess and improve performance.
			Develop packages for solving simple real world problems.
			Analyze and use appropriate library software to create graphical interface, mathematical software.
15.	20MT C04	Differential Equations &Transform Theory Lab	Explore all the possible solutions of first order differential equation.
			Analyse the solutions of higher order linear differential equations.
			Examine the series solutions for higher order differential equations.
			Evaluate the Improper integrals by Fourier Transform.
			Apply the Z-transform to solve the difference equations.
16.	20CYC02	Chemistry Lab	Identify the basic chemical methods to analyse the substances quantitatively & qualitatively.
			Estimate the amount of chemical substances by volumetric analysis.
			Determine the rate constants of reactions from concentration of reactants/ products as a function of time.
			Calculate the concentration and amount of various substances using instrumental techniques.
			Develop the basic drug molecules and polymeric compounds.
17.	20CSC04	Object Oriented	Inspect and identify suitable programming environment to work with Python.
			Choose appropriate control constructs, data structures to

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		Programming Lab	build the solutions.
			Develop the solutions with modular approach using functions, packages to enhance the code efficiency.
			Analyze and debug the programs to verify and validate code.
			Demonstrate use of STLs and modules to build graphical interfaces, mathematical software.
			Determine the requirements of real-world problems and use appropriate modules to develop solutions.
18.	20ME C02	Workshop / Manufacturing Practice	Understand safety measures to be followed in workshop to avoid accidents.
			Identify various tools used in fitting, carpentry, tin smithy, house wiring, welding, casting and machining processes.
			Make a given model by using workshop trades including fitting, carpentry, tinsmithy and House wiring.
			Perform various operations in welding, machining and casting processes.
			Conceptualize and produce simple device/mechanism of their choice.
19.	20ME C03	Engineering Exploration	Understand the role of an engineer as a problem solver.
			Identify multi-disciplinary approaches in solving an engineering problem.
			Build simple systems using engineering design process.
			Analyze engineering solutions from ethical and sustainability perspectives.
			Use basics of engineering project management skills in doing projects.
20.	20EEC01	Basic Electrical Engineering	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
			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.
			Understand the principle of operation, the emf and torque equations and classification of AC and DC machines
			Explain various tests and speed control methods to determine the characteristic of DC and AC machines.
			Acquire the knowledge of electrical wiring, types of wires, cables used and Electrical safety precautions to be followed in electrical installations.
			Recognize importance of earthing, methods of earthing and various low-tension switchgear used in electrical installations
21.	20ECC35	Basic Electronics	Interpret the usage of semiconductor devices in making circuits like rectifiers, filters, regulators etc
			Design and Analyse the characteristics of electronic circuits and systems
			Make use of various types of small and large signal amplifiers for electronic control systems.
			Model a prototype module using the operational amplifier for real time applications.
			Evaluate the performance of various semiconductor devices.
			Understand the basic concepts of data structures and

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22.	20CSC08	Data Structures	sorting techniques.
			Analyze the performance of algorithms.
			Distinguish between linear and non-linear data structures.
			Apply linear and non-linear data structures.
			Identify the significance of balanced search trees, graphs and hashing.
			Establish a suitable data structure for real world applications.
23.	20CSC09	Discrete Mathematics	Describe rules of inference for Propositional and Predicate logic.
			Demonstrate use of Set Theory, Venn Diagrams, relations, functions in Real-world scenarios.
			Model solutions using Generating Functions and Recurrence Relations.
			Determine the properties of graphs and trees to solve problems arising in computer science applications.
			Distinguish between groups, semi groups and monoids in algebraic systems.
			Formulate solutions to a variety of real world problems.
24.	20CSC10	Digital Logic Design	Demonstrate the number system conversions and simplify Boolean functions.
			Recall basic theorems and properties of Boolean algebra to represent logical functions in canonical and standard forms.
			Analyze and simplify Boolean expressions using karnaugh- maps and tabulation method.
			Analyze and Design various combinational circuits and Sequential circuits used in Computer Hardware.
			Understand the designs of Combinational and Sequential circuits using Verilog HDL.
			Develop different applications by configuring registers, counters and memories.
25.	20CIC01	Fundamentals of Cyber Security And Tools	Discuss different types of cybercrimes and analyze legal frameworks to deal with these cybercrimes.
			Describe the usage of Tools in cybercrimes.
			Recognize the importance of digital evidence in prosecution.
			Analyze and resolve cyber security issues in various domains.
			Analyze the commercial activities in the event of significant information security incidents in the Organization.
			Understand the importance of Cyber Laws and their Legal perspective.
26.	20EEC02	Basic Electrical Engineering Lab	Get an exposure to common electrical components, their ratings and basic electrical measuring equipment.
			Make electrical connections by wires of appropriate ratings and able to measure electric power and energy.
			Comprehend the circuit analysis techniques using various circuital laws and theorems.
			Determine the parameters of the given coil and calculate the time response of RL & RC series circuits.
			Recognize the basic characteristics of transformer and components of switchgear.
			Understand the basic characteristics of dc and ac machine

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			by conducting different types of tests on them.
27.	20CSC11	Data Structures Lab	Implement the abstract data type.
			Implement linear data structures such as stacks, queues using array and linked list.
			Implement non-linear data structures such as trees, graphs.
			Analyze various sorting techniques.
			Analyze various algorithms of linear and nonlinear data structures.
			Design and develop real world problem using suitable data structures.
28.	20CIC02	Fundamentals of Cyber Security And Tools Lab	Use Foot Printing Tools for Information Gathering.
			Scan and scrutinize the information gathered.
			Understand the usage of Sniffer Tools.
			Become familiar with Attack Launching Tools.
			Configure the proactive defense system.
29.	20CII01	MOOCS / TRAINING / INTERNSHIP	
30.	20ACT	Activity Points	
31.	20MTC13	Mathematical Foundation for Data Science & Security	Analyze the coefficient of skewness and fitting of the data by various methods
			Apply properties of Mathematical Expectations and analyse the various distributions.
			Evaluate areas of curves by using various distributions.
			Apply various technics of Number Theory for solving problems
			Apply RSA –PKC for solving security issues.
32.	20CSC13	Computer Architecture andMicroprocessor	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.
			Design assembly language program for specified computing 16 bit multiplication, division and I/O device interface.
			Derive flowchart for Concurrent access to memory and cache coherency in Parallel Processors and describe the process.
			Design a memory module and analyze its operation by interfacing with the CPU.
			Apply design techniques to enhance performance using pipelining, parallelism and RISC methodology.
			Develop testing and experimental procedures on Microprocessor and analyze their operation under different cases.
			Classify the difference between FMS and DBMS;

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33.	20CSC14	Data Base Management Systems	describe the roles of different users and the structure of the DBMS .Design the database logically using ER modeling.
			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 .
			Explore the inference rules for functional dependencies and apply the principles of normal forms to decompose the relations in a database.
			Summarize the concepts of dense ,sparse ,ISAM and B+ tree indexing and get familiar with static and extendable techniques of hashing .
			Explain the states and properties of transaction. Interpret the locking, time stamp, graph and validation based protocols for concurrency control.
			Relate log based, ARIES recovery techniques to increase the robustness of the database, identify to resolve the deadlocks in the transaction .
34.	20CSC15	Internet & Web Technologies	Understand the technologies required for developing web application.
			Identify and choose XHTML tags, CSS and java scripts to develop well-structured and easily maintained web pages.
			Design and Develop interactive and innovative web pages using various platforms/technologies like XHTML, CSS, XML, JAVASCRIPT.
			Create and deploy web applications in web server by using server-side programming concepts like Python.
			Build a data driven web site using different frameworks and Databases.
			Evaluate different web applications to implement optimal solutions for real time problems.
35.	20CSC36	Introduction to AI tools, Techniques and Applications	Understand fundamental concepts of AI and its importance.
			Identify various Machine Learning algorithms and their limitations
			Develop Chatbots based on requirements
			Analyze complex problems involving image processing, Computer Vision and HCI
			Understand smart solutions for various domains
36.	20MBC01	Engineering Economics &Accountancy	Apply fundamental knowledge of Managerial Economics concepts and tools.
			Analyze various aspects of Demand Analysis, Supply and Demand Forecasting.
			Understand Production and Cost relationships to make best use of resources available.
			Apply Accountancy Concepts and Conventions and preparation of Final Accounts.
			Evaluate Capital and Capital Budgeting decision based on any technique.
37.	20MTC14	Mathematical Foundation for Data	Analyze the coefficient of skewness and fitting of the data by various methods
			Apply properties of Mathematical Expectations and analyze the various distributions.

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		Science & Security Lab	Evaluate areas of curves by using various distributions.
			Apply various technics of Number Theory for solving problems
			Apply RSA –PKC for solving security issues.
38.	20CSC17	Data Base Management SystemsLab	Outline the built-in functions of SQL and apply these functions to write simple and complex queries using SQL operators.
			Demonstrate Queries to Retrieve and Change Data using Select, Insert, Delete and Update. Construct Queries using Group By, Order By and Having Clauses.
			Demonstrate Commit, Rollback, Save point commands, SQL Plus Reports and formulate the Queries for Creating, Dropping and Altering Tables, Views, constraints.
			Develop queries using Joins, Sub-Queries and Working with Index, Sequence, Synonym, Controlling Access and Locking Rows for Update, Creating Password and Security features.
			Demonstrate the usage of data types , Bind and Substitution Variables, Anchored, Declarations, Assignment Operation and PL/SQL code using Control Structures .
			Develop PL/SQL code using Cursors, Exception, Composite Data Types and Procedures, Functions and Packages.
39.	20CSC18	Internet & Web Technologies Lab	Identify and install web development tools.
			Develop client side web pages using XHTML, CSS and XML.
			Create dynamic, interactive web applications using java script.
			Develop server side web application using Django Frame work.
			Understanding working of Ajax, Node.js and JSON.
			Identify and explore differentframe works for web applications.
40.	20CSC37	Introduction to AI tools, Techniques and Applications Lab	Demonstrate the capabilities of AI
			Build models for various real time problems using AI/ML Tools
			Develop Chatbots, programs for simple applications
			Analyze and interpret the experimentation results
			Develop skills to communicate the experimentation results
41.	20ACT	Activity Points	
42.	20CSC12	Design and Analysis of	Identify and apply asymptotic notations to measure the performance of algorithms.
			Describe the algorithmic design techniques of divide and conquer, greedy, dynamic programming, backtracking and branch and bound to solve problems.
			Apply suitable algorithmic design techniques to solve problems to get optimal solution.

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		Algorithms	Analyze the performance of algorithmic design techniques.
			Evaluate the efficiency of alternative solutions derived for a problem by applying various algorithmic design techniques.
			Understand P, NP, NP-Hard, NP-Completeness and Reducibility.
43.	20CSC20	Operating Systems	Identify the basics of an operating systems and its major components.
			Understand the concepts related to process synchronization and deadlocks.
			Distinguish various memory management techniques.
			Interpret various threats and defense mechanisms used to protect the system.
			Evaluate various file allocation methods.
			Apply security as well as recovery features in the design of algorithms.
44.	20CIC03	IoT Development, Applications and Practice	Understand Internet of Things, its hardware and software components.
			Illustrate working of I/O devices, sensors & communication module.
			Compare communication protocols in IoT.
			Explore fundamentals of IoT Data Analytics and Supporting Services.
			Organize and Analyze IoT data.
			Develop real time IoT based projects.
45.	20CIC04	Computer Networks	Understand the communication protocol suites like ISO-OSI and TCP/IP.
			Illustrate Data Communications System and its components.
			Analyze various routing protocol, congestion control algorithms.
			Distinguish the internet protocols like IP, ICMP, IGMP, BGP, OSPF, and DHCP.
			Understand the transport layer protocols like TCP, UDP and SCTP.
			Identify the functions of application layer protocols like HTTP, WWW, DNS, Email protocols and
46.	20CIE01	Linux Kernel Internals and Programming	Understand fundamental concepts of Linux kernel.
			Apply system programming concepts and its library functions.
			Analyze memory management and system administration.
			Create multithreaded programs using POSIX threads.
			Work with file management and system management.
47.	20CIE02	Image Processing	Explain the basic principles of image processing and its significance in real world.
			Interpret various types of images and applies image transformations.
			Evaluate various approaches for image segmentation and image restoration.
			Define image processing methods and recognize morphological image processing techniques.
			Recognize image compression and comprehend image

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			compression techniques in both domains.
			Apply image processing algorithms for real world problems.
48.	20CIE03	Artificial Intelligence and Machine Learning	Understand the significance of AI and Tools.
			Apply regression and classification concepts to real-world problems.
			Perform clustering operations using appropriate algorithms.
			Implement AI concepts using Python.
			Perform predictive analysis using ML algorithms.
			Understand the fundamentals of Deep Learning and Neural Networks.
49.	20CSE05	Optimization Techniques	Calculate the optimum values for given objective function by LPP.
			Solve the solution for maximize the profit with minimum cost by Transportation problem.
			Determine the optimum feasible solution for assignment and travelling salesman problems and computing the optimal solution for Job sequencing models.
			Compute the optimum values for given objective function by IPP and optimal strategy for games.
			Identify critical path using network scheduling
50.	20CSE12	Embedded Systems	Understand the basics of embedded systems.
			Analyze the core concepts of Embedded System and Embedded System Architecture.
			Design and develop Embedded System hardware and software using Embedded C.
			Analyze the operating system for embedded systems.
			Analyze the embedded system development environment and tools used in embedded software development process.
51.	20ECO10	Fundamentals of Wireless Communication	Understand the overview of Wireless Communication.
			Relate the cellular concepts like frequency reuse, hand off, coverage and capacity.
			Analyse the mobile radio propagation with large scale and small scale fading.
			Select the suitable diversity technique to combat the multipath fading effects.
			Compare the multiple access techniques and apply to wireless standards.
52.	20EEO05	Waste Management	Categorize the waste based on the physical and chemical properties.
			Explain the Hazardous Waste Management and Treatment process.
			Illustrate the Environmental Risk Assessment, methods, mitigation and control.
			Interpret the Biological Treatment of Solid and Hazardous Waste.
			Identify the waste disposal options, describe the design and construction, Operation, Monitoring, Closure of Landfills.
53.	20MEO09	Organizational Behaviour	Understand Organizational Behavioral principles and practices.
			Compare various organizational designs and cultures enabling organizational development.

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			Apply motivational theories and leadership styles in resolving employee's problems and decision making processes.
			Understand the group dynamics, communication network, skills needed to resolve organizational conflicts.
			Analyze the behavior, perception and personality of individuals and groups in organizations in terms of the key factors that influence organizational behavior.
54.	20MTO03	Quantum Computing	Compute basic mathematical operations on Quantum bits.
			Execute Quantum operations of Quantum computing
			Built quantum programs
			Develop quantum Logical gates and circuits.
			Develop the quantum algorithm
55.	20BTO04	Bioinformatics	Explain the basic concepts of biology and bioinformatics.
			Identify various types of biological databases used for the retrieval and analysis of the information.
			Explain the sequence analysis and data mining.
			Discuss the methods used for sequence alignment and construction of the phylogenetic tree.
			Describe the methods used for gene and protein structure prediction.
56.	20CSC23	Operating Systems Lab	Understand Linux/Unix environment.
			Identify and interpret various system programs.
			Understand and implement shell programming.
			Simulate memory management and file allocation techniques.
			Analyze process and file management system calls by creating and/or modifying concurrent programs.
			Build network-oriented applications using system calls.
57.	20CIC05	IoT Development, Applications and Practice Lab	Use of various hardware and software components related to Internet of Things.
			Interface I/O devices, sensors to Raspberry Pi/Arduino.
			Implement various communication protocols in IoT.
			Monitoring remote system using IoT.
			Hypothesizing Real time IoT based projects.
			Develop real life IoT based projects.
58.	20CIC06	Computer Networks Lab	Identify the different types of connecting Medias and equipment's used in the networks Lab.
			Differentiate various network devices like repeater, hub and switch.
			Practice the basic network commands like ifconfig, ping, traceroute, nslookup, dig, arp, netstat, nmap.
			Design and demonstrate network topologies using GNS3.
			Examine the packet transfer using tcpdump.
			Analyze the network performance using Wire shark or any tool.
59.	20CII02	Internship-II (Industrial/ Rural Internship)	
60.	20CIC07	Theory of Computation and Compilers	Understand formal language basics and the power of automata to recognize the languages.

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			Analyze the concept compilation Process and data structures of a compiler.
			Attains the knowledge of context free grammars and able to implement parsers.
			Design Syntax directed translation scheme for a given Context free grammar and generation of intermediate code.
			Apply Optimization to intermediate code and machine code.
			Illustrate various object forms, error recovery and tools of a compiler.
61.	20CSC22	Software Engineering	State the software process and explain perspective process model, evolutionary process models.
			Understand the agile Software process models and demonstrate the skills necessary to specify the requirements of software product so as to prepare SRS document.
			Recall the modeling concepts and estimate the cost of software using empirical models.
			Enlist the design principles and construct a product using coding principles and standards.
			Develop test cases and apply software testing methods in conventional and O-O approaches and estimates software quality of SW.
62.	20CIC08	Blockchain Platforms and Applications	Understand the fundamental design and architectural primitives of Blockchain and consensus protocols.
			Explore various blockchain platforms and identify the significance of smart contracts.
			Identify the working of Ethereum and decentralized applications.
			Implement the blockchain applications with Hyperledger Fabric and Composer.
			Apply blockchain in different application domains such as financial and supply chain sectors.
			Analyze the Implications of blockchain for privacy and security.
63.	20CIE04	Sensors and Sensing Technologies	Understand and summarize different types of sensors/transducers.
			Illustrate the mechanism to connect the sensors to processing devices.
			Demonstrate the communication mechanism for IOT sensors.
			Apply different techniques to improve sensor IQ.
			Analyze various aspects of network communication.
			Understand IEEE standards for smart sensing.
64.	20CIE05	Vulnerability Analysis and Penetration Testing	Explain the basic principles and techniques of how attackers can enter computer systems.
			Describe and distinguish key phases of ethical hacking: reconnaissance, scanning, gaining access, maintaining access, and covering the tracks.
			Put acquired knowledge into practice by performing ethical penetration tests and hide the intrusion.
			Experience on various tools & techniques of vulnerability assessment & penetration testing used in Linux.

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			Identify flaws and vulnerabilities in applications, websites, networks, systems, protocols and configurations using both manual techniques and assistive tools.
			Evaluate the strengths and weaknesses of various information technology solutions in terms of data security.
65.	20CSE06	Soft Computing	Understand various soft computing concepts and techniques.
			Analyze and design various learning models.
			Apply the Neural Network Architecture for various Real time applications.
			Examine and approximate reasoning using fuzzy logic.
			Design Genetic algorithms in different applications.
			Develop soft computing techniques to solve different applications.
66.	20CSE23	Mobile Application Development	Interpret and analyze Android platform architecture and features to learn best practices in android programming.
			Design the User Interface for mobile applications.
			Apply Intents, Broadcast receivers and Internet services in Android App.
			Develop database management system to retrieve and/or store data for mobile application.
			Evaluate and select appropriate android solutions to the mobile computing platform.
			Build Flutter applications for complex problems.
67.	20CSE37	High Performance Computing	Understand different parallel computing architectures and networks.
			Ability to design parallel algorithms and measure their performance.
			Understand vector processing, memory bottlenecks, data and thread-level parallelism.
			Understand the various programming frameworks like MPI, OpenMP and CUDA.
			Understand cache coherence protocols and read-write semantics of parallel programs.
			Gain knowledge of writing efficient parallel programs.
68.	20ECO01	Remote Sensing and GIS	Demonstrate the understanding of basic concepts of remote sensing and interpret energy interactions.
			Choose an appropriate technique for a given scenario by appreciating the types of remote sensing.
			Distinguish the principle behind the working of microwave and LiDAR sensing.
			Apply Microwave remote sensing techniques.
			Explain the procedure for encoding data and geospatial data analysis.
69.	20MTO01	Financial Mathematics	Calculate the internal rate of return, annuity and amortization.
			Apply the portfolio theory.
			Examine the binomial model of pricing.
			Analyze the stochastic differential equations.
			Solve the BSM partial differential equations.
70.	20EEO02	Energy Management Systems	Know the current Energy Scenario and importance of Energy Conservation.

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			Understand the concepts of Energy Management, Energy Auditing.
			Interpret the Energy Management methodology, Energy security and Energy Strategy.
			Identify the importance of Energy Efficiency for Engineers and explore the methods of improving Energy Efficiency in mechanical systems, Electrical Engineering systems.
			Illustrate the Energy Efficient Technologies in Civil and Chemical engineering systems.
71.	20EGO01	Technical Writing Skills	Communicate effectively, without barriers and understand aspects of technical communication.
			Differentiate between general writing and technical writing and write error free sentences using technology specific words.
			Apply techniques of writing in business correspondence and in writing articles.
			Draft technical reports and technical proposals.
			Prepare agenda and minutes of a meeting and demonstrate effective technical presentation skills.
72.	20CEO02	Disaster Risk Reduction and Management	Identify and understand the concepts of hazards, causes and impacts of disasters.
			Develop a critical capacity to evaluate the principles and practices of disaster risk reduction and management.
			Develop a deep awareness of disaster resilience, risk mitigation, and recovery policies as they arise from natural hazards around the globe.
			Apply knowledge about existing global frameworks and existing agreements and role of community in successful Disaster Risk Reduction.
			Evaluate DM study including data search, analysis and presentation as a case study.
73.	20CHO04	Environmental and Sustainable Development	To relate sustainability concepts and ethical principles towards environment.
			To understand the different types of environmental pollution problems and their respect sustainable solutions.
			To become aware of concepts, analytical methods/models, and resources for evaluating and comparing sustainability implications of engineering activities.
			To critically evaluate existing and new methods.
			To develop sustainable engineering solutions by applying methods and tools to research a specific system design.
			To apply concepts of sustainable development to address sustainability challenges in a global context.
74.	20EGM03	Universal Human Values-II Understanding Harmony	Students are expected to become more aware of themselves and their surroundings (family, society, nature).
			They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
			They would have better critical ability.
			They would also become sensitive to their commitment towards what they have understood (human values,

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			human relationship and human society).
			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.
75.	20CSC25	Case Studies using UML Lab	Identify the problem scope and constraints in the problem.
			Prepare software requirements specifications (SRS) for the system according to standards.
			Apply the design notations of structured approach to develop ER and Data Flow Diagrams.
			Apply/Use the design notations of OO approach to develop UML diagrams using rational tools.
			Implement, analyze and prepare the documentation for the proposed system.
76.	20CIC09	Blockchain Platforms and Applications Lab	Understand the fundamental design and architectural primitives of Blockchain and consensus Protocols.
			Deploy various blockchain platforms and identify the significance of smart contracts.
			Implement the working of Ethereum and decentralized applications.
			Implement the blockchain applications with Hyperledger Fabric and Composer.
			Apply blockchain in different application domains such as financial and supply chain sectors.
			Analyze the Implications of blockchain for privacy and security.
77.	20CIE06	Sensors and Sensing Technologies Lab	Strong understanding of fundamentals of Sensing and Sensor Devices.
			Illustrate the mechanism to connect the sensors to processing devices.
			Demonstrate the communication mechanism for IoT sensors.
			Design and implement data processing software to utilise sensor data.
			Develop virtual instruments for specific application using LabVIEW software.
			Ease the programming required to make computer interact with real world.
78.	20CIE07	Vulnerability Analysis and Penetration Testing Lab	Install and exploit tools for network protection.
			Exploit and analyse vulnerabilities in LAN, wireless devices and identify the same using penetration testing.
			Perform vulnerability scanning and penetration testing using appropriate tools and techniques.
			Perform a wireless pen testing, packet analysis and log analysis.
			Perform static and dynamic analysis on application.
79.	20CSE15	Soft Computing Lab	Implement McCulloh-Pitts model for Boolean operations.
			Apply perceptron learning algorithm for a given problem.
			Design and analyze various Neural Networks Architectures.
			Apply concepts of fuzzy sets on real-time applications.
			Implement Genetic Algorithms with its operators.
			Apply soft computing strategies for various real time applications

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80.	20CSE32	Mobile Application Development Lab	Analyze all the components and their properties of various Emulators for selecting suitable emulator.
			Apply essential Android programming concepts for developing efficient mobile app.
			Develop Android applications related to various layouts.
			Design Flutter applications with rich user interactive interfaces.
			Develop Android applications related to mobile related server-less database like SQLite.
			Extend event handling to develop various mobile applications.
81.	20CSE40	High Performance Computing Lab	Apply System Commands and Networking commands of Linux.
			Describe OpenMP constructs and functions.
			Design and implement parallel programs using OpenMP.
			Apply the APIs in MPI programming.
			Design and implement parallel programs using CUDA.
82.	20EGC03	Employability Skills	Become effective communicators, participate in group discussions with confidence and be able to make presentations in a professional context.
			Write resumes, prepare and face interviews confidently.
			Be assertive and set short term and long term goals, learn to manage time effectively and deal with stress.
			Make the transition smoothly from campus to work, use media with etiquette and understand the academic ethics.
			Enrich their vocabulary, frame accurate sentences and comprehend passages confidently.
83.	20CSC30	Cryptography and Network Security	Analyze and design classical encryption techniques and block ciphers.
			Analyze and design hash and MAC algorithms, and digital signatures.
			Design network application security schemes like PGP, S/MIME, IPSec, SSL, TLS, HTTPS, SSH, etc.
			Evaluate the authentication and hash algorithms.
			Create and configure simple firewall architectures.
			Understand digital sign in emails and files.
84.	20CIE08	IoT Automation and Security	Explain the key IIoT concepts and technological developments.
			Comprehend the value created by collecting, communicating, coordinating, and leveraging the data from connected devices.
			Analyze the Security requirements in IoT.
			Illustrate authentication credentials and access control.
			Describe various types of Trust models.
			Identify and perform Cloud services for IoT Automation.
85.	20CIE09	Social Engineering	Apply up to date social engineering techniques and ethical consideration.
			Extract Intelligence from publicly available sources to support intelligent needs and to discover vulnerabilities in IT Systems.
			Explore different types of social engineering attack.
			Identity the attacks and victims.
			Acquire knowledge on tactics and strategies on how to protect network against attack.

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86.	20CIE10	Crypto Currencies	Understand the core functionality and utility of Blockchain and Cryptocurrency technologies.
			Familiarize with working of different cryptocurrencies.
			Explain the positive and negative implications of cryptocurrencies.
			Differentiate the modern currencies and its market usage.
			Understand the Regulations of different cryptocurrencies.
87.	20CSE11	Natural Language Processing	Understand the basic concepts of Natural language processing pipeline and applications of NLP.
			Illustrate various text representation techniques in NLP.
			Analyse text classification techniques and deep learning basics to process natural language text.
			Explore text summarization methods and example systems.
			Demonstrate levels of NLP for several case studies.
			Apply NLP Pipe lines to solve real world applications.
88.	20CSE22	Big Data Analytics	Demonstrate knowledge of Big Data, Data Analytics, challenges and their solutions in Big Data.
			Discuss about Hadoop Framework and eco systems.
			Understand and work on NoSQL environment and MongoDB.
			Explain and Analyse the Big Data using Map-reduce programming in Both Hadoop and Spark framework.
			Demonstrate spark programming with Python/R programming languages.
			Explain and Analyse the data Analytics algorithms in Spark.
89.	20CIE11	Malware Analysis	Set up a safe virtual environment to analyze malware, quickly extract network signatures and host-based indicators.
			Use key analysis tools like IDA Pro, OllyDbg, and WinDbg.
			Overcome malware tricks like obfuscation, anti-disassembly, anti-debugging, and anti-virtual machine techniques.
			Use knowledge of Windows internals for malware analysis.
			Analyse malware behaviour, including launching, encoding, and network signatures.
			Design and deploy machine learning based malware detectors.
90.	20CIE12	Building Secure and Reliable Systems	Understand the principles and strategies of infrastructure for building secure and reliable systems.
			Identify various tools and technologies to manage infrastructure and other resources.
			Create Git-based platforms for collaborative development and maintenance of Software Products
			Perform various tests including infrastructure, production, fail-over, capacity, security, and compliance tests.
			Configure infrastructure resources using configuration management tools.
			Design systems to provide concurrency.
91.	20CSE08	Enterprise Application	Understand the database connectivity and application

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		Development	servers.
			Explore the type of forms with validations using ReactJS.
			Utilize Express framework to develop responsive web applications.
			Demonstrate the architecture and file system of NodeJs.
			Identify the significance of component intercommunication with Angular2.
			Adapt MEAN or MERN stack to implement a real-time web application.
92.	20CSE21	Deep Learning	Understand various learning models.
			Design and develop various Neural Network Architectures.
			Understand approximate reasoning using Convolution Neural Networks.
			Analyze and design Deep learning algorithms in different applications.
			Ability to apply CNN and RNN techniques to solve different applications.
			Evaluate the Performance of different models of Deep learning networks.
93.	20CSE34	Cloud Computing	Understand the need of cloud technology and terminology.
			Identify and understand the cloud infrastructure.
			Write scripts for the automation of infrastructure and software deployment.
			Design solutions for the automation and migration of manual data centers.
			Develop scripts for the automation of cloud services.
94.	20PYO01	History of Science and Technology	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.
			Illustrate the advancements in science and technology in the medieval period across Asia and Arab countries and decline and revival of science in Europe.
			Explain the scientific approach and its advances of the Europeans and how the role of engineer during the industrial revolution and the major advancements.
			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.
			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.
95.	20MEO03	Research Methodologies	Define research problem.
			Review and assess the quality of literature from various sources.
			Understand and develp various sresearch designs.
			Analyze problem by sttistical techniques: ANOVA, F-test, Chi-square.
			Improve the style and ormat of writing a report for technical paper/Journal report.
96.	20MEO04	Entrepreneurship	Understand the concept and essence of entrepreneurship.
			Identify business opportunities and nature of enterprise.

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			Analyze the feasibility of new business plan.
			Apply project management techniques like PERT and CPM for effective planning and execution of projects.
			Use behavioral, leadership and time management aspects in entrepreneurial journey.
97.	20ECO05	Systems Automation and Control	Understand the features of various automatic and process control systems.
			Define and analyze various measuring parameters in the industry.
			Compare performance of various controllers (P, PD, PI, and PID).
			Illustrate the role of digital computers in automation.
			Develop various robot structures for different applications.
98.	20EEO03	Energy Auditing	Know the current energy scenario and various energy sources.
			Understand the concepts of energy auditing.
			Evaluate the performance of existing engineering systems.
			Explore the methods of improving energy efficiency in different engineering systems.
			Design different energy efficient appliances.
99.	20EGM01	Indian Constitution and Fundamental Principles	Understand the making of the Indian Constitution and its features.
			Identify the difference among Right To equality, Right To freedom and Right to Liberty.
			Analyze the structuring of the Indian Union and differentiate the powers between Union and States.
			Distinguish between the functioning of Lok Sabha and Rajya Sabha while appreciating the importance of Judiciary.
			Differentiate between the functions underlying Municipalities, Panchayats and Co-operative Societies.
100.	20EGM02	Indian Traditional Knowledge	Understand philosophy of Indian culture.
			Distinguish the Indian languages and literature.
			Learn the philosophy of ancient, medieval and modern India.
			Acquire the information about the fine arts in India.
			Know the contribution of scientists of different eras.
101.	20CSC31	Cryptography and Network Security Lab	Identify basic security attacks and services.
			Design symmetric and asymmetric key algorithms for cryptography.
			Create and use of Authentication functions.
			Identify and investigate network security threat.
			Analyze and design network security protocols.
102.	20CIE13	Malware Analysis Lab	Create virtual environment to analyze malware.
			Point out network signatures and host-based indicators for malware recognition on infected machines.
			Use key analysis tools to detect and classify malware.
			Understand malware tricks like obfuscation, anti-disassembly, anti-debugging, and anti-virtual machine techniques.
			Inspect malware functionalities and commands.
		Building Secure and	

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103.	20CIE14	Reliable Systems Lab	
104.	20CSE17	Enterprise Application Development Lab	Prepare database connections with application servers.
			Design user interfaces using ReactJS.
			Construct strong expertise on Express framework to develop responsive web applications.
			Create server side applications using Node.js
			Develop SPA using Angular 2.
			Invent next culture-shifting web applications.
105.	20CSE30	Deep Learning Lab	Implement various learning models.
			Design and develop various Neural Network Architectures.
			Analyze various Optimization and Regularizations techniques of deep learning.
			Analyze various pretrained models using Convolution Neural Networks.
			Ability to apply RNN techniques to solve different applications.
			Evaluate the Performance of different models of Deep learning networks.
106.	20CSE38	Cloud Computing Lab	Configure various virtualization tools such as VirtualBox/VMware Workstation.
			Manage resources in virtual machines.
			Design, implement and Deploy applications in PaaS environment.
			Demonstrate Unix and Hadoop commands in VM.
			Explore the features of Hadoop.
			Install Hadoop single node cluster and run simple applications like WordCount.
107.	20CIC10	Technical Seminar	Study and review research papers of new field/areas and summarize them.
			Identify promising new directions of various cutting edge technologies in Computer Science and Engineering.
			Impart skills to prepare detailed report describing the selected topic/area.
			Acquire skills to write technical papers/articles for publication.
			Effectively communicate by making an oral presentation before the evaluating committee.
108.	20CIC11	Project Part - 1	Review the literature related to the problem area / selected topic.
			Undertake problem identification, formulation and solution.
			Prepare synopsis of the selected topic.
			Gather the required data and Set up the environment for the implementation.
			Conduct preliminary analysis/modelling/simulation experiment.
			Communicate the work effectively in both oral and written forms.
	20CII03	Internship-III	

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109.			
110.	20CIE15	Cognitive IoT	Integrate the aspects of human cognitive processes in the system design.
			Comprehend underlying cognitive process that has many abstractions of a cognitive cycle.
			Detect any failure of system components and re-configure itself which provide a graceful degradation through self-healing.
			Accomplish knowledge about the application, system architecture, resources, system state and behavior.
			Apply advanced techniques in cognitive IoT.
			Analyze security issues in IoT applications.
111.	20CIE16	Blockchain Security and Privacy	Understand CIA Security triad in blockchain.
			Understand identity, authentication and naming mechanisms and their challenges.
			Identify different types of DDoS attacks.
			Apply blockchain based solutions for information security.
			Understand the common and specific risks in blockchain technology.
112.	20CIE17	Blockchain Policy: Legal, Economic and Social Impact	Understand the key essentials of policy making and areas of policy governance and nation-led blockchain policies worldwide.
			Understand the legal issues and the need for regulations in blockchain applications.
			Comprehend regulation mechanisms for digital assets and blockchain applications.
			Analyze the primary and secondary markets for digital assets.
			Understand the impact of blockchain adoption on the society in different sectors.
113.	20CSE04	Free and Open Source Technologies	Identify various FOSS tools, platforms, licensing procedures and development models, ethics.
			Describe various FOSS projects, development models and project management.
			Adapt to the usage of FOSS tools and technologies.
			Distinguish between Proprietary and Open Source tools, development methods.
			Practice Open Source principles, ethics, and models and to evaluate various Open Source projects like Linux, Apache, GIT, etc.
114.	20CSE35	Augmented Reality and Virtual Reality	Explain how the humans interact with computers.
			Understand the design and implementation of the technologies for AR and VR systems.
			Apply technical and creative approaches to make successful applications and experiences.
			Design audio and video interaction paradigms.
			Understand AR and VR best practices.
			Apply VR/MR/AR in various fields in industry.
	20EGM04	Gender Sensitization	Understand the difference between "Sex" and "Gender"

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115.			and be able to explain socially constructed theories of identity.
			Recognize shifting definitions of "Man" and "Women" in relation to evolving notions of "Masculinity" and "Femininity".
			Appreciate women's contributions to society historically, culturally and politically.
			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.
			Demonstrate an understanding of personal life, the workplace, the community and active civic engagement through classroom learning.
116.	20CEM01	Environmental Science	Identify the natural resources and realise the importance of water, food, forest, mineral, energy, land resources and affects of over utilization.
			Understand the concept of ecosystems and realise the importance of interlinking of food chains.
			Contribute for the conservation of bio-diversity.
			Suggest suitable remedial measure for the problems of environmental pollution and contribute for the framing of legislation for protection of environment.
			Follow the environmental ethics and contribute to the mitigation and management of environmental disasters.
117.	20CIC12	Project Part – 2	Demonstrate a sound technical knowledge of their selected topic.
			Design engineering solutions to complex problems utilizing a systematic approach.
			Conduct investigations by using research-based knowledge and methods to provide valid conclusions.
			Create/select/use modern tools for the modelling, prediction and understanding the limitation of complex engineering solutions.
			Communicate with engineers and the community at large in written and oral forms.
			Demonstrate the knowledge, skills and attitudes of a professional engineer.

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