

COURSE DETAILS	SYLLABUS TYPE	COURSE TYPE	SEMESTER	COURSE NAME	SYLLABUS
B.Tech.	THEORY	REGULAR	1st	Mathematical Foundations of Computer Science (MCS-101)	UNIT-I Probability mass, density, and cumulative distribution functions, Parametric families of distributions (Binomial and Multinomial, Poisson and Normal distribution), Expected value, variance, conditional expectation, Markov and Chebyshev Inequalities, Central Limit Theorem, Markov chains. Computer science and engineering applications: Data mining, Network protocols: Resource Allocation and Congestion Control, analysis of Web traffic, Bioinformatics, Machine learning.
B.Tech.	THEORY	REGULAR	3rd	Data Structures (CCS-102)	Unit-1 Basic concepts and Arrays : Concept of data type, Linear and non-linear data structures, Data structures versus data types, Operations on data structures, Algorithm complexity and Asymptotic notations. Linear and multi-dimensional arrays and their representation, Operations on arrays, Sparse matrices and their storage. Unit-2 Searching and Sorting: Linear and binary search techniques, Sorting methods – Bubble sort, Selection sort, Insertion sort, Merge sort, Shell sort and radix sort. Complexities of searching and sorting algorithms. Unit -3 Linked List : Definition and representation of Linked list, Types of Linked list- Linear linked list, Doubly linked list, Circular linked list and Header linked list and their operations, Application of linked lists.
B.Tech.	PRACTICAL	REGULAR	3rd	Data Structures (CCS-102)	Unit-1 Basic concepts and Arrays 5(L) hrs Concept of data type, Linear and non-linear data structures, Data structures versus data types, Operations on data structures, Algorithm complexity and Asymptotic notations. Linear and multi-dimensional arrays and their representation, Operations on arrays, Sparse matrices and their storage. Unit-2 Searching and Sorting 4(L) hrs Linear and binary search techniques, Sorting methods – Bubble sort, Selection sort, Insertion sort, Merge sort, Shell sort and radix sort. Complexities of searching and sorting algorithms. Unit -3 Linked List 7(L) hrs Definition and representation of Linked list, Types of Linked list- Linear linked list, Doubly linked list, Circular linked list and Header linked list and their operations, Application of linked lists.
B.Tech.	THEORY	REGULAR	3rd	Digital Electronics (ESCS-101)	Unit-1 Number system: Introduction to number system - Binary, Octal, Decimal, Hexadecimal. Number base conversions- 1's, 2's, rth's complements, signed Binary numbers. Binary Arithmetic, Binary codes - Weighted BCD, Gray code, Excess 3 code, ASCII – conversion from one code to another. Boolean Algebra Logic gates, NAND-NOR Implementation, Boolean postulates and laws, basic logic functions, standard forms of logic expressions – Sum of Products (SOP), Product of Sums (POS), Minterm, Maxterm. Minimization of Boolean expressions – using Boolean Algebra and Karnaugh map Minimization. Unit-3 Logic families , Brief overview of Transistor as a switch, Logic gate

					characteristics – propagation delay, speed, noise margin, fan-out and power dissipation. Standard TTL and static CMOS g
B.Tech.	PRACTICAL	REGULAR	3rd	Digital Electronics (ESCS-101)	Unit-1 Number system. Introduction to number system - Binary, Octal, Decimal, Hexadecimal. Number base conversions- 1's, 2's, rth's complements, signed Binary numbers. Binary Arithmetic, Binary codes - Weighted BCD, Gray code, Excess 3 code, ASCII – conversion from one code to another. Unit 2 Boolean Algebra Logic gates, NAND-NOR Implementation, Boolean postulates and laws, basic logic functions, standard forms of logic expressions – Sum of Products (SOP), Product of Sums (POS), Minterm, Maxterm. Minimization of Boolean expressions – using Boolean Algebra and Karnaugh map Minimization. Unit-3 Logic families. Brief overview of Transistor as a switch, Logic gate characteristics – propagation delay, speed, noise margin, fan-out and power dissipation. Standard TTL and static CMOS gates. Unit-4 Introduction to VHDL (VHSIC Hardware Description Language) 4 (L) hrs Behavioural – data flow algorithmic and structural description, lexical elements, data objects types, attributes, operators. VHDL coding examples. Practicals: To verify the truth table of various logic gates using ICs' 7408, 7402, 7400, 7404, 7432, 7486., To implement basic gates using universal gates NAND and NOR., 4-Bit Binary-to-Gray and Gray-to-Binary Code Converter: Realization using XOR gates.
B.Tech.	THEORY	REGULAR	3rd	Object Oriented Programming (CCS-101)	Part-A (Unit-1 Object Oriented Programming Concepts, Unit-2 Classes and Objects, Unit-3 Inheritance)
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B.Tech.	THEORY	REGULAR	3rd	Computer Architecture (CCS-103)	Part A only (Unit-1 Data Representation: Data types, Complements, Fixed point representation, IEEE 754 Floating point representation (32bit/64bit), Error detection and correction. Unit-2 Register Transfer and Micro-operations : Addition, Subtraction, Multiplication and division algorithms and hardware, Three-state buffer, Binary Adder, Binary Incrementor, Register-transfer language and operations, Arithmetic micro-operations, Logic micro-operations, Shift micro-operations, Arithmetic logic shift unit. Unit-3 Computer Organization and Design: Instruction codes - Direct and Indirect Address, Computer registers, Computer instructions, Timing and control, Instruction cycle, Instruction format, Memory, register, and input-output reference instructions, Input/ Output and

					interrupts, Design and working of a complete basic computer, Control functions, Design of accumulator logic. Unit-4 Memory Organization: Memory hierarchy, High-speed memories, Main Memory, Cache memory, Associative memory, Memory management techniques.)
B.Tech.	PRACTICAL	ELECTIVE	5th	Generative AI (ECS-101)	Till practical 6 in the syllabus
B.Tech.	THEORY	ELECTIVE	5th	Generative AI (ECS-101)	Part-A
B.Tech.	PRACTICAL	ELECTIVE	5th	Cryptography and Network Security (ECS-103)	Apply number theory concepts to cryptographic problems. • Implement modular arithmetic operations • Compute GCD using Euclidean and Extended Euclidean algorithms • Perform modular inverse and Chinese Remainder Theorem calculations .Apply classical encryption algorithms and analyze their security. • Implement Caesar, Monoalphabetic, Vigenère, and Transposition ciphers • Perform encryption and decryption • Analyze weaknesses using simple cryptanalysis Implement and evaluate modern symmetric encryption algorithms. • Implement AES for file/text encryption • Demonstrate different modes of operation (ECB, CBC)
B.Tech.	THEORY	ELECTIVE	5th	Data Warehousing and Business Intelligence (ECS-102)	Part-A Unit-1 Introduction to Data Warehousing Defining Features - Subject-Oriented Data, Integrated Data, Time-Variant Data, Nonvolatile Data, Data Granularity, Data Warehouses and Data Marts, Top-Down Versus Bottom-Up Approach. Components of Data Warehouse - Source Data Component, Data Staging Component, Data Storage Component, Information Delivery Component, Metadata Component, Management and Control Component. Metadata in the Data Warehouse, Trends in Data Warehousing, Data Warehousing and ERP, Data Warehousing and KM, Data Warehousing and CRM. Unit-2 Architecture and Infrastructure of Data Warehouse The Data Warehouse Project, Understanding Data Warehouse Architecture, Architectural Framework, Technical Architecture, Infrastructure Supporting Architecture, Hardware and Operating Systems, Data Modeling, Data Extraction, Data Transformation, Data Loading, Data Quality, Online Analytical Processing (OLAP). Data Warehouse Schema, Introduction to Data Warehouse Schema - Dimension, Measure, Fact Table, Multi-dimensional view of data, Star Schema, Snowflake Schema, Fact Constellation Schema (Galaxy Schema) , Comparison among Star, Snowflake and Fact Constellation Schema. Unit-3 Introduction to Data Mining: Introduction to Data Mining, Data Mining operations and techniques, The Data Mining Process, The Knowledge Discovery Process, Data Warehousing v/s Data Mining, Defining Association Rule Mining, Representations of Items for Association Mining, The Metrics to Evaluate the

B.Tech.	PRACTICAL	ELECTIVE	5th	Data Warehousing and Business Intelligence (ECS-102)	Strength of Association Rules, The Apriori Algorithm. Part-A Unit-1 Introduction to Data Warehousing Defining Features - Subject-Oriented Data, Integrated Data, Time-Variant Data, Nonvolatile Data, Data Granularity, Data Warehouses and Data Marts, Top-Down Versus Bottom-Up Approach. Components of Data Warehouse - Source Data Component, Data Staging Component, Data Storage Component, Information Delivery Component, Metadata Component, Management and Control Component. Metadata in the Data Warehouse, Trends in Data Warehousing, Data Warehousing and ERP, Data Warehousing and KM, Data Warehousing and CRM. Unit-2 Architecture and Infrastructure of Data Warehouse The Data Warehouse Project, Understanding Data Warehouse Architecture, Architectural Framework, Technical Architecture, Infrastructure Supporting Architecture, Hardware and Operating Systems, Data Modeling, Data Extraction, Data Transformation, Data Loading, Data Quality, Online Analytical Processing (OLAP). Data Warehouse Schema, Introduction to Data Warehouse Schema - Dimension, Measure, Fact Table, Multi-dimensional view of data, Star Schema, Snowflake Schema, Fact Constellation Schema (Galaxy Schema) , Comparison among Star, Snowflake and Fact Constellation Schema. Unit-3 Introduction to Data Mining: Introduction to Data Mining, Data Mining operations and techniques, The Data Mining Process, The Knowledge Discovery Process, Data Warehousing v/s Data Mining, Defining Association Rule Mining, Representations of Items for Association Mining, The Metrics to Evaluate the Strength of Association Rules, The Apriori Algorithm.
B.Tech.	THEORY	REGULAR	5th	Design and Analysis of Algorithms (CCS-113)	Part A
B.Tech.	PRACTICAL	REGULAR	5th	Design and Analysis of Algorithms (CCS-113)	Practical 1 to Practical 6
B.Tech.	THEORY	REGULAR	5th	Software Engineering (CCS-112)	Unit-1 Introduction to Software Engineering Nature of Software, Software Engineering, Software Process, Software Myths, Software application domains, Software crisis - Problem and causes. Unit-2 Software Development Lifecycle Software Process Models - Waterfall model, Prototype model, Spiral model, Incremental model, Evolutionary model, Agile model. Introduction to Software Development Methodologies - Agile development - Scrum, XP. DevOps principles (CI/CD). Unit-3 Requirement Engineering Problem Analysis, Requirement Engineering Process, Requirement Elicitation, Requirement Specification and

					Validation, documenting Software Requirement Specification (SRS), Requirement Analysis Approaches- Structured Analysis vs Object Oriented Analysis, Functional and non-functional requirements, Techniques for representing complex logic – Decision trees, Decision tables.
B.Tech.	PRACTICAL	REGULAR	5th	Software Engineering (CCS-112)	Experiment No. 1 to Experiment No. 5 (Based on Theory - Units 1 to 3)
B.Tech.	PRACTICAL	REGULAR	5th	Design Thinking LAB (ESCS-102)	Unit-I Overview of Design Thinking Introduction to Design Thinking- drivers, attributes, principles of design thinking, 3Ps of design thinking, features and applications of design thinking, design thinking vs traditional thinking. Case Studies- General, Engineering and Service applications. Activities: Identify an Opportunity and Scope of the Project Explore the possibilities and Prepare design brief Unit-II Design Thinking tools and techniques Design Thinking persona, visualisation, stakeholder mapping, journey mapping, mind mapping, Methods and Tools for Empathize and Define phases, star bursting, divergent thinking, convergent thinking, ethnography, brainstorming, storytelling, role playing and user interviews. Six thinking hats. Activities: Apply Design Thinking Tools and Techniques to Solve a User-Centric Problem.
B.Tech.	THEORY	REGULAR	5th	Cryptography and Network Security (ECS-103)	Introduction: Computer security concepts, security goals, threats and attacks, Security services and mechanisms, OSI security architecture, Fundamental security design principles, Attack surfaces and attack trees, Model for network security and standards, Number theory: divisibility, modular arithmetic, prime numbers, Fermat's theorems, discrete logarithm problem. Symmetric Key Cryptography : Symmetric cipher model. Classical encryption techniques - substitution and transposition ciphers (Caesar, Playfair, Hill), Block cipher principles, DES: structure, operation, strength and limitations. AES - structure, round transformations, key expansion overview. Block Cipher Modes and Stream Ciphers Multiple encryption and Triple DES. Block cipher modes of operation - Electronic Codebook mode, Cipher Block Chaining mode, Cipher Feedback mode, Output Feedback mode, Counter mode, Pseudorandom number generation
B.Tech.	THEORY	REGULAR	5th	Theory of Computation (CCS-110)	UNIT-1 Finite Automata, UNIT-2 Formal Languages and UNIT-3 Regular Grammar

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B.Tech.	THEORY	ELECTIVE	7th	Design and Analysis of Advanced Algorithms (PECS-132)	Dynamic Programming: Introduction, Elements of dynamic programming: Optimal substructure, Overlapping subproblems, reconstructing an optimal solution, Memoization, Rod cutting: Recursive top-down implementation, using dynamic programming for optimal rod cutting. Subproblem graphs. Matrix-chain multiplication, Longest common subsequence, Optimal binary search trees. Greedy Algorithms: Introduction, Elements of the greedy strategy, An activity-selection problem: The optimal substructure of the activity-selection problem, A recursive greedy algorithm, An iterative greedy algorithm. Greedy versus dynamic programming, Matroids and greedy methods, A task-scheduling problem as a matroid. Amortized Analysis: Introduction, Aggregate analysis, The accounting method, The potential method, Dynamic tables: Table expansion, Table expansion and contraction
B.Tech.	THEORY	ELECTIVE	7th	Soft Computing (PECS-122)	Introduction: Introduction to soft computing, Definition and importance, Evolution of soft computing, Difference between Hard and Soft computing, Requirement of Soft computing, Usefulness and applications. Neural Networks: Introduction to Neural Networks, Model of an artificial neuron, Comparison of artificial neural network and Biological neural network, Activation Functions, Recurrent Neural Networks, Neural network models- Perceptron, Adaline and medaline networks, Single layer, Back propagation, Multi-layer networks.
B.Tech.	THEORY	ELECTIVE	7th	Software Defined Networks (PECS-109)	Introduction: Historical Background of Software Defined Networking (SDN), The SDN Approach: Requirements, Characteristics of Software-Defined Networking, The Modern Data Center, Traditional Switch Architecture: Data Control and Management Planes, Centralized and Distributed Control and Data Planes. Software Defined Networking (SDN): The need of SDN, Fundamental Characteristics of SDN, SDN Operation, SDN Devices: Flow Tables, SDN software switches, hardware SDN devices, SDN Applications. Network Functions Virtualization: Background and motivation for NFV- Virtual Machines- NFV Concepts: Simple example of use of NFV, NFV Principles, High-Level NFV Framework, NFV Benefits and Requirements- NFV Reference Architecture. SDN Controllers: SDN Controllers: Core modules, Its Interfaces, implementations, Alternative SDN Methods: SDN via APIs, SDN via Hypervisor Based Overlays.

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B.Tech.	THEORY	ELECTIVE	7th	Data Warehouse and Data Mining (PECS-115)	Introduction to Data Warehousing and Data Mining: Historical developments in data warehousing, Defining data warehousing, Data warehouse architecture, Benefits of data warehousing, Data Granularity, The Information Flow Mechanism, Metadata, Two Classes of Data, The Lifecycle of Data, Data Flow from Warehouse to Operational Systems, Data Warehouse v/s Data Mining, Data Mining Applications, Data Mining Process, Data Mining Techniques, Predictive modelling, Database segmentation, Link analysis, Deviation detection, Difference between Data Mining and Machine Learning. The Building Blocks of a Data Warehouse: Data Warehouse: The Need for an Operational Data Store (ODS), Operational Data Store, Data Marts: Comparative Study of Data Warehouse with OLTP and ODS, Data Warehouse Schema, Introduction to Data Warehouse Schema: Dimension, Measure, Fact Table, Multi-dimensional view of data, Star Schema, Snowflake Schema, Fact Constellation Schema (Galaxy Schema), Comparison among Star, Snowflake and Fact Constellation Schema. Online Analytical Processing: Introduction to Online Analytical Processing, Defining OLAP, OLAP applications, Features of OLAP, OLAP Benefits, Strengths of OLAP, Comparison between OLTP and OLAP, Differences between OLAP and data mining.
B.Tech.	THEORY	ELECTIVE	7th	Web Technologies (PECS-128)	Introduction: History and evolution of Internet protocols, Internet addressing, Internet Service Provider (ISP), Introduction to WWW, DNS, URLs, HTTP, HTTPS, SSL, Web browsers, Cookies, Web servers, Proxy servers, Web applications, HTML: Introduction to HTML and DHTML, History of HTML, Structure of HTML Document: Text Basics, Structure of HTML Document: Images, Multimedia, Links, Audio, Video, Table and Forms, Document Layout, HTML vs. DHTML, Meta tags, and Website structure. Overview and features of HTML5, Style Sheets: Need for CSS, Introduction to CSS, Basic syntax and structure, Types of CSS – Inline, Internal and External CSS style sheets. CSS Properties - Background images, Colors and properties, Text Formatting, Margin, Padding, Positioning, CSS3- Animation, Page structure, Responsive Design, Framework - Twitter Bootstrap
B.Tech.	THEORY	ELECTIVE	7th	Computer Vision (PECS-121)	Digital Image Formation and Low-Level Processing: Introduction to Computer Vision, Image Formation: Photometric Image Formation, Reflectance Capture and Representation, Image Sensing Pipelining, Sampling and Aliasing, Image Compression; Image Processing: Operations, Linear Filtering, Correlation, Convolution, Image in Frequency Domain, Image Sampling. [9 Hours] Visual Features and Representations: Edge Detection, Image Gradients, Canny Edge Detection, More Recent Methods in Edge Detection, Blobs Detection, Corner Detection, Harris Corner Detector; Scale Space and Scale Selection; SIFT, SURF; HoG, LBP, etc

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B.Tech.	THEORY	ELECTIVE	7th	Applied Cloud Computing (PECS-135)	AWS Cloud global infrastructure, Cloud Service Models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS), Cloud storage. Structure of Cloud: Availability Zone, Edge Location, Origin, Latency, Region. Introduction to AWS Console, Virtual Servers: Amazon Elastic Compute Cloud (Amazon EC2), Domain Name, Domain Name System (DNS), Amazon Simple Storage Service (S3) bucket, Amazon Route 53, Javascript Object Notation (JSON), Dynamic website, Static website. Content Delivery: Amazon CloudFront, AWS Direct Connect, Caching, Content Delivery Network (CDN), Distribution. Virtual Storage: Amazon Simple Storage Service (Amazon S3), Amazon Elastic Block Store (Amazon EBS), Hard Disk Drive (HDD), Solid State Drive (SSD), Input/Output Operations Per second, Cloud Security: AWS Identity and Access Management (IAM), Role, User, Security group, Policy, Amazon Inspector, Root User, Credential, Multi-Factor Authentication (MFA), AWS shield, AWS Web Application Firewall (WAF), Distributed Denial of Service (DDoS), AWS Artifact. Cloud Monitoring: Amazon CloudWatch, AWS CloudTrail, AWS Config, Amazon Simple Notification Service
M.Tech.	THEORY	ELECTIVE	1st	Advances in Computer Network (MCS-114)	IEEE 802.11a/b/n/g/p, 802.15, and 802.16 standards for Wireless PAN, LAN, and MAN. IPv6 –Header, Addressing, Neighbor Discovery, Auto-Configuration, Header Extensions and options, support for QoS, security, etc. IP Multicasting: Multicast routing protocols
M.Tech.	THEORY	ELECTIVE	1st	Data Warehouse and Data Mining (MCS-121)	UNIT-I Introduction to Data Warehousing and Data Mining: Data Warehouse Defined, Features of a Data Warehouse, Data Granularity, The Information Flow Mechanism, Metadata, Two Classes of Data, The Lifecycle of Data, Data Flow from Warehouse to Operational Systems, Failures of Past Decision-Support Systems, Operational Versus Decision-Support Systems, Data Warehouse v/s Data Mining, Data Mining Process, Data Mining Functionalities, Data Pre-processing – Descriptive Data Summarization, Data Cleaning, Integration and Transformation, Reduction UNIT-II The Building Blocks of a Data Warehouse and Data Warehouse Schema: Data Warehouse Architecture Goals, Data Warehouse Architecture, Data Warehouse and Data Mart, Issues in Building Data Marts, Building Data Marts, Other Data Mart Issues, Overview of the Components, Data Warehouse Schema: The Star Schema, The Snowflake Schema, Aggregate Tables, Fact Constellation Schema or Families of Star, Keys in the Data Warehouse Schema UNIT-III Data Warehouse Modeling and Online Analytical Processing: Building the Fact Tables and Dimension Tables, Characteristics of a Dimension Table, Characteristics of a Fact Table, The Factless Fact Table, Updates To Dimension Tables, Cyclicity of Data - Wrinkle of Time, Dimensional Modeling, Strengths of Dimensional Modeling, Data

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					Warehouse and the Data Model, Enhancing the Data Warehouse Performance.
M.Tech.	THEORY	REGULAR	1st	Research Methodology and IPR (MRM-101)	Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations Unit 2: Effective literature studies approaches, analysis Plagiarism, Research ethics
M.Tech.	THEORY	ELECTIVE	3rd	Data Preparation and Analysis (MCS-155)	Introduction to Data Analysis : Problem definition, Data preparation, Implementation of the analysis, Deployment of the results, Data sources, Data understanding, Data preparation, Tables and graphs. Exploratory Analysis: Descriptive statistics- Central tendency, Variation, Shape. Inferential statistics- Confidence intervals, Hypothesis tests, Chi-square, One way analysis of variance. Comparative statistics Visualizing relationships Correlation coefficient(r). Correlation analysis for more than two variables. Grouping: Introduction, Clustering: Hierarchical agglomerative clustering, K means clustering. Associative rules: Grouping by value combinations, Extracting Rules from groups. Decision trees : Tree generation , Splitting criteria.


MSE COORDINATOR


HOD CSE

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