BTECH

SEM	SUBJECTS	SUBJECT CODE	SYLLABUS
3rd	Object Oriented Programming	CCS201	**Unit-1 Object Oriented Programming Concepts** Introduction, Comparison between Procedure oriented approach and Object-oriented approach, Basic data types, Derived data types, Keywords, Identifiers, Constants and variables, Type casting, Operators, and Operator precedence. Control Structures- if statement, switch-case, for, while and do-while loops, break and continue statement. Features of object-oriented programming- Class, Objects, Encapsulation, Abstraction, Data hiding, Polymorphism and Inheritance. **Unit-2 Classes and Objects** Implementation of a class, Class objects, Access specifiers, Accessing class members, Constructor and destructor, Types of constructors, Empty class, Nested class, Friend function, Inline function, Friend class, Static members. **Unit-3 Inheritance** Introduction, Defining derived classes, Types of inheritance, Ambiguity in inheritance, Virtual base class, Objects slicing, Overriding member functions.
	Data Structures	CCS102	Concept of data type, Linear and non-linear data structures, Data structures versus data types, Operations o ata structures, Algorithm omplexity and Asymptotic notations, Llinear and muli dimensional arrays and their representation, Operations on arrays, Sparse matrices and their storage,Linear and binary Search techniques, Sorting methods Bubble sort, Selection sort, Insertion sort, Merge sort, Shell sort and radix sort. Comflexities of scarching and soring algorithms,Defifition and represetation of Linkeld list their operations, list- Litnear of linked Dowbl link d list, Circular linked list and Header linke list and Typrs of Linked Application linked list lists.Sequential and Linked representation of stacks, Operations on stacks, Application of stacks- parenthesis checker, Evaluation of postfix expressions, Conversion from infix to postfix, Conversion from infix to prefix representation
	Digital Electronics	ESCS201	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.
	Computer Architecture	CCS103	**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.
	Applied Mathematics	BSCS-101	--------
5th	Artificial Intelligence	PCCS-108	Introduction: Intelligence, Foundations of artificial intelligence (AI). History of AI, Agents and Environments, Rationality of Agents, Nature and Structure of Agents, Communication among Agents. Problem Formulation and solution: Problem types, States and operators, State space, Uninformed Search Strategies, Informed Search Strategies– Best first search, A* algorithm, Heuristic functions, Iterative deepening A*(IDA), Small memory A*(SMA). Game playing: Perfect Information game, Imperfect Information game, Evaluation function, Minimax algorithm, Alpha-beta pruning. Logical Reasoning: Inference in Propositional logic and First order Predicate logic, Resolution
	Database Management Systems	PCCS 109	Introduction to Database Concepts: Introduction, Database systems versus file systems, Difference between Database and non-database system, Characteristics of Database Approach, Advantages and Disadvantages of Using DBMS. Data base users and administrators, Schemas and Instances, DBMS Architecture, components of a database system, Data Independence, Database Language and Interfaces, Classification of Database Management Systems. Introduction to NoSQL database.] Entity Relationship Model: Data models, Entity types, Entity sets, Attributes and keys, Relationship types, Relationship sets, Roles and structural constraints, Weak entity types, Design choices for ER conceptual design, Comparison of Models Relational Model: Relational model concepts, Constraints, Update operations, Transaction and dealing with constraint violations. Relational Algebra –Unary relational operations, Operations from Set theory, Binary relational operations, DIVISION operation and additional relational operations. Relational Calculus – Tuple relational calculus and Domain relational calculus, Queries related to Relational Algebra and Relational Calculus.] SQL: SQL Data Definition and data types, specifying constraints in SQL, Schema change statements, Basic queries in SQL, Set operations, Aggregate functions and views, Complex queries in SQL, Additional features of SQL.
	Formal Language and Automata		Finite Automata: Deterministic Finite Automata, Acceptance by Finite Automata, Transition systems, Non-Deterministic Finite Automata, Equivalence of DFA and NDFA, Moore and Mealy machines, Equivalence of Moore and Mealy machine, Minimization of Finite Automata, Applications and limitations of Finite Automata.partment of Computer Science and Engineering Formal Languages: Basics of strings, Alphabets, grammar, Formal language, Chomsky classification of languages, Languages and their relation, Operanions on languages, Closure properties of language classes. Regular Grammar Regular grammars, Regular expressions, AIgebraie method using Arden's theorem, Equivalence of Finite Automata and Regular expressions
	Design and Analysis of Algorithms	PCCS-111	Introduction: Algorithms, Algorithm Specification, Performance Analysis: Space complexity, Time complexity, Asymptotic Notations- Big-Oh notation (O), Omega notation (Ω), Theta notation (Θ), and Little-oh notation (o), Mathematical analysis of Non-Recursive and recursive Algorithms with Examples. Divide and Conquer: General method, solving recurrences using recurrence trees, repeated substitution, statement of Master Theorem, applications – Binary search, Merge sort, Quick sort, Strassen's Matrix Multiplication, Finding the maximum and minimum. Greedy Algorithms: Greedy choice, optimal substructure property, minimum spanning trees-Prims and Kruskals, Dijkstra shortest path using arrays and heaps, fractional knapsack, Travelling salesperson problem and Huffman coding. Dynamic Programming: Introduction to dynamic programming and application of the algorithm to solve multistage graphs, All pairs shortest path problem and Knapsack problem.
	Advance Computer Networks	PECS-106	Introduction: Basics, History of Internet, Requirements: perspectives, scalable connectivity, cost effective resource sharing, support for common services, manageability, network architecture: layering and protocols, Internet architecture, network performance: bandwidth, latency, high-speed networks, application performance needs. [4 Hours] Internetworking: half and full duplex, Ethernet at physical layer: standard Ethernet, fast Ethernet, gigabit Ethernet, Ethernet cabling-straight-through, crossover and rolled cable, Data encapsulation. Ethernet at data link layer: CSMA, CSMA/CD and CSMA/CA.[4 Hours] Wireless LANs: Introduction: architecture comparison, characteristics, access control. IEEE 802.11:architecture, MAC Sublayer, Physical layer. Bluetooth: architecture and its layers.[3Hours]Switching: Switching andbridging: datagrams, virtual circuit switching, source routing, Switches: Basics, its function, types of switches, Spanning Tree Protocol (STP), Virtual LANs (VLANs): purpose, memberships, configuration, connection between switches, advantages, types of VLANs: static and dynamic.
	Statistics for Data Science	PECS-111	Part A
	Information Retrieval	PECS-116	**Introduction**: Introduction, History of IR, Components of IR, The IR Problem, The IR System, The Software Architecture of the IR System, The impact of the web on IR, The role of artificial intelligence (AI) in IR, IR Versus Web Search, Components of a Search engine. **Basic IR Models:** Boolean and vector-space retrieval models; ranked retrieval; text-similarity metrics; TF-IDF (term frequency/inverse document frequency) weighting; cosine similarity. **Experimental Evaluation of IR**: Performance metrics: recall, precision, and F-measure; Evaluations on benchmark text collections. **Retrieval Utilities, Indexing and Searching:** Relevance feedback; clustering;
	System Programming		Overview of System Software: System Software, Application Software, Systems Programming, Recent Trends in Software Development, Levels of System Software, Evolution of Operating Systems, Operating System & Kernel, Functions of Operating System, Machine Structure, Evolution of components of a programming system -Assembler, Loader, Macros, Compiler.[5 Hours] Language Processors: Fundamentals of Language Processing & Language Specification, Language Processing Activities, Data Structures for Language Processing - Search Data structures, Allocation Data Structures.[4 Hours] Introduction to Assembly Language Program: Elements of Assembly Language Programming, A Simple Assembly Scheme, Pass Structure of Assemblers, One-Pass and TwoPass Assemblers with reference to IBM 360 machines.[6 Hours] Macro and Macro Processors: Introduction, Macro Definition and Call, Macro Expansion, Nested Macro calls, Advanced Macro Facilities, Design of a Macro Pre-processor, design of a Macro Assembler, Functions of a Macro Processor.
7th	Preparation and Analysis of Data	PECS-133	Overview of Data Preparation Process, Data types and Data Structure, Data Cleaning Techniques, Handling missing Data and Outliers, Data Validation and Quality Assurance methods, Data Collection methods, Data Integration Techniques, Data Preprocessing for Analysis, Exploratory Data Analysis, Hypothesis testing and Confidence Intervals, Regression Analysis, Classification and Clustering Algorithms, Model Evaluation and Validation Techniques
	Datawarehouse 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
	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.
	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.
	Applied Cloud Computing	PECS-135	Introduction to Amazon Web Services (AWS) Cloud: 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, Content Delivery and Virtual Storage: 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 (SDD), Input/Output Operations Per second (IOPS) Cloud Security and Cloud Monitoring: 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.
	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.

	Web Technologies	PECS-128	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

MTECH

SEM	SUBJECTS	SUBJECT CODE	SYLLABUS
MTECH 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 **UNIT-II :** Samples, populations, statistical modeling, graphical methods and data description, Random samples, sampling distributions (t-distribution and F-distribution) **UNIT-V :** Computer science and engineering applications: Data mining, Machine learning.
	Advanced Data Structures		UNIT-I Hashing: Introduction, Static Hashing –Hash table, Hash Function, overflow Handling, Dynamic Hashing Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists. UNIT-II Trees: Binary Search Trees, AVL Trees, Red Black Trees, B-Trees, B+-Trees, Splay Trees, Digital Search Trees, Finger search tree.
	Research Methodology and IPR	MRM 101	Unit 1: 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.nalysis,interpretation, Necessary instrumentations Unit 2: Effective literature studies approaches, analysisPlagiarism, Research ethics, Unit 3: Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee
	Machine Learning	MCS-111	**UNIT-I Introduction**: Well defined learning problems, Defining a learning system, perspectives and issues in machine learning, the concept learning task, concept learning as search, Find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, Inductive bias **UNIT-II Supervised Learning**: Basic methods: Distance based methods, Nearest-Neighbours, Decision Trees, Naive Bayes, Linear models: Linear regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Nonlinearity and kernel Methods. **Unsupervised Learning**: Clustering: k-means/ kernel k-means, Dimensionality Reduction: PCA and kernel PCA, Matrix Factorization and Matrix Completion, Generative models (mixture models and latent factor models) **UNIT-III Decision Tree Learning**: Introduction, Decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, issues in decision tree learning.
	Software Engineering Methodologies	MCS-123	Software Engineering: Software process models - Waterfall model, Iterative waterfall model, Spiral model, RAD model, Prototype model. Requirement engineering - Requirement analysis and specification, Formal and informal requirement specification, Requirement specification languages, Tools for requirements management and estimation. Project Management and Scheduling: Empirical, Heuristic and analytical cost estimation Techniques. Software project scheduling: Work break down structure, Activity chart, Gantt charts, PERT charts, Project monitoring, Organization and team structures. Software Design Methodologies: Function oriented design, Object oriented design, structured analysis and design, Object oriented design methodologies, related case studies.
MTECH 3RD	smart sensors and Internet of Things	MCS-156	UNIT 1: Environmental features of Measurement and Monitoring: Importance, effects of adverse parameters for the living being for IOT. Sensors: Principles and Working with their Types; Selection and usage of Sensors for Practical Applications, Overview of various kinds of Sensors like Capacitive, Resistive, Surface Acoustic Wave for Temperature, Pressure, Humidity, Toxic Gas etc.Important Properties of Sensors: Determination of the Fractional order elements, Constant Phase Impedance for sensing applications such as humidity, water quality, milk quality.

BTECH 2ND YEAR				
SEM	**SUBJECTS**	**SUBJECT CODE**	**LIST OF PRATICALS (PRACTICAL SYLLABUS)**	**Remarks**
3rd	**Seminar and Technical Report Writing for Engineers**	**SMCS201**	Practical1) Introduction to LaTeX and Its Background • History of LaTeX, its evolution, and use cases. • Comparison with other document preparation tools (Word, Google Docs). • Advantages of LaTeX in research and technical writing. Practical 2) Introduction to Supporting Tools for LaTeX • TeXLive, TeXworks and Overleaf. • Online vs. offline compilation of LaTeX documents. Practical 3) Installation • Installing BibTeX on Windows: step-by-step process. • Installing PDFLaTeX on Linux: dependencies and configurations. Practical 4) Develop a LaTeX script to create a simple document that consists of 2 sections [Section1, Section2], and a paragraph with dummy text in each section. And also include header [title of document] and footer [institute name, page number] in the document. Practical 5) Develop a LaTeX script to create a document that displays the sample Abstract/Summary.	**First Five Practical's as per syllabus**
3rd	**Digital Electronics**	**ESCS201**	1)To verify the truth table of various logic gates using ICs' 7408, 7402, 7400, 7404, 7432, 7486. 2) To implement basic gates using universal gates NAND and NOR. 3) 4-Bit Binary-to-Gray and Gray-to-Binary Code Converter: Realization using XOR gates.	