

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2017-18****Msc .-Ist Semester-Ist****1S : Digital Systems and Microprocessor**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Representation of integers and floating point nos., Boolean Algebra: laws, simplification of logic equations using Boolean laws, SOP and POS, standard forms of SOP and POS, Karnaugh Maps don't care conditions in K-map	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Design of Arithmetic circuits: Half Adder, half subtractor, full adder, full subtractor, parallel binary adder, subtraction using 1's and 2's compliment schemes, use of adder as subtractor, controlled parallel adder, ALU IC 74181.	04 04 03 04	15
3	Aug sep	UNIT-III :	Design of Arithmetic circuits: Half Adder, half subtractor, full adder, full subtractor, parallel binary adder, subtraction using 1's and 2's compliment schemes, use of adder as subtractor, controlled parallel adder, ALU IC 74181	04 03 03 02 03	15
4	sep	UNIT-IV :	Flip Flops: construction and working of RS, JK, MS-JK, D and T Flip flops. Shift registers and Counters: Buffer register, controlled buffer register, shift registers: SISO, SIPO, PISO,	04 04 03 04	15

			PIPO, bidirectional shift register, ring counter, twisted ring counter, applications of shift registers; Counters: asynchronous counter designs, synchronous counter, UP/DOWN counters, lock out in counters		
5	oct	UNIT-V :	Overview of microcomputer system, evolution of microprocessors, architecture of 8086 microprocessor, pin diagram, signal description, register organisation, concept of pipelining, memory segmentation, memory address generation, modes of operation of 8086 (minimum and maximum).	04 03 03 02 03	15
6	nov	UNIT- VI :	. Stack structure, interrupts in 8086 microprocessor, interrupt responses, Interrupt Vector Table, H/W and S/W interrupt processing; Interfacing: absolute and linear decoding, I/O mapped I/O and Memory Mapped I/O, memory interfacing (Even and Odd Banks), interfacing of keyboards, interfacing of displays, interfacing if ADC and DAC, address mapping.	04 04 03 04	15

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Department of Computer Science

Teaching Plan Session-2017-18

Msc .-Ist Semester-Ist

1S : Net Technologies and C#

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Understanding .net: The C# environment: origins of .net technology, .net framework, the common language runtime, framework base classes, user and program interfaces, visual studio .net, .net languages, benefits, c# and .net	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Overview of C#: namespaces, comments, aliases for namespaces, command-line arguments, program structure; Literals, variables and data types, operators, expressions, Decision making and branching, looping, methods in c#, Array handling, string manipulation, structures and enumerations	04 04 03 04	15
3	Aug sep	UNIT-III :	Classes and objects: Principle of OOP, Access modifiers, constructors, destructors, Nesting of classes; Inheritance and Polymorphism: multilevel inheritance, hierarchical inheritance, overriding, hiding methods, abstract methods and classes, sealed classes and methods; Interfaces: defining, extending and implementing interfaces, interfaces and inheritance, explicit interface implementation, abstract class and interfaces.	04 03 03 02 03	15

4	Sep oct	UNIT-IV :	Operator overloading: unary, binary, comparison, Delegates and events; Console I/O operations: console class, console inputoutput, formatted output. Errors and Exceptions: types of errors, exceptions, exception handling codes, multiple catch statements, exception hierarchy, catch handler, finally statement, nested try blocks.	04 04 03 04	15
5	oct	UNIT-V :	Multithreading in c#: Introduction, System. Threading namespace, scheduling, synchronizing threads, thread pooling. File Manipulation: Managing File System, Moving, copying, deleting files, Reading, writing to files, Reading Drive information, File Security	04 03 03 02 03	15
6	nov	UNIT- VI :	. Data Access with .Net: ADO.net overview, Database connections, commands, the Data Reader, the DataSet class, populating a DataSet, persisting a DataSet.	04 04 03 04	15

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2017-18****Msc .-Ist Semester-Ist****1S : Operating System**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Services, Types, User-O.S. Interface: Command Interpreter, Graphical User Interface; System Calls; System Programs; Operating System Structure: Simple, Layered Approach; Micro-kernels, Modules; Virtual Machine; System	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Process Management: Process Concept, Process States, Process Control Block, Process Scheduling: Schedulers, Context Switch; Operations on Process: Creation, Termination, Inter Process Communication; Threads: Concept, Benefits; CPU Scheduling: Burst Cycle, Types of Scheduling, Scheduler, Dispatcher, Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, Priority Scheduling, Round-Robin, [multiple processor	04 04 03 04	15
3	aug	UNIT-III :	Process Synchronization and Deadlocks: Critical Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors. Deadlock: System Model, Deadlock Characterization, Resource Allocation Graph, Methods for handling Deadlock: Prevention, Avoidance and Detection; Recovery from Deadlock: Process Termination	04 03 03 02 03	15
4	sep	UNIT-IV :	Memory Management: [Basic Hardware, Address Binding];	04	15

			Logical and Physical Address Space, Swapping, Contiguous Allocation, Dynamic Storage Allocation: First-fit, Best-Fit, Worst-fit; Fragmentation; Paging; Segmentation. Virtual Memory: Introduction, Virtual Address Space, Demand Paging, Copy-on-write, Page Replacement: Concept, Page Replacement Algorithms: FIFO, Optimal Page Replacement, LRU, Second-Chance Page Replacement; Thrashing, I/O Interlock.	04 03 04	
5	oct	UNIT-V :	File System: File: Concept, Attributes, Operations; File Organization and Access: Sequential, Index Sequential, Indexed, Direct or Hash File. Directory: Operations, Structures. Protection: Access Control and Permissions. File System Structure, Allocation Methods, Free Space Management. Disk Structure, Disk Scheduling Algorithms: FCFS, SSTF, SCAN, C-SCAN, LOOK. [Disk Management, Swap Space Management], RAID: Concept. I/O Systems: I/O Hardware, Interrupts, DMA, Application I/O Interface, Kernel I/O	04 03 03 02 03	15
6	nov	UNIT- VI :	.. : Distributed File System: Concept, Naming and Transparency, Remote File Access, Stateful Vs Stateless Service, File Replication, Remote Login, Remote File Transfer, Data Migration, Computation Migration, Process Migration. Embedded Operating Systems: Embedded Systems: Definition, Requirements and Constraints, Organization of Embedded System; Characteristics of Embedded Operating Systems.	04 04 03 04	15

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Teaching Plan Session-2017-18

Msc .-Ist Semester-Ist

1S : Computer Networks

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Digital Communication: Advantages; Data Transmission: Modes: Parallel, Serial: Asynchronous, Synchronous, Isochronous; Transmission Media: Guided and unguided; Modulation: Amplitude, Phase Shift, Frequency, QAM; Multiplexing: FDM, WDM, TDM, STDM, CDM; Switching: Circuit, Message, Packet; Delays in Packet Switched Network, Packet Loss; Network Reference Models: OSI: Layered Architecture and Services, TCP/IP: Layered Architecture and Services	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Application Layer: Principles of Application Layer Protocols; Processes: Client-Server Model, Socket Interface; Services required by Application Layer; HTTP: Introduction, RTT, HTTP Handshake, types of HTTP Connections, HTTP Messages, Authentication and Cookies; FTP: Service Model, FTP Commands; Electronic Mail; SMTP; DNS: Services and	04 04 03 04	15
3	Aug sep	UNIT-III :	Transport Layer: Transport-Layer Services and Principles; Multiplexing and Demultiplexing Applications; Connectionless Transport – UDP; Principles of Reliable of Data Transfer (RDT); Stop-and-wait and Pipelined protocols; GBN protocol; Connection-Oriented Transport: TCP; Flow Control; Principles of Congestion Control; Approaches	04 03 03 02 03	15

			towards Congestion Control; TCP Congestion Control		
4	Sep oct	UNIT-IV :	Network Layer: Introduction; Network Service Model: Datagram, Virtual Circuit; Routing Principles; Routing Algorithms: Classifications; Hierarchical Routing; Internet Protocol: IP Addressing, IPv4: Classes and Packet format, DHCP; ICMP; Routing in the Internet: RIP, OSPF, BGP; Router; IPv6; Multicast Routing	04 04 03 04	15
5	oct	UNIT-V :	Data Link Layer: Introduction; Services; Error Detection and Correction; Multiple Access Protocols and LANs; LAN Addresses and ARP; Ethernet; Hubs, Bridges and Switches; Wireless LANs: IEEE 802.11; The Point-to-Point Protocol; ATM, X.25 and Frame Relay	04 03 03 02 03	15
6	nov	UNIT- VI :	. Network Security and Management: Secured Communication: Threats and Characteristics; Cryptography: Principles of Cryptography, Symmetric Key Cryptography, Public Key Cryptography; Privacy, Authentication, Integrity, Nonrepudiation; Digital Signature; Key Distribution and Certification. Areas of Network Management; Network Management Architecture; Internet Network Management Framework; SMI, MIB, SNMP.	04 04 03 04	15

2S : Java Programming

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	Introduction to java, Java development tools, Java and WWW, Java applications, java building elements: Identifiers, Keywords, variables, constants, operators. Data types and type casting and type conversion. Control Structures: Simple if, If..else, switch statement, Loop structure : For , Do..while, while , loop control using break and continue	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Objects and classes: class variable, instance variable, class methods, Access specifier, access modifiers. Methods: main method, creating methods, calling methods, overloading methods, abstraction, recursion. Object: Initialization of object using constructors, parameterized constructor, Dynamic Memory allocation, Garbage collection. Passing objects to methods.	04 04 03 04	15
3	Feb mar	UNIT-III :	Packages: creating and importing packages, Arrays : Declaration, initialization, sorting searching, array of objects. String: String class, StringBuffer, StringTokenizer. Command line arguments. Inheritance: super class, subclass , super keyword, this keyword, final modifier, abstract class, Method overriding. Interface: implementing interfaces.	04 03 03 02 03	15
4	mar	UNIT-IV :	Applet: Life cycle of an applet, APPLET tag, passing arguments to an applet, paint, repaint, update methods.	04 04	15

			Graphics class, AWT class hierarchy, Frames, Layout managers, components, containers. Color class, Font class	03 04	
5	april	UNIT-V :	Exception Handling : Error and Exception class, Error handling routine, try , catch , throw, throws, finally, uncaught exceptions, built-in exception, nested try-catch, user defined exception. Thread: Thread class, Runnable interface, states, priority and synchronization. Java I/O classes, File handling.	04 03 03 02 03	15
6	may	UNIT- VI :	. : User Interface: Button, Label, TextField, TeatArea, Choice, List, CheckBox, CheckBox Group, Dialog Boxes, Menu Multiple Windows, Event handling: Event Delegation model, Adapter classes, Event classes, Event Listener Interfaces, Handling Mouse and Keyboard events.	04 04 03 04	15

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Msc .-Ist Semester-2st

2S : Data Structures

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	Introduction, Types of Data Structures, Linear & Nonlinear data structures, Arrays: Arrays as ADT, 1D, 2D, Multidimensional Arrays, Memory Representation and Applications. Linked List : Concept , Operations : Insert, Delete, Traversal, Static implementation using arrays,Dynamic implementation , Doubly Linked list, Circular list,Linked list applications : Merging of two linked lists.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Stacks: Introduction, Push and Pop operations, Stack implementation using array, Stack applications, Infix to Postfix conversion of expression, Expression evaluation, Recursion. Queues: Introduction, Insert and Delete operations, Queue implementation using array, Types – Priority Queue, Circular queue, Dequeue, Queue applications: CPU Scheduling Algorithms FCFS , Round Robin algorithm, Stacks and Queues as Linked Lists	04 04 03 04	15
3	Feb mar	UNIT-III :	Trees:Terminology and Concepts , Binary Tree Representation, Static implementation using arrays , Linked representation, Binary Search Tree, Operations on Binary search tree - Insert, Delete, Tree Traversals, Representing, Threaded binary trees, Height-balanced trees, AVL Rotations. Searching: Sequential binary tree searches. Unit IV : Searching and Sorti	04 03 03 02 03	15

4	mar	UNIT-IV :	Searching and Sorting :Searching, Concept and need, Techniques, Linear search, Binary search, Indexed sequential search, Sorting, Concept and Need, Performance criteria, Bubble sort, Insertion Sort, Selection Sort, Shell Sort, Quick Sort, Heap Sort, Merge Sor	04 04 03 04	15
5	april	UNIT-V :	Graphs :Terminology and concepts, Graph Representation: Adjacency matrix, Adjacency list, Adjacency multi-list, Traversals: Depth first and Breadth first. Minimum spanning tree, shortest path algorithm, topological ordering, sparse matrices, linked list implementation of graph and graph traversal.	04 03 03 02 03	15
6	may	UNIT- VI :	Indexing: B-tree indexing, Multilevel indexing, B+ tree, Hashing, Collision processing, Bucket hashing, Dynamic hashing, Linear hashing, Extendible hashing, Tries.	04 04 03 04	15

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Department of Computer Science

Teaching Plan Session-2017-18

Msc .-Ist Semester-2st

2S : Software Engineering

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	. System Concept: Definition, Characteristics of System, Elements of System; Types of System: Physical or Abstract Systems, Open or Closed Systems, Man-made Information Systems; Subsystem. System Analyst: Role; Skills: Interpersonal, Technical; Information Gathering Tools (Fact Finding Techniques); Feasibility Study. Introduction to Software Engineering: Definition and Characteristics of Software; Software Application Domains; Software Engineering: Definition, Layered Model.	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	Software Process Framework; Umbrella Activities. Process Models: SDLC (Waterfall); Incremental; Evolutionary Models: RAD, Prototyping, Spiral; Concurrent Development Model; Components based Development Model. Agility: Agile Process: Assumptions, Agility Principles, Human Factors. Software Engineering Practice: Essence of Practice, Core Principles, Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles.	04 04 03 04	15
3	Feb mar	UNIT-III :	Requirements Engineering: Requirements Engineering Tasks: Inception, Elicitation, Elaboration, Negotiation, Specification, Validation. Requirements Management; Steps in Requirements Engineering. Requirements Analysis:	04 03 03 02	15

			Objectives; Requirements Modeling Approaches: Scenario-Based Modeling: Use-Case; Class Models: E-R Diagram, Class Diagrams; Flow Oriented Modeling: DFD, CFD; Behavioral Models: State Diagram, Sequence Diagrams	03	
4	mar	UNIT-IV :	Software Design: Design Process and Quality; Design Concepts: Abstraction, Architecture, Modularity, Information Hiding, Functional Independence, Refinement. Component Level Design: Component-Definition; Object-oriented View, Traditional View, Cohesion, Coupling. Designing Traditional Components: Graphical Design – Notations (Flow Chart), Tabular Design – Notations (Decision Table), Program Design Language (Structured English or Pseudo-code). User Interface Design: Rules; Interface Design Models; Interface Analysis.	04 04 03 04	15
5	april	UNIT-V :	Software Quality: Definition; Garvin's Quality Dimensions; McCall's Quality Factors; ISO 9126 Quality Factors. Software Quality Assurance: Elements, Goals, ISO 9001-2000 Quality Standards. Software Metrics: Attributes, Metrics for Requirements Model: Function-based Model (FP). Metrics for Specification Quality, Metrics for Design Model: Architectural Design Metrics. Metrics for Object-Oriented Design, UserInterface Design Metrics, Metrics for Source Code, Metrics for Testing, Metrics for Maintenance.	04 03 03 02 03	15
6	may	UNIT- VI :	Software Testing: Need, Verification and Validation, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging, Test Characteristics. White Box Testing: Flow Graph Notations, Test Cases, Control Structure Testing. Black Box Testing: Graph-based Testing Methods,	04 04 03 04	15

			Equivalence Partitioning, Boundary Value Analysis, Orthogonal Array Testing.		

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2017-18****Msc .-Ist Semester-2st****2S : Discrete Mathematical Structures**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. Mathematical logic: Introduction, statements and notations, connectives – negation, conjunction, disjunction, Statement formulas and truth tables, conditional, bi-conditional, well formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal and principal normal forms, completely parenthesized infix and polish notations, Theory of inference for statement calculus – validity using truth table, rules of inference, consistency of premises and indirect method of proof.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Set theory: Basic concepts of set theory, representation of discrete structures, relations and ordering: relations, properties of binary relations in a set, relation matrix and graph of a relation, partition and covering of a set, equivalence relation, compatibility relations, composition of binary relations, Functions – composition of functions, Inverse function.	04 04 03 04	15
3	Feb mar	UNIT-III :	Algebraic Structures: Algebraic systems: Examples and general properties, Semigroups and monoids, Grammar and Languages, Polish expressions and their compilation, Groups- Definition and examples, subgroups and	04 03 03 02	15

			homomorphism, cosets and Lagrange's theorem, Group codes – the communication model and basic notions, generation of codes by using parity checks, error recovery in group codes	03	
4	mar	UNIT-IV :	Lattices and Boolean algebra: Lattice as POSETs, definition, examples and properties, Lattice as algebraic systems, sublattices, Direct product and homomorphism, Special lattices, Boolean algebra - definition and examples, subalgebra, Direct product and homomorphism, Boolean functions, representation and minimization of Boolean Finite state machines	04 04 03 04	15
5	april	UNIT-V :	Graph theory: Basic concepts of graph theory – definitions, paths, reachability and connectedness, matrix representation, Storage representation and manipulation of graphs- trees, representation and operations, list structures and graphs, Simple precedence grammars-syntax terminology, a view of parsing, notion and use of precedence relations, formal definiti	04 03 03 02 03	15
6	may	UNIT- VI :	Fault detection in combinational switching circuits – Faults in combinational circuits, Notions of Fault detection, Algorithm for generating a fault matrix, procedure for detection of faults; Introduction to computability theory: Finitestate acceptors and regular grammars, Turing machines and	04 04 03 04	15

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Msc .-Ist Semester-2st

2S : : Compiler Construction

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. Introduction to Compilers: Overview, typical compiler Structure, implementation. Programming Language Grammars: Elements of formal language grammars, derivation, reduction, syntax tree, ambiguity, regular grammars and expressions.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Scanning and Parsing Techniques: The scanner, top-down and bottom-up parsing, syntax directed translation, Symbol table organization, Hash table organization, Linked List and Tree structured symbol tables, symbol table organization for structures and records.	04 04 03 04	15
3	Feb mar	UNIT-III :	Memory Allocation: Static and dynamic memory allocation, array allocation and access, allocation for strings, structure allocation, common and equivalence allocation. Compilation of expressions.	04 03 03 02 03	15
5	mar	UNIT-V :	Error detection, indication and recovery. Compilation of I/O statements: Compilation of I/O list, compilation of FORMAT list, the I/O routine, file control.	04 03 03	15

				02 03	
6	April may	UNIT- VI :	Code optimization: Major issues, optimizing transformations, local optimizations, program flow analysis, Global optimization, writing compilers.	04 04 03 04	15

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Msc .-2nd Semester-3st

3S : Data Mining and Data Warehousing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	Introduction, Data Mining Functionalities, Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Data Warehouse and OLAP Technology: Overview, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Data Generalization and Concept Description.	04 04 03 04	15
3	Feb mar	UNIT-III :	Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.	04 03 03 02 03	15
4	mar	UNIT-IV :	Classification and Prediction: Issues, Classification by	04 04	15

			Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation. Prediction: Linear Regression, Nonlinear Regression, Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor.	03 04	
5	april	UNIT-V :	Cluster Analysis: Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data. Mining Time-Series Data, Mining Sequence Patterns in Biological Data	04 03 03 02 03	15
6	may	UNIT- VI :	: Graph Mining, Social Network Analysis and Multirelational Data Mining. Mining Object, Spatial, Multimedia, Text, and Web Data, Data Mining Applications, Trends in Data Mining	04 04 03 04	15

3S : Computer Graphics

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	. Geometry and line generation: Introduction, points and lines, planes and coordinates, Line segments, perpendicular line segments, vectors, pixels and frame buffers, vector generation, character generation, displaying the frame buffer. Graphics primitive: Introduction, display devices, primitive operations, the Display-File Interpreter, normalized device coordinates, Display-file structure, Display control, Text line style primitives.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. : Polygon: Introduction, Polygon , Polygon representation, Entering polygon, An inside test, filling polygon, Antialiasing. Transformations: Introduction, matrices, scaling transformations, sin and cos, sum of angles, identifiers, rotation, homogeneous coordinates and translation, rotation about an arbitrary point, other transformations, display procedures	04 04 03 04	15
3	Aug sep	UNIT-III :	Segments: Introduction, the segment table, segment creation, closing a segment, deleting a segment, renaming a segment, visibility, image transformations, saving and showing segments, other display file structures, some raster techniques, Windowing and clipping: Introduction, viewing transformation, implementation, clipping, clipping the polygon, adding clipping to the system, a voiding division,	04 03 03 02 03	15

			generalized clipping, position relative to an arbitrary line, multiple windowing,		
4	Sep oct	UNIT-IV :	Interaction : Introduction, hardware, input devices, handling algorithm, event handling, sample devices, the detectability attributes, simulating a locator with a pick and pick with a locator, Echoing, Interactive techniques. Three dimension: Introduction, 3D Geometry, primitives and transformations, rotation about an arbitrary axis, parallel projection, perspective projection, viewing parameters, conversion to view plane coordinates, The 3D viewing transformation, , special projection.	04 04 03 04	15
5	Oct	UNIT-V :	Hidden surfaces and lines: Introduction, back face removal, the painter algorithm, collection of polygons, remembering the style, the hidden surface check, decomposition into triangles, comparing two triangles, The minima test, Overlapping edges, containment of points, finding a point in the triangle plane, comparing of the entire triangle, establishing depth order, geometrical sorting, linked list, sorting the triangles.	04 03 03 02 03	15
6	nov	UNIT- VI :	Shading: Introduction, diffusion, illumination, point source illumination, specular reflection, transparency and shadows. Curves: Introduction, curve generation, implementation, interpolating polygons, E-splines, B-Splines and Curves.	04 04 03 04	15

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Msc .-2nd Semester-3st

3S : Client-Server Computing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Networking in Java: Basics, Socket overview, Client-Server concepts, Proxy servers, Internet addressing, Java Networking classes and interfaces, InetAddress, TCP/IP Client Sockets, URL Connection, TCP/IP Server sockets, Creating TCP client server	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Java Database Connectivity: JDBC concepts, JDBC API, DriverManager, Connection, Statement and ResultSet classes with relevant methods. Prepared and Callable statements, Handling queries, inserts, deletes and updates to database. Displaying query results	04 04 03 04	15
3	Aug sep	UNIT-III :	Servlets: Structure and lifecycle of Servlets, Servlet API: basics, Various classes & interfaces. Servlet requirements, writing. Running and debugging of Servlets, Concepts of Cookies, State and session management with Servlet API. Server side includes and request forwarding. Servlet chaining. Jdbc Servlets.	04 03 03 02 03	15
4	Sep	UNIT-IV :	JavaScript Overview, Variables, Operators, Data Types, Control Statements, Functions and Objects, The Window	04 04	15

	oct		Object: Dialog Boxes, Status Bar Messages, Window Manipulations; The Document Object: Writing to Documents, Dynamic Documents, The Form Object: Working With Form Elements and Their Properties The String and RegExp Objects, Dates and Math ies The String and RegExp Objects, Dates and Math o	03 04	
5	Oct	UNIT-V :	Remote Method Invocation (RMI): Object serialization in Java, Concept of remote object, Architecture of RMI application, Java RMI package, classes & Interfaces, Client-Server application using RMI, RMI Servlets, RMI-JDBC Servlets.	04 03 03 02 03	15
6	nov	UNIT- VI :	. Introduction to JSP; Simple JSP concepts, Request-time expressions. Advanced JSPs: Scripts. conditionals, loops, Try/Catch. Concept of Beans, Properties, Bean instances & serialization; Bean Scopes, Writing Beans, Introspection, Beans & Scriplets..	04 04 03 04	15

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Msc .-2nd Semester-3st

3S : Distributed Operating System

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Introduction to distributed systems: goals of distributed system, hardware and software concepts, design issues. Communication in distributed systems: Layered protocols, ATM networks, the client-server model, remote procedure call and group communication.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Synchronization in distributed systems: Clock Synchronization, mutual exclusion, Election Algorithms, the Bully algorithm, a ring algorithm, atomic transactions, dead lock in distributed systems, distributed dead lock prevention, and distributed dead ock detection.	04 04 03 04	15
3	Aug sep	UNIT-III :	Processes and processors in distributed systems: Threads, system, models, processor allocation, scheduling in distributed system, fault tolerance and real time distributed systems.	04 03 03 02 03	15
4	Sep oct	UNIT-IV :	Distributed file systems: Distributed file systems design, distributed file system implementation, trends in distributed file systems. Distributed shared memory: What is shared	04 04 03 04	15

			memory, consistency models, page based distributed shared memory, shared variable, distributed shared memory, object based DSM.		
5	Oct	UNIT-V :	Case Study : AMOEBA : Introduction to AMOEBA, objects and capabilities in AMOEBA, Process Management in AMOEBA, Memory Management in AMOEBA, Communication in AMOEBA. The AMOEBA servers : The Bullet Server - Interface and Implementation, The Directory Server – Interface and Implementation, The Replication Server, The Run Server, The Boot Server, The TCP/IP Server, Other Servers	04 03 03 02 03	15
6	nov	UNIT- VI :	Case study MACH: Introduction to MACH, Process management, in MACH, Memory management in MACH, communication in MACH, UNIX emulation in MACH. Case study DCE: Introduction to DCE threads, RPC's, Time service, directory service, security service, distributed file system.	04 04 03 04	15

3S : Theory of Computation

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Strings, alphabets and languages, Graphs and trees, Inductive proofs, set notations, relations, Finite automata and regular Expression: Finite state system, Non deterministic finite automata, Finite automata with ϵ -moves. Deterministic finite automata, equivalence between NFA and DFA, Conversion of NFA to DFA	04 03 03 02 03	15
2	July - Aug	UNIT-II :	Regular set and regular expression, Two way finite automata, finite automat with output, Applications of finite automata. Equivalence of RE and FA, Inter conversion, pumping lemma, closure property of regular sets, Regular grammars, Right linear and Left linear grammar, equivalence between Regular linear grammar and FA inter conversion between RE and RG	04 04 03 04	15
3	Aug sep	UNIT-III :	Context free grammar, derivation trees, Chomsky Normal Form, Greibach Normal Form. Push Down Automata: Definition, model, acceptance of CFL, equivalence of CFL and PDA , Interconversion, Enumeration of properties of CFL.	04 03 03 02 03	15
4	Sep oct	UNIT-IV :	Turing Machine: Definition, model, Design of turing machine, computable languages and function, Techniques of	04 04 03	15

			turing machine construction, Modifications of Turing machine, Church's Hypothesis.	04	
5	Oct	UNIT-V :	, Chomsky Hierarchy of languages, Linear bounded automata and context sensitive languages, Introduction of DCFL and DPDA, Decidability of problems.	04 03 03 02 03	15
6	nov	UNIT- VI :	. I: Undecidability : Properties of recursive & non recursive enumerable languages, universal turing machine, post correspondence problem, introduction to recursive function theory.	04 04 03 04	15

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4S : Artificial Intelligence and Expert Systems

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	Prolog Programming: Introduction to turbo prolog, introduction to language, structure of language, cut, fail, recursion, lists and complex structures, interactive programming, expert system in prolog.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Introduction: Definition of AI, AI technique, tic-tac-toe, pattern recognition, level of the model, criteria for success, problems and problem spaces, defining the problems, production systems, control strategies, heuristic search, problem characteristics, decomposition of problems, solution steps, predictability, absolute and relative solutions.	04 04 03 04	15
3	Feb mar	UNIT-III :	Basic problem solving methods, reasoning, problem trees and graphs, knowledge representation, matching indexing with variables, heuristic functions, weak methods, problem reduction, constraints satisfaction, means-ends analysis, analysis of search algorithms.	04 03 03 02 03	15
	mar				
5		UNIT-V :	Knowledge representation using predicate logic: representing simple facts in logic, augmenting the	04 03	15

			representation, structural representation of knowledge: some common knowledge structures, choosing the level of representation, finding the right structure as needed, declarative representation	03 02 03	
	april				
6		UNIT- VI :	. Natural Language Understanding: Concept of understanding, keyword matching, syntactic and semantic analysis, understanding, language generation and matching translation. General concepts of implementation of AI systems. Introduction to pattern recognition. Rule based systems, semantics of CFL, semantic network, frames, frame kit. Application, introduction to knowledge engineering, artificial neural network: introduction, learning: single and multilayer networks	04 04 03 04	15
	may				

4S : Design and Analysis of Algorithms

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	Introduction: algorithm, writing algorithms in SPARKS, structured program, analyzing algorithms, Divide and conquer: The general method, Binay Search, Finding minimum and maximum, merge sort, quick sort, selection sort, Strassen's matrix multiplication.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	. Greedy Method: The general method, Optimal storage on tapes, Knapsack problem, Job sequencing with deadlines, Optimal merge patterns, minimum spanning trees, Single source shortest path. Dynamic programming: General method, multistage graph, all pair shortest paths, Optimal binary search trees, 0/1 knapsack , Travelling salesperson problem, flow shop scheduling.	04 04 03 04	15
3	Feb mar	UNIT-III :	Basic Search and Traversal techniques: General method, code optimization, AND/OR graph, game trees, biconnected components and depth first search , Back tracking : General method, 8-queens problem, sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem.	04 03 03 02 03	15
4	mar	UNIT-IV :	Branch and bound: General method, 0/1 knapsack problem, Travelling salesperson, efficiency considerations, Algebraic simplification and transformations: General method,	04 04 03 04	15

			evaluation and interpolation, fast Fourier transform, modular arithmetic		
5	april	UNIT-V :	Lower bound theory: comparison trees for sorting and searching, Oracle and adversary arguments, techniques for algebraic problems, some lower bounds and parallel computation.	04 03 03 02 03	15
6	may	UNIT- VI :	NP-Hard and NP-Complete problems: basic concept, cook's theorem, NP-Hard graph problem, NP-Hard scheduling problem, NP-Hard code generation problem.	04 04 03 04	15

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Msc .-2nd Semester-4st

4S : Network Security

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. Introduction: Terminology, Notation, Networking Security Attacks, Layers And Cryptography, Authorization, Tempest, Keys, Viruses, Worms, Trojan Horses, Multilevel Model of Security, Legal Issues	04 03 03 02 03	15
2	Jan feb	UNIT-II :	. Cryptography: Introduction, Breaking an Encryption Scheme, Types of Cryptographic Function, Respective Algorithms, Standards and Modes of Operation, Hashes and Message Digests.	04 04 03 04	15
3	Feb mar	UNIT-III :	Authentication: Overview of Authentication System, Password-based Authentication, Address-based Authentication, Cryptographic Authentication Protocols, Keys, Trusted Intermediaries, Authentication of People, Security Handshake Pitfalls: Login Only, Mutual Authentication, Integrity / Encryption for Data, Mediated Authentication, Performance Considerations.	04 03 03 02 03	15
4	mar	UNIT-IV :	Standards: Kerberos V4: Tickets, Kerberos V5: ASN.1, Names,	04 04	15

			Delegation of Rights, Ticket Lifetimes, Key Versions, Optimizations. Cryptographic Algorithms, Kerberos V5 Messages, Real Time Communication Security: IPSec: AH & ESP: Overview of IPSEC, IP and IPV6, AH (Authentication Header), ESP (Encapsulating Security Payload)	03 04	
5	april	UNIT-V :	E-mail Security: Distribution Lists, Store and Forward, Security Services for E-Mail, Establishing Keys, Privacy, Authentication of Source, Message Integrity, Non Repudiation, Proof of Submission, Proof of Delivery, Message Flow Confidentiality, Anonymity, Containment. PEM and S/MIME, PGP	04 03 03 02 03	15
6	may	UNIT- VI :	Firewalls: Packet Filters, Application Level Gateways, Encrypted Tunnels, Comparisons. Security Systems: Netware V3, Netware V4, Microsoft Windows Security. Web Issues: URLs/URIs, HTTP, Cookies. Web Security Problems.	04 04 03 04	15

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Msc .-2nd Semester-4st

4S : Mobile Communications

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. Mobile Communication: Applications, History, Market, Simplified Reference Model. Frequencies, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular System.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	. Medium Access Control: Need, SDMA, FDMA, TDMA, CDMA, Comparison of S/T/F/CDMA. Telecommunica	04 04 03 04	15
3	Feb mar	UNIT-III :	., Satellite Systems: History, Applications, Basics, Routing, Localization, Handover, Examples. Broadcast Systems: Overview, Cyclical Repetition of Data, Digital Audio Broadcasting, Digital Video Broadcasting, C	04 03 03 02 03	15
4	mar	UNIT-IV :	Wireless LAN: Infrared Versus Radio Transmission, Infrastructure and Adhoc Network, IEEE 802.11, HIPERLAN, Bluetooth.	04 04 03 04	15

5		UNIT-V :	Layers: Mobile Network Layer: Mobile IP, DHCP, Mobile Adhoc Networks. Mobile Transport Layer: Traditional TCP, Classical TCP improvements, TCP over 2.5/3G Wireless Networks.	04 03 03 02 03	15
	april				
6		UNIT- VI :	. Support For Mobility: File Systems, World Wide Web, Wireless Application Protocol, i-Mode, SyncML, WAP2.0.	04 04 03 04	15
	may				

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4S : Digital Image Processing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. I : Introduction: Definition, Origins, Examples: X-ray Imaging, Ultraviolet Band, Visible and Infrared Bands, Microwave Band, and Radio Band Imaging; Fundamental Steps, Components of an Image Processing System Digital Image Fundamentals: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, A Simple Image Formation Model; Image Sampling and Quantization; Basic Relationships Between Pixels; Linear and Nonlinear Operations.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	: Image Enhancement in the Spatial Domain: Basic Gray Level Transformations; Histogram Processing - Histogram Equalization, Histogram Matching (Specification), Local Enhancement; Enhancement Using Arithmetic/Logic Operations; Basics of Spatial Filtering, Smoothing Spatial Filters: Smoothing Linear, Smoothing Order-Statistics Filters; Sharpening Spatial Filters : The Laplacian, The Gradient; Combining Spatial Enhancement Methods	04 04 03 04	15
3	Feb mar	UNIT-III :	Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain: OneDimensional Fourier Transform and its Inverse, TwoDimensional DFT and Its Inverse, Filtering in the Frequency Domain, Correspondence between Filtering in the	04 03 03 02 03	15

			Spatial and Frequency Domains; Smoothing and Frequency-Domain Filters - Ideal , Butterworth, and Gaussian Lowpass Filters; Sharpening Frequency Domain Filters - Ideal , Butterworth, and Gaussian Highpass Filters, Laplacian in the Frequency Domain, Unsharp Masking, High-Boost Filtering, and High-Frequency Emphasis Filtering; Homomorphic Filtering; Implementation: Additional Properties of the 2-D Fourier Transform, Inverse Fourier Transform Using a Forward Transform Algorithm, Need for Padding, Convolution and Correlation Theorems, The Fast Fourier Transform;		
4	mar	UNIT-IV :	Image Restoration: Model of the Image Degradation/ Restoration Process, Noise Models: Restoration in the Presence of Noise Only Spatial Filtering: Mean, Order-Statistics, and Adaptive Filters; Periodic Noise Reduction by Frequency Domain Filtering: Bandreject, Bandpass, and Notch Filtering; Estimating the Degradation Function - Estimation by Image Observation, Experimentation and Modeling; Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Geometric Mean Filter; Geometric Transformations: Spatial Transformations, Gray-Level Interpolation	04 04 03 04	15
5	april	UNIT-V :	Color Image Processing: Color Fundamentals, Color Models; Pseudocolor Image Processing; Full-Color Image Processing, Color Transformations: Formulation, Color Complements, Color Slicing, Tone and Color Corrections, Histogram Processing; Smoothing and Sharpening, Color Segmentation, Noise in Color Images. Morphological Image Processing: Preliminaries, Dilation and Erosion, Opening and Closing, The	04 03 03 02 03	15

			Hit-or-Miss Transformation, Some Basic Morphological Algorithms: Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening, Skeletons, Pruning; Extensions to Gray-Scale Images.		
6	may	UNIT- VI :	Image Segmentation: Detection of Discontinuities: Point, Line, Edge Detection; Edge Linking and Boundary Detection: Local Processing, Global Processing via the Hough Transform, Global Processing via Graph-Theoretic Techniques; Thresholding: Role of Illumination, Basic Global Thresholding, Basic Adaptive Thresholding, Optimal Global and Adaptive Thresholding, Use of Boundary Characteristics for Histogram Improvement and Local Thresholding, Thresholds Based on Several Variables; Region-Based Segmentation: Region Growing, Region Splitting and Merging	04 04 03 04	15

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4S : Software Testing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. Testing: Introduction and Outline - Introduction to testing and test outline, sample application, incremental testing approach, outline approach steps, evaluation and schedule estimation.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Introduction to test outline to test cases, creating test cases, documentation short cuts, introduction to using tables and spreadsheets, sample application, Documenting test cases.	04 04 03 04	15
3	Feb mar	UNIT-III :	Introduction to test outline to test cases, creating test cases, documentation short cuts, introduction to using tables and spreadsheets, sample application, Documenting test cases.	04 03 03 02 03	15
4	mar	UNIT-IV :	Testing Web Applications: Introduction, sample application, functional and usability issues, configuration and compatibility testing, reliability and availability, security	04 04 03 04	15

			testing, database testing, post implementation testing.		
5	april	UNIT-V :	Reducing the No. of test cases: Introduction, prioritization guidelines, priority category scheme, Risk analysis, interviewing to identify problem areas, combination schemes, tracking selected test cases.	04 03 03 02 03	15
6	may	UNIT- VI :	Creating Quality Software: Introduction, development environmental infrastructure, software testing environment, software testing tools, applying software standards to test documentation.	04 04 03 04	15

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Msc .-Ist Semester-Ist

1S : Digital Systems and Microprocessor

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Representation of integers and floating point nos., Boolean Algebra: laws, simplification of logic equations using Boolean laws, SOP and POS, standard forms of SOP and POS, Karnaugh Maps don't care conditions in K-map	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Design of Arithmetic circuits: Half Adder, half subtractor, full adder, full subtractor, parallel binary adder, subtraction using 1's and 2's compliment schemes, use of adder as subtractor, controlled parallel adder, ALU IC 74181.	04 04 03 04	15
3	Aug sep	UNIT-III :	Design of Arithmetic circuits: Half Adder, half subtractor, full adder, full subtractor, parallel binary adder, subtraction using 1's and 2's compliment schemes, use of adder as subtractor, controlled parallel adder, ALU IC 74181	04 03 03 02 03	15
4	Sep oct	UNIT-IV :	Flip Flops: construction and working of RS, JK, MS-JK, D and T Flip flops. Shift registers and Counters: Buffer register,	04 04 03	15

			controlled buffer register, shift registers: SISO, SIPO, PISO, PIPO, bidirectional shift register, ring counter, twisted ring counter, applications of shift registers; Counters: asynchronous counter designs, synchronous counter, UP/DOWN counters, lock out in counters	04	
5	oct	UNIT-V :	Overview of microcomputer system, evolution of microprocessors, architecture of 8086 microprocessor, pin diagram, signal description, register organisation, concept of pipelining, memory segmentation, memory address generation, modes of operation of 8086 (minimum and maximum).	04 03 03 02 03	15
6	nov	UNIT- VI :	. Stack structure, interrupts in 8086 microprocessor, interrupt responses, Interrupt Vector Table, H/W and S/W interrupt processing; Interfacing: absolute and linear decoding, I/O mapped I/O and Memory Mapped I/O, memory interfacing (Even and Odd Banks), interfacing of keyboards, interfacing of displays, interfacing if ADC and DAC, address mapping.	04 04 03 04	15

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Department of Computer Science

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Msc .-Ist Semester-Ist

1S : Net Technologies and C#

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Understanding .net: The C# environment: origins of .net technology, .net framework, the common language runtime, framework base classes, user and program interfaces, visual studio .net, .net languages, benefits, c# and .net	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Overview of C#: namespaces, comments, aliases for namespaces, command-line arguments, program structure; Literals, variables and data types, operators, expressions, Decision making and branching, looping, methods in c#, Array handling, string manipulation, structures and enumerations	04 04 03 04	15
3	Aug sep	UNIT-III :	Classes and objects: Principle of OOP, Access modifiers, constructors, destructors, Nesting of classes; Inheritance and Polymorphism: multilevel inheritance, hierarchical inheritance, overriding, hiding methods, abstract methods and classes, sealed classes and methods; Interfaces: defining, extending and implementing interfaces, interfaces and inheritance, explicit interface implementation, abstract class and interfaces.	04 03 03 02 03	15

4	Sep oct	UNIT-IV :	Operator overloading: unary, binary, comparison, Delegates and events; Console I/O operations: console class, console inputoutput, formatted output. Errors and Exceptions: types of errors, exceptions, exception handling codes, multiple catch statements, exception hierarchy, catch handler, finally statement, nested try blocks.	04 04 03 04	15
5	oct	UNIT-V :	Multithreading in c#: Introduction, System. Threading namespace, scheduling, synchronizing threads, thread pooling. File Manipulation: Managing File System, Moving, copying, deleting files, Reading, writing to files, Reading Drive information, File Security	04 03 03 02 03	15
6	nov	UNIT- VI :	. Data Access with .Net: ADO.net overview, Database connections, commands, the Data Reader, the DataSet class, populating a DataSet, persisting a DataSet.	04 04 03 04	15

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2018-19****Msc .-Ist Semester-Ist****1S : Operating System**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Services, Types, User-O.S. Interface: Command Interpreter, Graphical User Interface; System Calls; System Programs; Operating System Structure: Simple, Layered Approach; Micro-kernels, Modules; Virtual Machine; System	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Process Management: Process Concept, Process States, Process Control Block, Process Scheduling: Schedulers, Context Switch; Operations on Process: Creation, Termination, Inter Process Communication; Threads: Concept, Benefits; CPU Scheduling: Burst Cycle, Types of Scheduling, Scheduler, Dispatcher, Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, Priority Scheduling, Round-Robin, [multiple processor	04 04 03 04	15
3	Aug sep	UNIT-III :	Process Synchronization and Deadlocks: Critical Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors. Deadlock: System Model, Deadlock Characterization, Resource Allocation Graph, Methods for handling Deadlock: Prevention, Avoidance and Detection; Recovery from Deadlock: Process Termination	04 03 03 02 03	15
4	Sep	UNIT-IV :	Memory Management: [Basic Hardware, Address Binding];	04	15

	oct		Logical and Physical Address Space, Swapping, Contiguous Allocation, Dynamic Storage Allocation: First-fit, Best-Fit, Worst-fit; Fragmentation; Paging; Segmentation. Virtual Memory: Introduction, Virtual Address Space, Demand Paging, Copy-on-write, Page Replacement: Concept, Page Replacement Algorithms: FIFO, Optimal Page Replacement, LRU, Second-Chance Page Replacement; Thrashing, I/O Interlock.	04 03 04	
5	oct	UNIT-V :	File System: File: Concept, Attributes, Operations; File Organization and Access: Sequential, Index Sequential, Indexed, Direct or Hash File. Directory: Operations, Structures. Protection: Access Control and Permissions. File System Structure, Allocation Methods, Free Space Management. Disk Structure, Disk Scheduling Algorithms: FCFS, SSTF, SCAN, C-SCAN, LOOK. [Disk Management, Swap Space Management], RAID: Concept. I/O Systems: I/O Hardware, Interrupts, DMA, Application I/O Interface, Kernel I/O	04 03 03 02 03	15
6	nov	UNIT- VI :	.. : Distributed File System: Concept, Naming and Transparency, Remote File Access, Stateful Vs Stateless Service, File Replication, Remote Login, Remote File Transfer, Data Migration, Computation Migration, Process Migration. Embedded Operating Systems: Embedded Systems: Definition, Requirements and Constraints, Organization of Embedded System; Characteristics of Embedded Operating Systems.	04 04 03 04	15

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2018-19****Msc .-Ist Semester-Ist****1S : Computer Networks**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Digital Communication: Advantages; Data Transmission: Modes: Parallel, Serial: Asynchronous, Synchronous, Isochronous; Transmission Media: Guided and unguided; Modulation: Amplitude, Phase Shift, Frequency, QAM; Multiplexing: FDM, WDM, TDM, STDM, CDM; Switching: Circuit, Message, Packet; Delays in Packet Switched Network, Packet Loss; Network Reference Models: OSI: Layered Architecture and Services, TCP/IP: Layered Architecture and Services	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Application Layer: Principles of Application Layer Protocols; Processes: Client-Server Model, Socket Interface; Services required by Application Layer; HTTP: Introduction, RTT, HTTP Handshake, types of HTTP Connections, HTTP Messages, Authentication and Cookies; FTP: Service Model, FTP Commands; Electronic Mail; SMTP; DNS: Services and	04 04 03 04	15
3	Aug sep	UNIT-III :	Transport Layer: Transport-Layer Services and Principles; Multiplexing and Demultiplexing Applications; Connectionless Transport – UDP; Principles of Reliable of Data Transfer (RDT); Stop-and-wait and Pipelined protocols; GBN protocol; Connection-Oriented Transport: TCP; Flow Control; Principles of Congestion Control; Approaches	04 03 03 02 03	15

			towards Congestion Control; TCP Congestion Control		
4	Sep oct	UNIT-IV :	Network Layer: Introduction; Network Service Model: Datagram, Virtual Circuit; Routing Principles; Routing Algorithms: Classifications; Hierarchical Routing; Internet Protocol: IP Addressing, IPv4: Classes and Packet format, DHCP; ICMP; Routing in the Internet: RIP, OSPF, BGP; Router; IPv6; Multicast Routing	04 04 03 04	15
5	oct	UNIT-V :	Data Link Layer: Introduction; Services; Error Detection and Correction; Multiple Access Protocols and LANs; LAN Addresses and ARP; Ethernet; Hubs, Bridges and Switches; Wireless LANs: IEEE 802.11; The Point-to-Point Protocol; ATM, X.25 and Frame Relay	04 03 03 02 03	15
6	nov	UNIT- VI :	. Network Security and Management: Secured Communication: Threats and Characteristics; Cryptography: Principles of Cryptography, Symmetric Key Cryptography, Public Key Cryptography; Privacy, Authentication, Integrity, Nonrepudiation; Digital Signature; Key Distribution and Certification. Areas of Network Management; Network Management Architecture; Internet Network Management Framework; SMI, MIB, SNMP.	04 04 03 04	15

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2018-19****Msc .-Ist Semester-2st****2S : Java Programming**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	Introduction to java, Java development tools, Java and WWW, Java applications, java building elements: Identifiers, Keywords, variables, constants, operators. Data types and type casting and type conversion. Control Structures: Simple if, If..else, switch statement, Loop structure : For , Do..while, while , loop control using break and continue	04 03 03 02 03	15
2	jan - feb	UNIT-II :	Objects and classes: class variable, instance variable, class methods, Access specifier, access modifiers. Methods: main method, creating methods, calling methods, overloading methods, abstraction, recursion. Object: Initialization of object using constructors, parameterized constructor, Dynamic Memory allocation, Garbage collection. Passing objects to methods.	04 04 03 04	15
3	feb mar	UNIT-III :	Packages: creating and importing packages, Arrays : Declaration, initialization, sorting searching, array of objects. String: String class, StringBuffer, StringTokenizer. Command line arguments. Inheritance: super class, subclass , super keyword, this keyword, final modifier, abstract class, Method overriding. Interface: implementing interfaces.	04 03 03 02 03	15
4	mar	UNIT-IV :	Applet: Life cycle of an applet, APPLET tag, passing arguments to an applet, paint, repaint, update methods.	04 04	15

	mar april		Graphics class, AWT class hierarchy, Frames, Layout managers, components, containers. Color class, Font class	03 04	
5	april	UNIT-V :	Exception Handling : Error and Exception class, Error handling routine, try , catch , throw, throws, finally, uncaught exceptions, built-in exception, nested try-catch, user defined exception. Thread: Thread class, Runnable interface, states, priority and synchronization. Java I/O classes, File handling.	04 03 03 02 03	15
6	may	UNIT- VI :	. : User Interface: Button, Label, TextField, TeatArea, Choice, List, CheckBox, CheckBox Group, Dialog Boxes, Menu Multiple Windows, Event handling: Event Delegation model, Adapter classes, Event classes, Event Listener Interfaces, Handling Mouse and Keyboard events.	04 04 03 04	15

2S : Data Structures

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	Introduction, Types of Data Structures, Linear & Nonlinear data structures, Arrays: Arrays as ADT, 1D, 2D, Multidimensional Arrays, Memory Representation and Applications. Linked List : Concept , Operations : Insert, Delete, Traversal, Static implementation using arrays, Dynamic implementation , Doubly Linked list, Circular list, Linked list applications : Merging of two linked lists.	04 03 03 02 03	15
2	jan - feb	UNIT-II :	Stacks: Introduction, Push and Pop operations, Stack implementation using array, Stack applications, Infix to Postfix conversion of expression, Expression evaluation, Recursion. Queues: Introduction, Insert and Delete operations, Queue implementation using array, Types – Priority Queue, Circular queue, Dequeue, Queue applications: CPU Scheduling Algorithms FCFS , Round Robin algorithm, Stacks and Queues as Linked Lists	04 04 03 04	15
3	feb mar	UNIT-III :	Trees: Terminology and Concepts , Binary Tree Representation, Static implementation using arrays , Linked representation, Binary Search Tree, Operations on Binary search tree - Insert, Delete, Tree Traversals, Representing, Threaded binary trees, Height-balanced trees, AVL Rotations. Searching: Sequential binary tree searches. Unit IV : Searching and Sorti	04 03 03 02 03	15

4	mar mar april	UNIT-IV :	Searching and Sorting :Searching, Concept and need, Techniques, Linear search, Binary search, Indexed sequential search, Sorting, Concept and Need, Performance criteria, Bubble sort, Insertion Sort, Selection Sort, Shell Sort, Quick Sort, Heap Sort, Merge Sor	04 04 03 04	15
5	april	UNIT-V :	Graphs :Terminology and concepts, Graph Representation: Adjacency matrix, Adjacency list, Adjacency multi-list, Traversals: Depth first and Breadth first. Minimum spanning tree, shortest path algorithm, topological ordering, sparse matrices, linked list implementation of graph and graph traversal.	04 03 03 02 03	15
6	may	UNIT- VI :	Indexing: B-tree indexing, Multilevel indexing, B+ tree, Hashing, Collision processing, Bucket hashing, Dynamic hashing, Linear hashing, Extendible hashing, Tries.	04 04 03 04	15

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Department of Computer Science

Teaching Plan Session-2018-19

Msc .-Ist Semester-2st

2S : Software Engineering

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. System Concept: Definition, Characteristics of System, Elements of System; Types of System: Physical or Abstract Systems, Open or Closed Systems, Man-made Information Systems; Subsystem. System Analyst: Role; Skills: Interpersonal, Technical; Information Gathering Tools (Fact Finding Techniques); Feasibility Study. Introduction to Software Engineering: Definition and Characteristics of Software; Software Application Domains; Software Engineering: Definition, Layered Model.	04 03 03 02 03	15
2	jan - feb	UNIT-II :	Software Process Framework; Umbrella Activities. Process Models: SDLC (Waterfall); Incremental; Evolutionary Models: RAD, Prototyping, Spiral; Concurrent Development Model; Components based Development Model. Agility: Agile Process: Assumptions, Agility Principles, Human Factors. Software Engineering Practice: Essence of Practice, Core Principles, Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles.	04 04 03 04	15
3	feb mar	UNIT-III :	Requirements Engineering: Requirements Engineering Tasks: Inception, Elicitation, Elaboration, Negotiation, Specification, Validation. Requirements Management; Steps in Requirements Engineering. Requirements Analysis:	04 03 03 02	15

			Objectives; Requirements Modeling Approaches: Scenario-Based Modeling: Use-Case; Class Models: E-R Diagram, Class Diagrams; Flow Oriented Modeling: DFD, CFD; Behavioral Models: State Diagram, Sequence Diagrams	03	
4	mar mar april	UNIT-IV :	Software Design: Design Process and Quality; Design Concepts: Abstraction, Architecture, Modularity, Information Hiding, Functional Independence, Refinement. Component Level Design: Component-Definition; Object-oriented View, Traditional View, Cohesion, Coupling. Designing Traditional Components: Graphical Design – Notations (Flow Chart), Tabular Design – Notations (Decision Table), Program Design Language (Structured English or Pseudo-code). User Interface Design: Rules; Interface Design Models; Interface Analysis.	04 04 03 04	15
5	april	UNIT-V :	Software Quality: Definition; Garvin’s Quality Dimensions; McCall’s Quality Factors; ISO 9126 Quality Factors. Software Quality Assurance: Elements, Goals, ISO 9001-2000 Quality Standards. Software Metrics: Attributes, Metrics for Requirements Model: Function-based Model (FP). Metrics for Specification Quality, Metrics for Design Model: Architectural Design Metrics. Metrics for Object-Oriented Design, UserInterface Design Metrics, Metrics for Source Code, Metrics for Testing, Metrics for Maintenance.	04 03 03 02 03	15
6	may	UNIT- VI :	Software Testing: Need, Verification and Validation, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging, Test Characteristics. White Box Testing: Flow Graph Notations, Test Cases, Control Structure Testing. Black Box Testing: Graph-based Testing Methods,	04 04 03 04	15

			Equivalence Partitioning, Boundary Value Analysis, Orthogonal Array Testing.		

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2018-19****Msc .-Ist Semester-2st****2S : Discrete Mathematical Structures**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. Mathematical logic: Introduction, statements and notations, connectives – negation, conjunction, disjunction, Statement formulas and truth tables, conditional, bi-conditional, well formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal and principal normal forms, completely parenthesized infix and polish notations, Theory of inference for statement calculus – validity using truth table, rules of inference, consistency of premises and indirect method of proof.	04 03 03 02 03	15
2	jan - feb	UNIT-II :	Set theory: Basic concepts of set theory, representation of discrete structures, relations and ordering: relations, properties of binary relations in a set, relation matrix and graph of a relation, partition and covering of a set, equivalence relation, compatibility relations, composition of binary relations, Functions – composition of functions, Inverse function.	04 04 03 04	15
3	feb mar	UNIT-III :	Algebraic Structures: Algebraic systems: Examples and general properties, Semigroups and monoids, Grammar and Languages, Polish expressions and their compilation, Groups- Definition and examples, subgroups and	04 03 03 02	15

			homomorphism, cosets and Lagrange's theorem, Group codes – the communication model and basic notions, generation of codes by using parity checks, error recovery in group codes	03	
4	mar mar april	UNIT-IV :	Lattices and Boolean algebra: Lattice as POSETs, definition, examples and properties, Lattice as algebraic systems, sublattices, Direct product and homomorphism, Special lattices, Boolean algebra - definition and examples, subalgebra, Direct product and homomorphism, Boolean functions, representation and minimization of Boolean Finite state machines	04 04 03 04	15
5	april	UNIT-V :	Graph theory: Basic concepts of graph theory – definitions, paths, reachability and connectedness, matrix representation, Storage representation and manipulation of graphs- trees, representation and operations, list structures and graphs, Simple precedence grammars-syntax terminology, a view of parsing, notion and use of precedence relations, formal definiti	04 03 03 02 03	15
6	may	UNIT- VI :	Fault detection in combinational switching circuits – Faults in combinational circuits, Notions of Fault detection, Algorithm for generating a fault matrix, procedure for detection of faults; Introduction to computability theory: Finitestate acceptors and regular grammars, Turing machines and	04 04 03 04	15

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Msc .-Ist Semester-2st

2S : : Compiler Construction

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. Introduction to Compilers: Overview, typical compiler Structure, implementation. Programming Language Grammars: Elements of formal language grammars, derivation, reduction, syntax tree, ambiguity, regular grammars and expressions.	04 03 03 02 03	15
2	jan - feb	UNIT-II :	Scanning and Parsing Techniques: The scanner, top-down and bottom-up parsing, syntax directed translation, Symbol table organization, Hash table organization, Linked List and Tree structured symbol tables, symbol table organization for structures and records.	04 04 03 04	15
3	feb mar	UNIT-III :	Memory Allocation: Static and dynamic memory allocation, array allocation and access, allocation for strings, structure allocation, common and equivalence allocation. Compilation of expressions.	04 03 03 02 03	15
	mar mar				

	april				
5		UNIT-V :	Error detection, indication and recovery. Compilation of I/O statements: Compilation of I/O list, compilation of FORMAT list, the I/O routine, file control.	04 03 03 02 03	15
	april				
6		UNIT- VI :	Code optimization: Major issues, optimizing transformations, local optimizations, program flow analysis, Global optimization, writing compilers.	04 04 03 04	15
	may				

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Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana
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Msc .-2nd Semester-3st

3S : Data Mining and Data Warehousing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Introduction, Data Mining Functionalities, Data	04	15
			Preprocessing: Data Cleaning, Data Integration and	03	
			Transformation, Data Reduction, Data Discretization and	03	
			Concept Hierarchy Generation.	02	
				03	
2	July - Aug	UNIT-II :	Data Warehouse and OLAP Technology: Overview, A	04	15
			Multidimensional Data Model, Data Warehouse	04	
			Architecture, Data Warehouse Implementation, From Data	03	
			Warehousing to Data Mining. Data Cube Computation and	04	
			Data Generalization: Efficient Methods for Data Cube		
Computation, Data Generalization and Concept Description.					
3	Aug sep	UNIT-III :	Mining Frequent Patterns, Associations, and Correlations:	04	15
			Basic Concepts, Efficient and Scalable Frequent Itemset	03	
			Mining Methods, Mining Various Kinds of Association Rules,	03	
			From Association Mining to Correlation Analysis, Constraint-	02	
			Based Association Mining.	03	

4	sep	UNIT-IV :	Classification and Prediction: Issues, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation. Prediction: Linear Regression, Nonlinear Regression, Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor.	04 04 03 04	15
5	oct	UNIT-V :	Cluster Analysis: Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data. Mining Time-Series Data, Mining Sequence Patterns in Biological Data	04 03 03 02 03	15
6	nov	UNIT- VI :	: Graph Mining, Social Network Analysis and Multirelational Data Mining. Mining Object, Spatial, Multimedia, Text, and Web Data, Data Mining Applications, Trends in Data Mining	04 04 03 04	15

3S : Computer Graphics

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	. Geometry and line generation: Introduction, points and lines, planes and coordinates, Line segments, perpendicular line segments, vectors, pixels and frame buffers, vector generation, character generation, displaying the frame buffer. Graphics primitive: Introduction, display devices, primitive operations, the Display-File Interpreter, normalized device coordinates, Display-file structure, Display control, Text line style primitives.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. : Polygon: Introduction, Polygon , Polygon representation, Entering polygon, An inside test, filling polygon, Antialiasing. Transformations: Introduction, matrices, scaling transformations, sin and cos, sum of angles, identifiers, rotation, homogeneous coordinates and translation, rotation about an arbitrary point, other transformations, display procedures	04 04 03 04	15
3	Aug sep	UNIT-III :	Segments: Introduction, the segment table, segment creation, closing a segment, deleting a segment, renaming a segment, visibility, image transformations, saving and showing segments, other display file structures, some raster techniques, Windowing and clipping: Introduction, viewing transformation, implementation, clipping, clipping the polygon, adding clipping to the system, a voiding division,	04 03 03 02 03	15

			generalized clipping, position relative to an arbitrary line, multiple windowing,		
4	sep	UNIT-IV :	Interaction : Introduction, hardware, input devices, handling algorithm, event handling, sample devices, the detectability attributes, simulating a locator with a pick and pick with a locator, Echoing, Interactive techniques. Three dimension: Introduction, 3D Geometry, primitives and transformations, rotation about an arbitrary axis, parallel projection, perspective projection, viewing parameters, conversion to view plane coordinates, The 3D viewing transformation, , special projection.	04 04 03 04	15
5	oct	UNIT-V :	Hidden surfaces and lines: Introduction, back face removal, the painter algorithm, collection of polygons, remembering the style, the hidden surface check, decomposition into triangles, comparing two triangles, The minima test, Overlapping edges, containment of points, finding a point in the triangle plane, comparing of the entire triangle, establishing depth order, geometrical sorting, linked list, sorting the triangles.	04 03 03 02 03	15
6	nov	UNIT- VI :	Shading: Introduction, diffusion, illumination, point source illumination, specular reflection, transparency and shadows. Curves: Introduction, curve generation, implementation, interpolating polygons, E-splines, B-Splines and Curves.	04 04 03 04	15

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Msc .-2nd Semester-3st

3S : Client-Server Computing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Networking in Java: Basics, Socket overview, Client-Server concepts, Proxy servers, Internet addressing, Java Networking classes and interfaces, InetAddress, TCP/IP Client Sockets, URL Connection, TCP/IP Server sockets, Creating TCP client server	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Java Database Connectivity: JDBC concepts, JDBC API, DriverManager, Connection, Statement and ResultSet classes with relevant methods. Prepared and Callable statements, Handling queries, inserts, deletes and updates to database. Displaying query results	04 04 03 04	15
3	Aug sep	UNIT-III :	Servlets: Structure and lifecycle of Servlets, Servlet API: basics, Various classes & interfaces. Servlet requirements, writing. Running and debugging of Servlets, Concepts of Cookies, State and session management with Servlet API. Server side includes and request forwarding. Servlet chaining. Jdbc Servlets.	04 03 03 02 03	15
4	sep	UNIT-IV :	JavaScript Overview, Variables, Operators, Data Types, Control Statements, Functions and Objects, The Window	04 04	15

			Object: Dialog Boxes, Status Bar Messages, Window Manipulations; The Document Object: Writing to Documents, Dynamic Documents, The Form Object: Working With Form Elements and Their Properties The String and RegExp Objects, Dates and Math ies The String and RegExp Objects, Dates and Math o	03 04	
5	oct	UNIT-V :	Remote Method Invocation (RMI): Object serialization in Java, Concept of remote object, Architecture of RMI application, Java RMI package, classes & Interfaces, Client-Server application using RMI, RMI Servlets, RMI-JDBC Servlets.	04 03 03 02 03	15
6	nov	UNIT- VI :	. Introduction to JSP; Simple JSP concepts, Request-time expressions. Advanced JSPs: Scripts. conditionals, loops, Try/Catch. Concept of Beans, Properties, Bean instances & serialization; Bean Scopes, Writing Beans, Introspection, Beans & Scriplets..	04 04 03 04	15

3S : Distributed Operating System

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Introduction to distributed systems: goals of distributed system, hardware and software concepts, design issues. Communication in distributed systems: Layered protocols, ATM networks, the client-server model, remote procedure call and group communication.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Synchronization in distributed systems: Clock Synchronization, mutual exclusion, Election Algorithms, the Bully algorithm, a ring algorithm, atomic transactions, dead lock in distributed systems, distributed dead lock prevention, and distributed dead ock detection.	04 04 03 04	15
3	Aug sep	UNIT-III :	Processes and processors in distributed systems: Threads, system, models, processor allocation, scheduling in distributed system, fault tolerance and real time distributed systems.	04 03 03 02 03	15
4	sep	UNIT-IV :	Distributed file systems: Distributed file systems design, distributed file system implementation, trends in distributed file systems. Distributed shared memory: What is shared	04 04 03 04	15

			memory, consistency models, page based distributed shared memory, shared variable, distributed shared memory, object based DSM.		
5	oct	UNIT-V :	Case Study : AMOEBA : Introduction to AMOEBA, objects and capabilities in AMOEBA, Process Management in AMOEBA, Memory Management in AMOEBA, Communication in AMOEBA. The AMOEBA servers : The Bullet Server - Interface and Implementation, The Directory Server – Interface and Implementation, The Replication Server, The Run Server, The Boot Server, The TCP/IP Server, Other Servers	04 03 03 02 03	15
6	nov	UNIT- VI :	Case study MACH: Introduction to MACH, Process management, in MACH, Memory management in MACH, communication in MACH, UNIX emulation in MACH. Case study DCE: Introduction to DCE threads, RPC's, Time service, directory service, security service, distributed file system.	04 04 03 04	15

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Msc .-2nd Semester-3st

3S : Theory of Computation

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Strings, alphabets and languages, Graphs and trees, Inductive proofs, set notations, relations, Finite automata and regular Expression: Finite state system, Non deterministic finite automata, Finite automata with ϵ -moves. Deterministic finite automata, equivalence between NFA and DFA, Conversion of NFA to DFA	04 03 03 02 03	15
2	July - Aug	UNIT-II :	Regular set and regular expression, Two way finite automata, finite automat with output, Applications of finite automata. Equivalence of RE and FA, Inter conversion, pumping lemma, closure property of regular sets, Regular grammars, Right linear and Left linear grammar, equivalence between Regular linear grammar and FA inter conversion between RE and RG	04 04 03 04	15
3	Aug sep	UNIT-III :	Context free grammar, derivation trees, Chomsky Normal Form, Greibach Normal Form. Push Down Automata: Definition, model, acceptance of CFL, equivalence of CFL and PDA , Interconversion, Enumeration of properties of CFL.	04 03 03 02 03	15
4	sep	UNIT-IV :	Turing Machine: Definition, model, Design of turing	04 04	15

			machine, computable languages and function, Techniques of turing machine construction, Modifications of Turing machine, Church's Hypothesis.	03 04	
5	oct	UNIT-V :	, Chomsky Hierarchy of languages, Linear bounded automata and context sensitive languages, Introduction of DCFL and DPDA, Decidability of problems.	04 03 03 02 03	15
6	nov	UNIT- VI :	. I: Undecidability : Properties of recursive & non recursive enumerable languages, universal turing machine, post correspondence problem, introduction to recursive function theory.	04 04 03 04	15

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Msc .-2nd Semester-4st

4S : Artificial Intelligence and Expert Systems

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	Prolog Programming: Introduction to turbo prolog, introduction to language, structure of language, cut, fail, recursion, lists and complex structures, interactive programming, expert system in prolog.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Introduction: Definition of AI, AI technique, tic-tac-toe, pattern recognition, level of the model, criteria for success, problems and problem spaces, defining the problems, production systems, control strategies, heuristic search, problem characteristics, decomposition of problems, solution steps, predictability, absolute and relative solutions.	04 04 03 04	15
3	Feb mar	UNIT-III :	Basic problem solving methods, reasoning, problem trees and graphs, knowledge representation, matching indexing with variables, heuristic functions, weak methods, problem reduction, constraints satisfaction, means-ends analysis, analysis of search algorithms.	04 03 03 02 03	15
4	Mar april	UNIT-IV :	Game Playing: Minimax search procedure, adding alphabeta cutoffs, additional refinements, waiting for quiescence, secondary search, using book moves limitations.	04 04 03 04	15

5	April	UNIT-V :	Knowledge representation using predicate logic: representing simple facts in logic, augmenting the representation, structural representation of knowledge: some common knowledge structures, choosing the level of representation, finding the right structure as needed, declarative representation	04 03 03 02 03	15
6	may	UNIT- VI :	. Natural Language Understanding: Concept of understanding, keyword matching, syntactic and semantic analysis, understanding, language generation and matching translation. General concepts of implementation of AI systems. Introduction to pattern recognition. Rule based systems, semantics of CFL, semantic network, frames, frame kit. Application, introduction to knowledge engineering, artificial neural network: introduction, learning: single and multilayer networks	04 04 03 04	15

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2018-19****Msc .-2nd Semester-4st****4S : Design and Analysis of Algorithms**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	Introduction: algorithm, writing algorithms in SPARKS, structured program, analyzing algorithms, Divide and conquer: The general method, Binay Search, Finding minimum and maximum, merge sort, quick sort, selection sort, Strassen's matrix multiplication.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	. Greedy Method: The general method, Optimal storage on tapes, Knapsack problem, Job sequencing with deadlines, Optimal merge patterns, minimum spanning trees, Single source shortest path. Dynamic programming: General method, multistage graph, all pair shortest paths, Optimal binary search trees, 0/1 knapsack , Travelling salesperson problem, flow shop scheduling.	04 04 03 04	15
3	Feb mar	UNIT-III :	Basic Search and Traversal techniques: General method, code optimization, AND/OR graph, game trees, biconnected components and depth first search , Back tracking : General method, 8-queens problem, sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem.	04 03 03 02 03	15
4	Mar april	UNIT-IV :	Branch and bound: General method, 0/1 knapsack problem, Travelling salesperson, efficiency considerations, Algebraic simplification and transformations: General method,	04 04 03 04	15

			evaluation and interpolation, fast Fourier transform, modular arithmetic		
5	April	UNIT-V :	Lower bound theory: comparison trees for sorting and searching, Oracle and adversary arguments, techniques for algebraic problems, some lower bounds and parallel computation.	04 03 03 02 03	15
6	may	UNIT- VI :	NP-Hard and NP-Complete problems: basic concept, cook's theorem, NP-Hard graph problem, NP-Hard scheduling problem, NP-Hard code generation problem.	04 04 03 04	15

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Msc .-2nd Semester-4st

4S : Network Security

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. Introduction: Terminology, Notation, Networking Security Attacks, Layers And Cryptography, Authorization, Tempest, Keys, Viruses, Worms, Trojan Horses, Multilevel Model of Security, Legal Issues	04 03 03 02 03	15
2	Jan feb	UNIT-II :	. Cryptography: Introduction, Breaking an Encryption Scheme, Types of Cryptographic Function, Respective Algorithms, Standards and Modes of Operation, Hashes and Message Digests.	04 04 03 04	15
3	Feb mar	UNIT-III :	Authentication: Overview of Authentication System, Password-based Authentication, Address-based Authentication, Cryptographic Authentication Protocols, Keys, Trusted Intermediaries, Authentication of People, Security Handshake Pitfalls: Login Only, Mutual Authentication, Integrity / Encryption for Data, Mediated Authentication, Performance Considerations.	04 03 03 02 03	15
4	Mar	UNIT-IV :	Standards: Kerberos V4: Tickets, Kerberos V5: ASN.1, Names,	04 04	15

	april		Delegation of Rights, Ticket Lifetimes, Key Versions, Optimizations. Cryptographic Algorithms, Kerberos V5 Messages, Real Time Communication Security: IPSec: AH & ESP: Overview of IPSEC, IP and IPV6, AH (Authentication Header), ESP (Encapsulating Security Payload)	03 04	
5	April	UNIT-V :	E-mail Security: Distribution Lists, Store and Forward, Security Services for E-Mail, Establishing Keys, Privacy, Authentication of Source, Message Integrity, Non Repudiation, Proof of Submission, Proof of Delivery, Message Flow Confidentiality, Anonymity, Containment. PEM and S/MIME, PGP	04 03 03 02 03	15
6	may	UNIT- VI :	Firewalls: Packet Filters, Application Level Gateways, Encrypted Tunnels, Comparisons. Security Systems: Netware V3, Netware V4, Microsoft Windows Security. Web Issues: URLs/URIs, HTTP, Cookies. Web Security Problems.	04 04 03 04	15

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Department of Computer Science

Teaching Plan Session-2018-19

Msc .-2nd Semester-4st

4S : Mobile Communications

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. Mobile Communication: Applications, History, Market, Simplified Reference Model. Frequencies, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular System.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	. Medium Access Control: Need, SDMA, FDMA, TDMA, CDMA, Comparison of S/T/F/CDMA. Telecommunica	04 04 03 04	15
3	Feb mar	UNIT-III :	., Satellite Systems: History, Applications, Basics, Routing, Localization, Handover, Examples. Broadcast Systems: Overview, Cyclical Repetition of Data, Digital Audio Broadcasting, Digital Video Broadcasting, C	04 03 03 02 03	15
	Mar april				

5		UNIT-V :	Layers: Mobile Network Layer: Mobile IP, DHCP, Mobile Adhoc Networks. Mobile Transport Layer: Traditional TCP, Classical TCP improvements, TCP over 2.5/3G Wireless Networks.	04 03 03 02 03	15
	April				
6		UNIT- VI :	. Support For Mobility: File Systems, World Wide Web, Wireless Application Protocol, i-Mode, SyncML, WAP2.0.	04 04 03 04	15
	may				

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Msc .-2nd Semester-4st

4S : Digital Image Processing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. I : Introduction: Definition, Origins, Examples: X-ray Imaging, Ultraviolet Band, Visible and Infrared Bands, Microwave Band, and Radio Band Imaging; Fundamental Steps, Components of an Image Processing System Digital Image Fundamentals: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, A Simple Image Formation Model; Image Sampling and Quantization; Basic Relationships Between Pixels; Linear and Nonlinear Operations.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	: Image Enhancement in the Spatial Domain: Basic Gray Level Transformations; Histogram Processing - Histogram Equalization, Histogram Matching (Specification), Local Enhancement; Enhancement Using Arithmetic/Logic Operations; Basics of Spatial Filtering, Smoothing Spatial Filters: Smoothing Linear, Smoothing Order-Statistics Filters; Sharpening Spatial Filters : The Laplacian, The Gradient; Combining Spatial Enhancement Methods	04 04 03 04	15
3	Feb mar	UNIT-III :	Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain: OneDimensional Fourier Transform and its Inverse, TwoDimensional DFT and Its Inverse, Filtering in the Frequency Domain, Correspondence between Filtering in the	04 03 03 02 03	15

			Spatial and Frequency Domains; Smoothing and Frequency-Domain Filters - Ideal , Butterworth, and Gaussian Lowpass Filters; Sharpening Frequency Domain Filters - Ideal , Butterworth, and Gaussian Highpass Filters, Laplacian in the Frequency Domain, Unsharp Masking, High-Boost Filtering, and High-Frequency Emphasis Filtering; Homomorphic Filtering; Implementation: Additional Properties of the 2-D Fourier Transform, Inverse Fourier Transform Using a Forward Transform Algorithm, Need for Padding, Convolution and Correlation Theorems, The Fast Fourier Transform;		
4	Mar april	UNIT-IV :	Image Restoration: Model of the Image Degradation/ Restoration Process, Noise Models: Restoration in the Presence of Noise Only Spatial Filtering: Mean, Order-Statistics, and Adaptive Filters; Periodic Noise Reduction by Frequency Domain Filtering: Bandreject, Bandpass, and Notch Filtering; Estimating the Degradation Function - Estimation by Image Observation, Experimentation and Modeling; Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Geometric Mean Filter; Geometric Transformations: Spatial Transformations, Gray-Level Interpolation	04 04 03 04	15
5	April	UNIT-V :	Color Image Processing: Color Fundamentals, Color Models; Pseudocolor Image Processing; Full-Color Image Processing, Color Transformations: Formulation, Color Complements, Color Slicing, Tone and Color Corrections, Histogram Processing; Smoothing and Sharpening, Color Segmentation, Noise in Color Images. Morphological Image Processing: Preliminaries, Dilation and Erosion, Opening and Closing, The	04 03 03 02 03	15

			Hit-or-Miss Transformation, Some Basic Morphological Algorithms: Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening, Skeletons, Pruning; Extensions to Gray-Scale Images.		
6	may	UNIT- VI :	Image Segmentation: Detection of Discontinuities: Point, Line, Edge Detection; Edge Linking and Boundary Detection: Local Processing, Global Processing via the Hough Transform, Global Processing via Graph-Theoretic Techniques; Thresholding: Role of Illumination, Basic Global Thresholding, Basic Adaptive Thresholding, Optimal Global and Adaptive Thresholding, Use of Boundary Characteristics for Histogram Improvement and Local Thresholding, Thresholds Based on Several Variables; Region-Based Segmentation: Region Growing, Region Splitting and Merging	04 04 03 04	15

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Department of Computer Science

Teaching Plan Session-2018-19

Msc .-2nd Semester-4st

4S : Software Testing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. Testing: Introduction and Outline - Introduction to testing and test outline, sample application, incremental testing approach, outline approach steps, evaluation and schedule estimation.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Introduction to test outline to test cases, creating test cases, documentation short cuts, introduction to using tables and spreadsheets, sample application, Documenting test cases.	04 04 03 04	15
3	Feb mar	UNIT-III :	Introduction to test outline to test cases, creating test cases, documentation short cuts, introduction to using tables and spreadsheets, sample application, Documenting test cases.	04 03 03 02 03	15
4	Mar april	UNIT-IV :	Testing Web Applications: Introduction, sample application, functional and usability issues, configuration and compatibility testing, reliability and availability, security	04 04 03 04	15

			testing, database testing, post implementation testing.		
5	April	UNIT-V :	Reducing the No. of test cases: Introduction, prioritization guidelines, priority category scheme, Risk analysis, interviewing to identify problem areas, combination schemes, tracking selected test cases.	04 03 03 02 03	15
6	may	UNIT- VI :	Creating Quality Software: Introduction, development environmental infrastructure, software testing environment, software testing tools, applying software standards to test documentation.	04 04 03 04	15

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Teaching Plan Session-2019-20
Msc .-Ist Semester-Ist

1S : Digital Systems and Microprocessor

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Representation of integers and floating point nos., Boolean Algebra: laws, simplification of logic equations using Boolean laws, SOP and POS, standard forms of SOP and POS, Karnaugh Maps don't care conditions in K-map	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Design of Arithmetic circuits: Half Adder, half subtractor, full adder, full subtractor, parallel binary adder, subtraction using 1's and 2's compliment schemes, use of adder as subtractor, controlled parallel adder, ALU IC 74181.	04 04 03 04	15
3	Aug sep	UNIT-III :	Design of Arithmetic circuits: Half Adder, half subtractor, full adder, full subtractor, parallel binary adder, subtraction using 1's and 2's compliment schemes, use of adder as subtractor, controlled parallel adder, ALU IC 74181	04 03 03 02 03	15
4	sep	UNIT-IV :	Flip Flops: construction and working of RS, JK, MS-JK, D and T Flip flops. Shift registers and Counters: Buffer register,	04 04 03	15

			controlled buffer register, shift registers: SISO, SIPO, PISO, PIPO, bidirectional shift register, ring counter, twisted ring counter, applications of shift registers; Counters: asynchronous counter designs, synchronous counter, UP/DOWN counters, lock out in counters	04	
5	oct	UNIT-V :	Overview of microcomputer system, evolution of microprocessors, architecture of 8086 microprocessor, pin diagram, signal description, register organisation, concept of pipelining, memory segmentation, memory address generation, modes of operation of 8086 (minimum and maximum).	04 03 03 02 03	15
6	nov	UNIT- VI :	. Stack structure, interrupts in 8086 microprocessor, interrupt responses, Interrupt Vector Table, H/W and S/W interrupt processing; Interfacing: absolute and linear decoding, I/O mapped I/O and Memory Mapped I/O, memory interfacing (Even and Odd Banks), interfacing of keyboards, interfacing of displays, interfacing if ADC and DAC, address mapping.	04 04 03 04	15

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Department of Computer Science

Teaching Plan Session-2019-20

Msc .-Ist Semester-Ist

1S : Net Technologies and C#

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Understanding .net: The C# environment: origins of .net technology, .net framework, the common language runtime, framework base classes, user and program interfaces, visual studio .net, .net languages, benefits, c# and .net	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Overview of C#: namespaces, comments, aliases for namespaces, command-line arguments, program structure; Literals, variables and data types, operators, expressions, Decision making and branching, looping, methods in c#, Array handling, string manipulation, structures and enumerations	04 04 03 04	15
3	Aug sep	UNIT-III :	Classes and objects: Principle of OOP, Access modifiers, constructors, destructors, Nesting of classes; Inheritance and Polymorphism: multilevel inheritance, hierarchical inheritance, overriding, hiding methods, abstract methods and classes, sealed classes and methods; Interfaces: defining, extending and implementing interfaces, interfaces and inheritance, explicit interface implementation, abstract class and interfaces.	04 03 03 02 03	15

4	sep	UNIT-IV :	Operator overloading: unary, binary, comparison, Delegates and events; Console I/O operations: console class, console inputoutput, formatted output. Errors and Exceptions: types of errors, exceptions, exception handling codes, multiple catch statements, exception hierarchy, catch handler, finally statement, nested try blocks.	04 04 03 04	15
5	oct	UNIT-V :	Multithreading in c#: Introduction, System. Threading namespace, scheduling, synchronizing threads, thread pooling. File Manipulation: Managing File System, Moving, copying, deleting files, Reading, writing to files, Reading Drive information, File Security	04 03 03 02 03	15
6	nov	UNIT- VI :	. Data Access with .Net: ADO.net overview, Database connections, commands, the Data Reader, the DataSet class, populating a DataSet, persisting a DataSet.	04 04 03 04	15

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2019-20****Msc .-Ist Semester-Ist****1S : Operating System**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Services, Types, User-O.S. Interface: Command Interpreter, Graphical User Interface; System Calls; System Programs; Operating System Structure: Simple, Layered Approach; Micro-kernels, Modules; Virtual Machine; System	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Process Management: Process Concept, Process States, Process Control Block, Process Scheduling: Schedulers, Context Switch; Operations on Process: Creation, Termination, Inter Process Communication; Threads: Concept, Benefits; CPU Scheduling: Burst Cycle, Types of Scheduling, Scheduler, Dispatcher, Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, Priority Scheduling, Round-Robin, [multiple processor	04 04 03 04	15
3	Aug sep	UNIT-III :	Process Synchronization and Deadlocks: Critical Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors. Deadlock: System Model, Deadlock Characterization, Resource Allocation Graph, Methods for handling Deadlock: Prevention, Avoidance and Detection; Recovery from Deadlock: Process Termination	04 03 03 02 03	15
4	sep	UNIT-IV :	Memory Management: [Basic Hardware, Address Binding];	04	15

			Logical and Physical Address Space, Swapping, Contiguous Allocation, Dynamic Storage Allocation: First-fit, Best-Fit, Worst-fit; Fragmentation; Paging; Segmentation. Virtual Memory: Introduction, Virtual Address Space, Demand Paging, Copy-on-write, Page Replacement: Concept, Page Replacement Algorithms: FIFO, Optimal Page Replacement, LRU, Second-Chance Page Replacement; Thrashing, I/O Interlock.	04 03 04	
5	oct	UNIT-V :	File System: File: Concept, Attributes, Operations; File Organization and Access: Sequential, Index Sequential, Indexed, Direct or Hash File. Directory: Operations, Structures. Protection: Access Control and Permissions. File System Structure, Allocation Methods, Free Space Management. Disk Structure, Disk Scheduling Algorithms: FCFS, SSTF, SCAN, C-SCAN, LOOK. [Disk Management, Swap Space Management], RAID: Concept. I/O Systems: I/O Hardware, Interrupts, DMA, Application I/O Interface, Kernel I/O	04 03 03 02 03	15
6	nov	UNIT- VI :	.. : Distributed File System: Concept, Naming and Transparency, Remote File Access, Stateful Vs Stateless Service, File Replication, Remote Login, Remote File Transfer, Data Migration, Computation Migration, Process Migration. Embedded Operating Systems: Embedded Systems: Definition, Requirements and Constraints, Organization of Embedded System; Characteristics of Embedded Operating Systems.	04 04 03 04	15

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2019-20****Msc .-Ist Semester-Ist****1S : Computer Networks**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Digital Communication: Advantages; Data Transmission: Modes: Parallel, Serial: Asynchronous, Synchronous, Isochronous; Transmission Media: Guided and unguided; Modulation: Amplitude, Phase Shift, Frequency, QAM; Multiplexing: FDM, WDM, TDM, STDM, CDM; Switching: Circuit, Message, Packet; Delays in Packet Switched Network, Packet Loss; Network Reference Models: OSI: Layered Architecture and Services, TCP/IP: Layered Architecture and Services	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Application Layer: Principles of Application Layer Protocols; Processes: Client-Server Model, Socket Interface; Services required by Application Layer; HTTP: Introduction, RTT, HTTP Handshake, types of HTTP Connections, HTTP Messages, Authentication and Cookies; FTP: Service Model, FTP Commands; Electronic Mail; SMTP; DNS: Services and	04 04 03 04	15
3	Aug sep	UNIT-III :	Transport Layer: Transport-Layer Services and Principles; Multiplexing and Demultiplexing Applications; Connectionless Transport – UDP; Principles of Reliable of Data Transfer (RDT); Stop-and-wait and Pipelined protocols; GBN protocol; Connection-Oriented Transport: TCP; Flow Control; Principles of Congestion Control; Approaches	04 03 03 02 03	15

			towards Congestion Control; TCP Congestion Control		
4	sep	UNIT-IV :	Network Layer: Introduction; Network Service Model: Datagram, Virtual Circuit; Routing Principles; Routing Algorithms: Classifications; Hierarchical Routing; Internet Protocol: IP Addressing, IPv4: Classes and Packet format, DHCP; ICMP; Routing in the Internet: RIP, OSPF, BGP; Router; IPv6; Multicast Routing	04 04 03 04	15
5	oct	UNIT-V :	Data Link Layer: Introduction; Services; Error Detection and Correction; Multiple Access Protocols and LANs; LAN Addresses and ARP; Ethernet; Hubs, Bridges and Switches; Wireless LANs: IEEE 802.11; The Point-to-Point Protocol; ATM, X.25 and Frame Relay	04 03 03 02 03	15
6	nov	UNIT- VI :	. Network Security and Management: Secured Communication: Threats and Characteristics; Cryptography: Principles of Cryptography, Symmetric Key Cryptography, Public Key Cryptography; Privacy, Authentication, Integrity, Nonrepudiation; Digital Signature; Key Distribution and Certification. Areas of Network Management; Network Management Architecture; Internet Network Management Framework; SMI, MIB, SNMP.	04 04 03 04	15

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2019-20****Msc .-Ist Semester-2st****2S : Java Programming**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	Introduction to java, Java development tools, Java and WWW, Java applications, java building elements: Identifiers, Keywords, variables, constants, operators. Data types and type casting and type conversion. Control Structures: Simple if, If..else, switch statement, Loop structure : For , Do..while, while , loop control using break and continue	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Objects and classes: class variable, instance variable, class methods, Access specifier, access modifiers. Methods: main method, creating methods, calling methods, overloading methods, abstraction, recursion. Object: Initialization of object using constructors, parameterized constructor, Dynamic Memory allocation, Garbage collection. Passing objects to methods.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Packages: creating and importing packages, Arrays : Declaration, initialization, sorting searching, array of objects. String: String class, StringBuffer, StringTokenizer. Command line arguments. Inheritance: super class, subclass , super keyword, this keyword, final modifier, abstract class, Method overriding. Interface: implementing interfaces.	04 03 03 02 03	15
4	Mar April	UNIT-IV :	Applet: Life cycle of an applet, APPLET tag, passing arguments to an applet, paint, repaint, update methods.	04 04	15

			Graphics class, AWT class hierarchy, Frames, Layout managers, components, containers. Color class, Font class	03 04	
5	April	UNIT-V :	Exception Handling : Error and Exception class, Error handling routine, try , catch , throw, throws, finally, uncaught exceptions, built-in exception, nested try-catch, user defined exception. Thread: Thread class, Runnable interface, states, priority and synchronization. Java I/O classes, File handling.	04 03 03 02 03	15
6	may	UNIT- VI :	. : User Interface: Button, Label, TextField, TeatArea, Choice, List, CheckBox, CheckBox Group, Dialog Boxes, Menu Multiple Windows, Event handling: Event Delegation model, Adapter classes, Event classes, Event Listener Interfaces, Handling Mouse and Keyboard events.	04 04 03 04	15

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2019-20****Msc .-Ist Semester-2st****2S : Data Structures**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	Introduction, Types of Data Structures, Linear & Nonlinear data structures, Arrays: Arrays as ADT, 1D, 2D, Multidimensional Arrays, Memory Representation and Applications. Linked List : Concept , Operations : Insert, Delete, Traversal, Static implementation using arrays, Dynamic implementation , Doubly Linked list, Circular list, Linked list applications : Merging of two linked lists.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Stacks: Introduction, Push and Pop operations, Stack implementation using array, Stack applications, Infix to Postfix conversion of expression, Expression evaluation, Recursion. Queues: Introduction, Insert and Delete operations, Queue implementation using array, Types – Priority Queue, Circular queue, Dequeue, Queue applications: CPU Scheduling Algorithms FCFS , Round Robin algorithm, Stacks and Queues as Linked Lists	04 04 03 04	15
3	Feb Mar	UNIT-III :	Trees: Terminology and Concepts , Binary Tree Representation, Static implementation using arrays , Linked representation, Binary Search Tree, Operations on Binary search tree - Insert, Delete, Tree Traversals, Representing, Threaded binary trees, Height-balanced trees, AVL Rotations. Searching: Sequential binary tree searches. Unit IV : Searching and Sorti	04 03 03 02 03	15

4	Mar April	UNIT-IV :	Searching and Sorting :Searching, Concept and need, Techniques, Linear search, Binary search, Indexed sequential search, Sorting, Concept and Need, Performance criteria, Bubble sort, Insertion Sort, Selection Sort, Shell Sort, Quick Sort, Heap Sort, Merge Sor	04 04 03 04	15
5	April	UNIT-V :	Graphs :Terminology and concepts, Graph Representation: Adjacency matrix, Adjacency list, Adjacency multi-list, Traversals: Depth first and Breadth first. Minimum spanning tree, shortest path algorithm, topological ordering, sparse matrices, linked list implementation of graph and graph traversal.	04 03 03 02 03	15
6	may	UNIT- VI :	Indexing: B-tree indexing, Multilevel indexing, B+ tree, Hashing, Collision processing, Bucket hashing, Dynamic hashing, Linear hashing, Extendible hashing, Tries.	04 04 03 04	15

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Department of Computer Science

Teaching Plan Session-2019-20

Msc .-Ist Semester-2st

2S : Software Engineering

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. System Concept: Definition, Characteristics of System, Elements of System; Types of System: Physical or Abstract Systems, Open or Closed Systems, Man-made Information Systems; Subsystem. System Analyst: Role; Skills: Interpersonal, Technical; Information Gathering Tools (Fact Finding Techniques); Feasibility Study. Introduction to Software Engineering: Definition and Characteristics of Software; Software Application Domains; Software Engineering: Definition, Layered Model.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Software Process Framework; Umbrella Activities. Process Models: SDLC (Waterfall); Incremental; Evolutionary Models: RAD, Prototyping, Spiral; Concurrent Development Model; Components based Development Model. Agility: Agile Process: Assumptions, Agility Principles, Human Factors. Software Engineering Practice: Essence of Practice, Core Principles, Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Requirements Engineering: Requirements Engineering Tasks: Inception, Elicitation, Elaboration, Negotiation, Specification, Validation. Requirements Management; Steps in Requirements Engineering. Requirements Analysis:	04 03 03 02	15

			Objectives; Requirements Modeling Approaches: Scenario-Based Modeling: Use-Case; Class Models: E-R Diagram, Class Diagrams; Flow Oriented Modeling: DFD, CFD; Behavioral Models: State Diagram, Sequence Diagrams	03	
4	Mar April	UNIT-IV :	Software Design: Design Process and Quality; Design Concepts: Abstraction, Architecture, Modularity, Information Hiding, Functional Independence, Refinement. Component Level Design: Component-Definition; Object-oriented View, Traditional View, Cohesion, Coupling. Designing Traditional Components: Graphical Design – Notations (Flow Chart), Tabular Design – Notations (Decision Table), Program Design Language (Structured English or Pseudo-code). User Interface Design: Rules; Interface Design Models; Interface Analysis.	04 04 03 04	15
5	April	UNIT-V :	Software Quality: Definition; Garvin’s Quality Dimensions; McCall’s Quality Factors; ISO 9126 Quality Factors. Software Quality Assurance: Elements, Goals, ISO 9001-2000 Quality Standards. Software Metrics: Attributes, Metrics for Requirements Model: Function-based Model (FP). Metrics for Specification Quality, Metrics for Design Model: Architectural Design Metrics. Metrics for Object-Oriented Design, UserInterface Design Metrics, Metrics for Source Code, Metrics for Testing, Metrics for Maintenance.	04 03 03 02 03	15
6	may	UNIT- VI :	Software Testing: Need, Verification and Validation, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging, Test Characteristics. White Box Testing: Flow Graph Notations, Test Cases, Control Structure Testing. Black Box Testing: Graph-based Testing Methods,	04 04 03 04	15

			Equivalence Partitioning, Boundary Value Analysis, Orthogonal Array Testing.		

2S : Discrete Mathematical Structures

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. Mathematical logic: Introduction, statements and notations, connectives – negation, conjunction, disjunction, Statement formulas and truth tables, conditional, bi-conditional, well formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal and principal normal forms, completely parenthesized infix and polish notations, Theory of inference for statement calculus – validity using truth table, rules of inference, consistency of premises and indirect method of proof.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Set theory: Basic concepts of set theory, representation of discrete structures, relations and ordering: relations, properties of binary relations in a set, relation matrix and graph of a relation, partition and covering of a set, equivalence relation, compatibility relations, composition of binary relations, Functions – composition of functions, Inverse function.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Algebraic Structures: Algebraic systems: Examples and general properties, Semigroups and monoids, Grammar and Languages, Polish expressions and their compilation, Groups- Definition and examples, subgroups and	04 03 03 02	15

			homomorphism, cosets and Lagrange's theorem, Group codes – the communication model and basic notions, generation of codes by using parity checks, error recovery in group codes	03	
4	Mar April	UNIT-IV :	Lattices and Boolean algebra: Lattice as POSETs, definition, examples and properties, Lattice as algebraic systems, sublattices, Direct product and homomorphism, Special lattices, Boolean algebra - definition and examples, subalgebra, Direct product and homomorphism, Boolean functions, representation and minimization of Boolean Finite state machines	04 04 03 04	15
5	April	UNIT-V :	Graph theory: Basic concepts of graph theory – definitions, paths, reachability and connectedness, matrix representation, Storage representation and manipulation of graphs- trees, representation and operations, list structures and graphs, Simple precedence grammars-syntax terminology, a view of parsing, notion and use of precedence relations, formal definiti	04 03 03 02 03	15
6	may	UNIT- VI :	Fault detection in combinational switching circuits – Faults in combinational circuits, Notions of Fault detection, Algorithm for generating a fault matrix, procedure for detection of faults; Introduction to computability theory: Finitestate acceptors and regular grammars, Turing machines and	04 04 03 04	15

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Msc .-Ist Semester-2st

2S : : Compiler Construction

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec jan	UNIT-I :	. Introduction to Compilers: Overview, typical compiler Structure, implementation. Programming Language Grammars: Elements of formal language grammars, derivation, reduction, syntax tree, ambiguity, regular grammars and expressions.	04 03 03 02 03	15
2	Jan feb	UNIT-II :	Scanning and Parsing Techniques: The scanner, top-down and bottom-up parsing, syntax directed translation, Symbol table organization, Hash table organization, Linked List and Tree structured symbol tables, symbol table organization for structures and records.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Memory Allocation: Static and dynamic memory allocation, array allocation and access, allocation for strings, structure allocation, common and equivalence allocation. Compilation of expressions.	04 03 03 02 03	15
4	Mar April	UNIT-IV :	Compilation of control structures: Control transfers, procedural calls, conditional execution, iteration control	04 04 03	15

			constructs	04	
5	April	UNIT-V :	Error detection, indication and recovery. Compilation of I/O statements: Compilation of I/O list, compilation of FORMAT list, the I/O routine, file control.	04 03 03 02 03	15
6	may	UNIT- VI :	Code optimization: Major issues, optimizing transformations, local optimizations, program flow analysis, Global optimization, writing compilers.	04 04 03 04	15

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Teaching Plan Session-2019-20
Msc .-2nd Semester-3st

3S : Data Mining and Data Warehousing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Introduction, Data Mining Functionalities, Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	Data Warehouse and OLAP Technology: Overview, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Data Generalization and Concept Description.	04 04 03 04	15
3	Aug Sep	UNIT-III :	Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.	04 03 03 02 03	15
4	Sep Oct	UNIT-IV :	Classification and Prediction: Issues, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based	04 04 03	15

			Classification, Classification by Backpropagation. Prediction: Linear Regression, Nonlinear Regression, Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor.	04	
5	Oct	UNIT-V :	Cluster Analysis: Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data. Mining Time-Series Data, Mining Sequence Patterns in Biological Data	04 03 03 02 03	15
6	Nov	UNIT- VI :	: Graph Mining, Social Network Analysis and Multirelational Data Mining. Mining Object, Spatial, Multimedia, Text, and Web Data, Data Mining Applications, Trends in Data Mining	04 04 03 04	15

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2019-20****Msc .-2nd Semester-3st****3S : Computer Graphics**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	. Geometry and line generation: Introduction, points and lines, planes and coordinates, Line segments, perpendicular line segments, vectors, pixels and frame buffers, vector generation, character generation, displaying the frame buffer. Graphics primitive: Introduction, display devices, primitive operations, the Display-File Interpreter, normalized device coordinates, Display-file structure, Display control, Text line style primitives.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. : Polygon: Introduction, Polygon , Polygon representation, Entering polygon, An inside test, filling polygon, Antialiasing. Transformations: Introduction, matrices, scaling transformations, sin and cos, sum of angles, identifiers, rotation, homogeneous coordinates and translation, rotation about an arbitrary point, other transformations, display procedures	04 04 03 04	15
3	Aug Sep	UNIT-III :	Segments: Introduction, the segment table, segment creation, closing a segment, deleting a segment, renaming a segment, visibility, image transformations, saving and showing segments, other display file structures, some raster techniques, Windowing and clipping: Introduction, viewing transformation, implementation, clipping, clipping the polygon, adding clipping to the system, a voiding division,	04 03 03 02 03	15

			generalized clipping, position relative to an arbitrary line, multiple windowing,		
4	Sep Oct	UNIT-IV :	Interaction : Introduction, hardware, input devices, handling algorithm, event handling, sample devices, the detectability attributes, simulating a locator with a pick and pick with a locator, Echoing, Interactive techniques. Three dimension: Introduction, 3D Geometry, primitives and transformations, rotation about an arbitrary axis, parallel projection, perspective projection, viewing parameters, conversion to view plane coordinates, The 3D viewing transformation, , special projection.	04 04 03 04	15
5	Oct	UNIT-V :	Hidden surfaces and lines: Introduction, back face removal, the painter algorithm, collection of polygons, remembering the style, the hidden surface check, decomposition into triangles, comparing two triangles, The minima test, Overlapping edges, containment of points, finding a point in the triangle plane, comparing of the entire triangle, establishing depth order, geometrical sorting, linked list, sorting the triangles.	04 03 03 02 03	15
6	Nov	UNIT- VI :	Shading: Introduction, diffusion, illumination, point source illumination, specular reflection, transparency and shadows. Curves: Introduction, curve generation, implementation, interpolating polygons, E-splines, B-Splines and Curves.	04 04 03 04	15

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Msc .-2nd Semester-3st

3S : Client-Server Computing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Networking in Java: Basics, Socket overview, Client-Server concepts, Proxy servers, Internet addressing, Java Networking classes and interfaces, InetAddress, TCP/IP Client Sockets, URL Connection, TCP/IP Server sockets, Creating TCP client server	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Java Database Connectivity: JDBC concepts, JDBC API, DriverManager, Connection, Statement and ResultSet classes with relevant methods. Prepared and Callable statements, Handling queries, inserts, deletes and updates to database. Displaying query results	04 04 03 04	15
3	Aug Sep	UNIT-III :	Servlets: Structure and lifecycle of Servlets, Servlet API: basics, Various classes & interfaces. Servlet requirements, writing. Running and debugging of Servlets, Concepts of Cookies, State and session management with Servlet API. Server side includes and request forwarding. Servlet chaining. Jdbc Servlets.	04 03 03 02 03	15
4	Sep	UNIT-IV :	JavaScript Overview, Variables, Operators, Data Types,	04	15

	Oct		Control Statements, Functions and Objects, The Window Object: Dialog Boxes, Status Bar Messages, Window Manipulations; The Document Object: Writing to Documents, Dynamic Documents, The Form Object: Working With Form Elements and Their Properties The String and RegExp Objects, Dates and Math ies The String and RegExp Objects, Dates and Math o	04 03 04	
5	Oct	UNIT-V :	Remote Method Invocation (RMI): Object serialization in Java, Concept of remote object, Architecture of RMI application, Java RMI package, classes & Interfaces, Client-Server application using RMI, RMI Servlets, RMI-JDBC Servlets.	04 03 03 02 03	15
6	Nov	UNIT- VI :	. Introduction to JSP; Simple JSP concepts, Request-time expressions. Advanced JSPs: Scripts. conditionals, loops, Try/Catch. Concept of Beans, Properties, Bean instances & serialization; Bean Scopes, Writing Beans, Introspection, Beans & Scriplets..	04 04 03 04	15

Late Ku. Durga K. Banmeru Science College, Lonar Dist- Buldana**Department of Computer Science****Teaching Plan Session-2019-2020****Msc .-2nd Semester-3st****3S : Distributed Operating System**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Introduction to distributed systems: goals of distributed system, hardware and software concepts, design issues. Communication in distributed systems: Layered protocols, ATM networks, the client-server model, remote procedure call and group communication.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Synchronization in distributed systems: Clock Synchronization, mutual exclusion, Election Algorithms, the Bully algorithm, a ring algorithm, atomic transactions, dead lock in distributed systems, distributed dead lock prevention, and distributed dead ock detection.	04 04 03 04	15
3	Aug Sep	UNIT-III :	Processes and processors in distributed systems: Threads, system, models, processor allocation, scheduling in distributed system, fault tolerance and real time distributed systems.	04 03 03 02 03	15
4	Sep Oct	UNIT-IV :	Distributed file systems: Distributed file systems design, distributed file system implementation, trends in distributed file systems. Distributed shared memory: What is shared	04 04 03 04	15

			memory, consistency models, page based distributed shared memory, shared variable, distributed shared memory, object based DSM.		
5	Oct	UNIT-V :	Case Study : AMOEBA : Introduction to AMOEBA, objects and capabilities in AMOEBA, Process Management in AMOEBA, Memory Management in AMOEBA, Communication in AMOEBA. The AMOEBA servers : The Bullet Server - Interface and Implementation, The Directory Server – Interface and Implementation, The Replication Server, The Run Server, The Boot Server, The TCP/IP Server, Other Servers	04 03 03 02 03	15
6	Nov	UNIT- VI :	Case study MACH: Introduction to MACH, Process management, in MACH, Memory management in MACH, communication in MACH, UNIX emulation in MACH. Case study DCE: Introduction to DCE threads, RPC's, Time service, directory service, security service, distributed file system.	04 04 03 04	15

3S : Theory of Computation

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Strings, alphabets and languages, Graphs and trees, Inductive proofs, set notations, relations, Finite automata and regular Expression: Finite state system, Non deterministic finite automata, Finite automata with ϵ -moves. Deterministic finite automata, equivalence between NFA and DFA, Conversion of NFA to DFA	04 03 03 02 03	15
2	July - Aug	UNIT-II :	Regular set and regular expression, Two way finite automata, finite automat with output, Applications of finite automata. Equivalence of RE and FA, Inter conversion, pumping lemma, closure property of regular sets, Regular grammars, Right linear and Left linear grammar, equivalence between Regular linear grammar and FA inter conversion between RE and RG	04 04 03 04	15
3	Aug Sep	UNIT-III :	Context free grammar, derivation trees, Chomsky Normal Form, Greibach Normal Form. Push Down Automata: Definition, model, acceptance of CFL, equivalence of CFL and PDA , Interconversion, Enumeration of properties of CFL.	04 03 03 02 03	15
4	Sep Oct	UNIT-IV :	Turing Machine: Definition, model, Design of turing machine, computable languages and function, Techniques of turing machine construction, Modifications of Turing	04 04 03 04	15

			machine, Church's Hypothesis.		
5	Oct	UNIT-V :	, Chomsky Hierarchy of languages, Linear bounded automata and context sensitive languages, Introduction of DCFL and DPDA, Decidability of problems.	04 03 03 02 03	15
6	Nov	UNIT- VI :	. I: Undecidability : Properties of recursive & non recursive enumerable languages, universal turing machine, post correspondence problem, introduction to recursive function theory.	04 04 03 04	15

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Msc .-2nd Semester-4st

4S : Artificial Intelligence and Expert Systems

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	Prolog Programming: Introduction to turbo prolog, introduction to language, structure of language, cut, fail, recursion, lists and complex structures, interactive programming, expert system in prolog.	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	Introduction: Definition of AI, AI technique, tic-tac-toe, pattern recognition, level of the model, criteria for success, problems and problem spaces, defining the problems, production systems, control strategies, heuristic search, problem characteristics, decomposition of problems, solution steps, predictability, absolute and relative solutions.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Basic problem solving methods, reasoning, problem trees and graphs, knowledge representation, matching indexing with variables, heuristic functions, weak methods, problem reduction, constraints satisfaction, means-ends analysis, analysis of search algorithms.	04 03 03 02 03	15
5	April	UNIT-V :	Knowledge representation using predicate logic: representing simple facts in logic, augmenting the representation, structural representation of knowledge:	04 03 03	15

			some common knowledge structures, choosing the level of representation, finding the right structure as needed, declarative representation	02 03	
6	May	UNIT- VI :	. Natural Language Understanding: Concept of understanding, keyword matching, syntactic and semantic analysis, understanding, language generation and matching translation. General concepts of implementation of AI systems. Introduction to pattern recognition. Rule based systems, semantics of CFL, semantic network, frames, frame kit. Application, introduction to knowledge engineering, artificial neural network: introduction, learning: single and multilayer networks	04 04 03 04	15

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4S : Design and Analysis of Algorithms

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	Introduction: algorithm, writing algorithms in SPARKS, structured program, analyzing algorithms, Divide and conquer: The general method, Binay Search, Finding minimum and maximum, merge sort, quick sort, selection sort, Strassen's matrix multiplication.	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	. Greedy Method: The general method, Optimal storage on tapes, Knapsack problem, Job sequencing with deadlines, Optimal merge patterns, minimum spanning trees, Single source shortest path. Dynamic programming: General method, multistage graph, all pair shortest paths, Optimal binary search trees, 0/1 knapsack , Travelling salesperson problem, flow shop scheduling.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Basic Search and Traversal techniques: General method, code optimization, AND/OR graph, game trees, biconnected components and depth first search , Back tracking : General method, 8-queens problem, sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem.	04 03 03 02 03	15
4	April	UNIT-IV :	Branch and bound: General method, 0/1 knapsack problem, Travelling salesperson, efficiency considerations, Algebraic simplification and transformations: General method,	04 04 03 04	15

			evaluation and interpolation, fast Fourier transform, modular arithmetic		
5	May	UNIT-V :	Lower bound theory: comparison trees for sorting and searching, Oracle and adversary arguments, techniques for algebraic problems, some lower bounds and parallel computation.	04 03 03 02 03	15
6		UNIT- VI :	NP-Hard and NP-Complete problems: basic concept, cook's theorem, NP-Hard graph problem, NP-Hard scheduling problem, NP-Hard code generation problem.	04 04 03 04	15

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4S : Network Security

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	. Introduction: Terminology, Notation, Networking Security Attacks, Layers And Cryptography, Authorization, Tempest, Keys, Viruses, Worms, Trojan Horses, Multilevel Model of Security, Legal Issues	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	. Cryptography: Introduction, Breaking an Encryption Scheme, Types of Cryptographic Function, Respective Algorithms, Standards and Modes of Operation, Hashes and Message Digests.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Authentication: Overview of Authentication System, Password-based Authentication, Address-based Authentication, Cryptographic Authentication Protocols, Keys, Trusted Intermediaries, Authentication of People, Security Handshake Pitfalls: Login Only, Mutual Authentication, Integrity / Encryption for Data, Mediated Authentication, Performance Considerations.	04 03 03 02 03	15
4		UNIT-IV :	Standards: Kerberos V4: Tickets, Kerberos V5: ASN.1, Names,	04 04	15

	April		Delegation of Rights, Ticket Lifetimes, Key Versions, Optimizations. Cryptographic Algorithms, Kerberos V5 Messages, Real Time Communication Security: IPSec: AH & ESP: Overview of IPSEC, IP and IPV6, AH (Authentication Header), ESP (Encapsulating Security Payload)	03 04	
5	May	UNIT-V :	E-mail Security: Distribution Lists, Store and Forward, Security Services for E-Mail, Establishing Keys, Privacy, Authentication of Source, Message Integrity, Non Repudiation, Proof of Submission, Proof of Delivery, Message Flow Confidentiality, Anonymity, Containment. PEM and S/MIME, PGP	04 03 03 02 03	15
6		UNIT- VI :	Firewalls: Packet Filters, Application Level Gateways, Encrypted Tunnels, Comparisons. Security Systems: Netware V3, Netware V4, Microsoft Windows Security. Web Issues: URLs/URIs, HTTP, Cookies. Web Security Problems.	04 04 03 04	15

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4S : Mobile Communications

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	. Mobile Communication: Applications, History, Market, Simplified Reference Model. Frequencies, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular System.	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	. Medium Access Control: Need, SDMA, FDMA, TDMA, CDMA, Comparison of S/T/F/CDMA. Telecommunica	04 04 03 04	15
3	Feb Mar	UNIT-III :	., Satellite Systems: History, Applications, Basics, Routing, Localization, Handover, Examples. Broadcast Systems: Overview, Cyclical Repetition of Data, Digital Audio Broadcasting, Digital Video Broadcasting, C	04 03 03 02 03	15
	April				

5		UNIT-V :	Layers: Mobile Network Layer: Mobile IP, DHCP, Mobile Adhoc Networks. Mobile Transport Layer: Traditional TCP, Classical TCP improvements, TCP over 2.5/3G Wireless Networks.	04 03 03 02 03	15
	May				
6		UNIT- VI :	. Support For Mobility: File Systems, World Wide Web, Wireless Application Protocol, i-Mode, SyncML, WAP2.0.	04 04 03 04	15

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4S : Digital Image Processing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	. I : Introduction: Definition, Origins, Examples: X-ray Imaging, Ultraviolet Band, Visible and Infrared Bands, Microwave Band, and Radio Band Imaging; Fundamental Steps, Components of an Image Processing System Digital Image Fundamentals: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, A Simple Image Formation Model; Image Sampling and Quantization; Basic Relationships Between Pixels; Linear and Nonlinear Operations.	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	: Image Enhancement in the Spatial Domain: Basic Gray Level Transformations; Histogram Processing - Histogram Equalization, Histogram Matching (Specification), Local Enhancement; Enhancement Using Arithmetic/Logic Operations; Basics of Spatial Filtering, Smoothing Spatial Filters: Smoothing Linear, Smoothing Order-Statistics Filters; Sharpening Spatial Filters : The Laplacian, The Gradient; Combining Spatial Enhancement Methods	04 04 03 04	15
3	Feb Mar	UNIT-III :	Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain: OneDimensional Fourier Transform and its Inverse, TwoDimensional DFT and Its Inverse, Filtering in the Frequency Domain, Correspondence between Filtering in the	04 03 03 02 03	15

			Spatial and Frequency Domains; Smoothing and Frequency-Domain Filters - Ideal , Butterworth, and Gaussian Lowpass Filters; Sharpening Frequency Domain Filters - Ideal , Butterworth, and Gaussian Highpass Filters, Laplacian in the Frequency Domain, Unsharp Masking, High-Boost Filtering, and High-Frequency Emphasis Filtering; Homomorphic Filtering; Implementation: Additional Properties of the 2-D Fourier Transform, Inverse Fourier Transform Using a Forward Transform Algorithm, Need for Padding, Convolution and Correlation Theorems, The Fast Fourier Transform;		
4	April	UNIT-IV :	Image Restoration: Model of the Image Degradation/ Restoration Process, Noise Models: Restoration in the Presence of Noise Only Spatial Filtering: Mean, Order-Statistics, and Adaptive Filters; Periodic Noise Reduction by Frequency Domain Filtering: Bandreject, Bandpass, and Notch Filtering; Estimating the Degradation Function - Estimation by Image Observation, Experimentation and Modeling; Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Geometric Mean Filter; Geometric Transformations: Spatial Transformations, Gray-Level Interpolation	04 04 03 04	15
5	May	UNIT-V :	Color Image Processing: Color Fundamentals, Color Models; Pseudocolor Image Processing; Full-Color Image Processing, Color Transformations: Formulation, Color Complements, Color Slicing, Tone and Color Corrections, Histogram Processing; Smoothing and Sharpening, Color Segmentation, Noise in Color Images. Morphological Image Processing: Preliminaries, Dilation and Erosion, Opening and Closing, The	04 03 03 02 03	15

			Hit-or-Miss Transformation, Some Basic Morphological Algorithms: Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening, Skeletons, Pruning; Extensions to Gray-Scale Images.		
6		UNIT- VI :	Image Segmentation: Detection of Discontinuities: Point, Line, Edge Detection; Edge Linking and Boundary Detection: Local Processing, Global Processing via the Hough Transform, Global Processing via Graph-Theoretic Techniques; Thresholding: Role of Illumination, Basic Global Thresholding, Basic Adaptive Thresholding, Optimal Global and Adaptive Thresholding, Use of Boundary Characteristics for Histogram Improvement and Local Thresholding, Thresholds Based on Several Variables; Region-Based Segmentation: Region Growing, Region Splitting and Merging	04 04 03 04	15

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4S : Software Testing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	. Testing: Introduction and Outline - Introduction to testing and test outline, sample application, incremental testing approach, outline approach steps, evaluation and schedule estimation.	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	Introduction to test outline to test cases, creating test cases, documentation short cuts, introduction to using tables and spreadsheets, sample application, Documenting test cases.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Introduction to test outline to test cases, creating test cases, documentation short cuts, introduction to using tables and spreadsheets, sample application, Documenting test cases.	04 03 03 02 03	15
4	April	UNIT-IV :	Testing Web Applications: Introduction, sample application, functional and usability issues, configuration and compatibility testing, reliability and availability, security	04 04 03 04	15

			testing, database testing, post implementation testing.		
5	May	UNIT-V :	Reducing the No. of test cases: Introduction, prioritization guidelines, priority category scheme, Risk analysis, interviewing to identify problem areas, combination schemes, tracking selected test cases.	04 03 03 02 03	15
6		UNIT- VI :	Creating Quality Software: Introduction, development environmental infrastructure, software testing environment, software testing tools, applying software standards to test documentation.	04 04 03 04	15

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1S : Digital Systems and Microprocessor

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Representation of integers and floating point nos., Boolean Algebra: laws, simplification of logic equations using Boolean laws, SOP and POS, standard forms of SOP and POS, Karnaugh Maps don't care conditions in K-map	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Design of Arithmetic circuits: Half Adder, half subtractor, full adder, full subtractor, parallel binary adder, subtraction using 1's and 2's compliment schemes, use of adder as subtractor, controlled parallel adder, ALU IC 74181.	04 04 03 04	15
3	Aug sep	UNIT-III :	Design of Arithmetic circuits: Half Adder, half subtractor, full adder, full subtractor, parallel binary adder, subtraction using 1's and 2's compliment schemes, use of adder as subtractor, controlled parallel adder, ALU IC 74181	04 03 03 02 03	15
4	sep	UNIT-IV :	Flip Flops: construction and working of RS, JK, MS-JK, D and T Flip flops. Shift registers and Counters: Buffer register,	04 04 03	15

			controlled buffer register, shift registers: SISO, SIPO, PISO, PIPO, bidirectional shift register, ring counter, twisted ring counter, applications of shift registers; Counters: asynchronous counter designs, synchronous counter, UP/DOWN counters, lock out in counters	04	
5	oct	UNIT-V :	Overview of microcomputer system, evolution of microprocessors, architecture of 8086 microprocessor, pin diagram, signal description, register organisation, concept of pipelining, memory segmentation, memory address generation, modes of operation of 8086 (minimum and maximum).	04 03 03 02 03	15
6	nov	UNIT- VI :	. Stack structure, interrupts in 8086 microprocessor, interrupt responses, Interrupt Vector Table, H/W and S/W interrupt processing; Interfacing: absolute and linear decoding, I/O mapped I/O and Memory Mapped I/O, memory interfacing (Even and Odd Banks), interfacing of keyboards, interfacing of displays, interfacing if ADC and DAC, address mapping.	04 04 03 04	15

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Msc .-Ist Semester-Ist

1S : Net Technologies and C#

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Understanding .net: The C# environment: origins of .net technology, .net framework, the common language runtime, framework base classes, user and program interfaces, visual studio .net, .net languages, benefits, c# and .net	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Overview of C#: namespaces, comments, aliases for namespaces, command-line arguments, program structure; Literals, variables and data types, operators, expressions, Decision making and branching, looping, methods in c#, Array handling, string manipulation, structures and enumerations	04 04 03 04	15
3	Aug sep	UNIT-III :	Classes and objects: Principle of OOP, Access modifiers, constructors, destructors, Nesting of classes; Inheritance and Polymorphism: multilevel inheritance, hierarchical inheritance, overriding, hiding methods, abstract methods and classes, sealed classes and methods; Interfaces: defining, extending and implementing interfaces, interfaces and inheritance, explicit interface implementation, abstract class and interfaces.	04 03 03 02 03	15

4	sep	UNIT-IV :	Operator overloading: unary, binary, comparison, Delegates and events; Console I/O operations: console class, console inputoutput, formatted output. Errors and Exceptions: types of errors, exceptions, exception handling codes, multiple catch statements, exception hierarchy, catch handler, finally statement, nested try blocks.	04 04 03 04	15
5	oct	UNIT-V :	Multithreading in c#: Introduction, System. Threading namespace, scheduling, synchronizing threads, thread pooling. File Manipulation: Managing File System, Moving, copying, deleting files, Reading, writing to files, Reading Drive information, File Security	04 03 03 02 03	15
6	nov	UNIT- VI :	. Data Access with .Net: ADO.net overview, Database connections, commands, the Data Reader, the DataSet class, populating a DataSet, persisting a DataSet.	04 04 03 04	15

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Msc .-Ist Semester-Ist

1S : Operating System

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Services, Types, User-O.S. Interface: Command Interpreter, Graphical User Interface; System Calls; System Programs; Operating System Structure: Simple, Layered Approach; Micro-kernels, Modules; Virtual Machine; System	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Process Management: Process Concept, Process States, Process Control Block, Process Scheduling: Schedulers, Context Switch; Operations on Process: Creation, Termination, Inter Process Communication; Threads: Concept, Benefits; CPU Scheduling: Burst Cycle, Types of Scheduling, Scheduler, Dispatcher, Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, Priority Scheduling, Round-Robin, [multiple processor	04 04 03 04	15
3	Aug sep	UNIT-III :	Process Synchronization and Deadlocks: Critical Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors. Deadlock: System Model, Deadlock Characterization, Resource Allocation Graph, Methods for handling Deadlock: Prevention, Avoidance and Detection; Recovery from Deadlock: Process Termination	04 03 03 02 03	15

4	sep	UNIT-IV :	Memory Management: [Basic Hardware, Address Binding]; Logical and Physical Address Space, Swapping, Contiguous Allocation, Dynamic Storage Allocation: First-fit, Best-Fit, Worst-fit; Fragmentation; Paging; Segmentation. Virtual Memory: Introduction, Virtual Address Space, Demand Paging, Copy-on-write, Page Replacement: Concept, Page Replacement Algorithms: FIFO, Optimal Page Replacement, LRU, Second-Chance Page Replacement; Thrashing, I/O Interlock.	04 04 03 04	15
5	oct	UNIT-V :	File System: File: Concept, Attributes, Operations; File Organization and Access: Sequential, Index Sequential, Indexed, Direct or Hash File. Directory: Operations, Structures. Protection: Access Control and Permissions. File System Structure, Allocation Methods, Free Space Management. Disk Structure, Disk Scheduling Algorithms: FCFS, SSTF, SCAN, C-SCAN, LOOK. [Disk Management, Swap Space Management], RAID: Concept. I/O Systems: I/O Hardware, Interrupts, DMA, Application I/O Interface, Kernel I/O	04 03 03 02 03	15
6	nov	UNIT- VI :	.. : Distributed File System: Concept, Naming and Transparency, Remote File Access, Stateful Vs Stateless Service, File Replication, Remote Login, Remote File Transfer, Data Migration, Computation Migration, Process Migration. Embedded Operating Systems: Embedded Systems: Definition, Requirements and Constraints, Organization of Embedded System; Characteristics of Embedded Operating Systems.	04 04 03 04	15

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Msc .-Ist Semester-Ist

1S : Computer Networks

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Digital Communication: Advantages; Data Transmission: Modes: Parallel, Serial: Asynchronous, Synchronous, Isochronous; Transmission Media: Guided and unguided; Modulation: Amplitude, Phase Shift, Frequency, QAM; Multiplexing: FDM, WDM, TDM, STDM, CDM; Switching: Circuit, Message, Packet; Delays in Packet Switched Network, Packet Loss; Network Reference Models: OSI: Layered Architecture and Services, TCP/IP: Layered Architecture and Services	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Application Layer: Principles of Application Layer Protocols; Processes: Client-Server Model, Socket Interface; Services required by Application Layer; HTTP: Introduction, RTT, HTTP Handshake, types of HTTP Connections, HTTP Messages, Authentication and Cookies; FTP: Service Model, FTP Commands; Electronic Mail; SMTP; DNS: Services and	04 04 03 04	15
3	Aug sep	UNIT-III :	Transport Layer: Transport-Layer Services and Principles; Multiplexing and Demultiplexing Applications; Connectionless Transport – UDP; Principles of Reliable of Data Transfer (RDT); Stop-and-wait and Pipelined protocols;	04 03 03 02	15

			GBN protocol; Connection-Oriented Transport: TCP; Flow Control; Principles of Congestion Control; Approaches towards Congestion Control; TCP Congestion Control	03	
4	sep	UNIT-IV :	Network Layer: Introduction; Network Service Model: Datagram, Virtual Circuit; Routing Principles; Routing Algorithms: Classifications; Hierarchical Routing; Internet Protocol: IP Addressing, IPv4: Classes and Packet format, DHCP; ICMP; Routing in the Internet: RIP, OSPF, BGP; Router; IPv6; Multicast Routing	04 04 03 04	15
5	oct	UNIT-V :	Data Link Layer: Introduction; Services; Error Detection and Correction; Multiple Access Protocols and LANs; LAN Addresses and ARP; Ethernet; Hubs, Bridges and Switches; Wireless LANs: IEEE 802.11; The Point-to-Point Protocol; ATM, X.25 and Frame Relay	04 03 03 02 03	15
6	nov	UNIT- VI :	. Network Security and Management: Secured Communication: Threats and Characteristics; Cryptography: Principles of Cryptography, Symmetric Key Cryptography, Public Key Cryptography; Privacy, Authentication, Integrity, Nonrepudiation; Digital Signature; Key Distribution and Certification. Areas of Network Management; Network Management Architecture; Internet Network Management Framework; SMI, MIB, SNMP.	04 04 03 04	15

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2S : Java Programming

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	Introduction to java, Java development tools, Java and WWW, Java applications, java building elements: Identifiers, Keywords, variables, constants, operators. Data types and type casting and type conversion. Control Structures: Simple if, If..else, switch statement, Loop structure : For , Do..while, while , loop control using break and continue	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	Objects and classes: class variable, instance variable, class methods, Access specifier, access modifiers. Methods: main method, creating methods, calling methods, overloading methods, abstraction, recursion. Object: Initialization of object using constructors, parameterized constructor, Dynamic Memory allocation, Garbage collection. Passing objects to methods.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Packages: creating and importing packages, Arrays : Declaration, initialization, sorting searching, array of objects. String: String class, StringBuffer, StringTokenizer. Command line arguments. Inheritance: super class, subclass , super keyword, this keyword, final modifier, abstract class, Method overriding. Interface: implementing interfaces.	04 03 03 02 03	15

4	Mar April	UNIT-IV :	Applet: Life cycle of an applet, APPLET tag, passing arguments to an applet, paint, repaint, update methods. Graphics class, AWT class hierarchy, Frames, Layout managers, components, containers. Color class, Font class	04 04 03 04	15
5	April	UNIT-V :	Exception Handling : Error and Exception class, Error handling routine, try , catch , throw, throws, finally, uncaught exceptions, built-in exception, nested try-catch, user defined exception. Thread: Thread class, Runnable interface, states, priority and synchronization. Java I/O classes, File handling.	04 03 03 02 03	15
6	May	UNIT- VI :	. : User Interface: Button, Label, TextField, TeatArea, Choice, List, CheckBox, CheckBox Group, Dialog Boxes, Menu Multiple Windows, Event handling: Event Delegation model, Adapter classes, Event classes, Event Listener Interfaces, Handling Mouse and Keyboard events.	04 04 03 04	15

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Msc .-Ist Semester-2st

2S : Data Structures

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	Introduction, Types of Data Structures, Linear & Nonlinear	04	15
			data structures, Arrays: Arrays as ADT, 1D, 2D,	03	
	Multidimensional Arrays, Memory Representation and		03		
	Applications. Linked List : Concept , Operations : Insert,		02		
	Delete, Traversal, Static implementation using		03		
arrays,Dynamic implementation , Doubly Linked list, Circular list,Linked list applications : Merging of two linked lists.					
2	Jan Feb	UNIT-II :	Stacks: Introduction, Push and Pop operations, Stack	04	15
			implementation using array, Stack applications, Infix to	04	
			Postfix conversion of expression, Expression evaluation,	03	
Recursion. Queues: Introduction, Insert and Delete	04				
operations, Queue implementation using array, Types –					
Priority Queue, Circular queue, Dequeue, Queue					
applications: CPU Scheduling Algorithms FCFS , Round Robin					
algorithm, Stacks and Queues as Linked Lists					
3	Feb Mar	UNIT-III :	Trees:Terminology and Concepts , Binary Tree	04	15
			Representation, Static implementation using arrays , Linked	03	
	representation, Binary Search Tree, Operations on Binary		03		
	search tree - Insert, Delete, Tree Traversals, Representing,		02		
	Threaded binary trees, Height-balanced trees, AVL		03		
Rotations. Searching: Sequential binary tree searches. Unit					

			IV : Searching and Sorti		
4	Mar April	UNIT-IV :	Searching and Sorting :Searching, Concept and need, Techniques, Linear search, Binary search, Indexed sequential search, Sorting, Concept and Need, Performance criteria, Bubble sort, Insertion Sort, Selection Sort, Shell Sort, Quick Sort, Heap Sort, Merge Sor	04 04 03 04	15
5	April	UNIT-V :	Graphs :Terminology and concepts, Graph Representation: Adjacency matrix, Adjacency list, Adjacency multi-list, Traversals: Depth first and Breadth first. Minimum spanning tree, shortest path algorithm, topological ordering, sparse matrices, linked list implementation of graph and graph traversal.	04 03 03 02 03	15
6	May	UNIT- VI :	Indexing: B-tree indexing, Multilevel indexing, B+ tree, Hashing, Collision processing, Bucket hashing, Dynamic hashing, Linear hashing, Extendible hashing, Tries.	04 04 03 04	15

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Msc .-Ist Semester-2st

2S : Software Engineering

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	. System Concept: Definition, Characteristics of System, Elements of System; Types of System: Physical or Abstract Systems, Open or Closed Systems, Man-made Information Systems; Subsystem. System Analyst: Role; Skills: Interpersonal, Technical; Information Gathering Tools (Fact Finding Techniques); Feasibility Study. Introduction to Software Engineering: Definition and Characteristics of Software; Software Application Domains; Software Engineering: Definition, Layered Model.	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	Software Process Framework; Umbrella Activities. Process Models: SDLC (Waterfall); Incremental; Evolutionary Models: RAD, Prototyping, Spiral; Concurrent Development Model; Components based Development Model. Agility: Agile Process: Assumptions, Agility Principles, Human Factors. Software Engineering Practice: Essence of Practice, Core Principles, Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Requirements Engineering: Requirements Engineering Tasks: Inception, Elicitation, Elaboration, Negotiation, Specification, Validation. Requirements Management; Steps in	04 03 03	15

			Requirements Engineering. Requirements Analysis: Objectives; Requirements Modeling Approaches: Scenario-Based Modeling: Use-Case; Class Models: E-R Diagram, Class Diagrams; Flow Oriented Modeling: DFD, CFD; Behavioral Models: State Diagram, Sequence Diagrams	02 03	
4	Mar April	UNIT-IV :	Software Design: Design Process and Quality; Design Concepts: Abstraction, Architecture, Modularity, Information Hiding, Functional Independence, Refinement. Component Level Design: Component-Definition; Object-oriented View, Traditional View, Cohesion, Coupling. Designing Traditional Components: Graphical Design – Notations (Flow Chart), Tabular Design – Notations (Decision Table), Program Design Language (Structured English or Pseudo-code). User Interface Design: Rules; Interface Design Models; Interface Analysis.	04 04 03 04	15
5	April	UNIT-V :	Software Quality: Definition; Garvin’s Quality Dimensions; McCall’s Quality Factors; ISO 9126 Quality Factors. Software Quality Assurance: Elements, Goals, ISO 9001-2000 Quality Standards. Software Metrics: Attributes, Metrics for Requirements Model: Function-based Model (FP). Metrics for Specification Quality, Metrics for Design Model: Architectural Design Metrics. Metrics for Object-Oriented Design, UserInterface Design Metrics, Metrics for Source Code, Metrics for Testing, Metrics for Maintenance.	04 03 03 02 03	15
6	May	UNIT- VI :	Software Testing: Need, Verification and Validation, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging, Test Characteristics. White Box Testing: Flow Graph Notations, Test Cases, Control Structure Testing.	04 04 03 04	15

			Black Box Testing: Graph-based Testing Methods, Equivalence Partitioning, Boundary Value Analysis, Orthogonal Array Testing.		

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2S : Discrete Mathematical Structures

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	. Mathematical logic: Introduction, statements and notations, connectives – negation, conjunction, disjunction, Statement formulas and truth tables, conditional, bi-conditional, well formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal and principal normal forms, completely parenthesized infix and polish notations, Theory of inference for statement calculus – validity using truth table, rules of inference, consistency of premises and indirect method of proof.	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	Set theory: Basic concepts of set theory, representation of discrete structures, relations and ordering: relations, properties of binary relations in a set, relation matrix and graph of a relation, partition and covering of a set, equivalence relation, compatibility relations, composition of binary relations, Functions – composition of functions, Inverse function.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Algebraic Structures: Algebraic systems: Examples and general properties, Semigroups and monoids, Grammar and Languages, Polish expressions and their compilation,	04 03 03	15

			Groups- Definition and examples, subgroups and homomorphism, cosets and Lagrange's theorem, Group codes – the communication model and basic notions, generation of codes by using parity checks, error recovery in group codes	02 03	
4	Mar April	UNIT-IV :	Lattices and Boolean algebra: Lattice as POSETs, definition, examples and properties, Lattice as algebraic systems, sublattices, Direct product and homomorphism, Special lattices, Boolean algebra - definition and examples, subalgebra, Direct product and homomorphism, Boolean functions, representation and minimization of Boolean Finite state machines	04 04 03 04	15
5	April	UNIT-V :	Graph theory: Basic concepts of graph theory – definitions, paths, reachability and connectedness, matrix representation, Storage representation and manipulation of graphs- trees, representation and operations, list structures and graphs, Simple precedence grammars-syntax terminology, a view of parsing, notion and use of precedence relations, formal definiti	04 03 03 02 03	15
6	May	UNIT- VI :	Fault detection in combinational switching circuits – Faults in combinational circuits, Notions of Fault detection, Algorithm for generating a fault matrix, procedure for detection of faults; Introduction to computability theory: Finitestate acceptors and regular grammars, Turing machines and	04 04 03 04	15

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Msc .-Ist Semester-2st

2S : : Compiler Construction

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	. Introduction to Compilers: Overview, typical compiler Structure, implementation. Programming Language Grammars: Elements of formal language grammars, derivation, reduction, syntax tree, ambiguity, regular grammars and expressions.	04	15
	Jan			03	
				03	
				02	
				03	
2	Jan	UNIT-II :	Scanning and Parsing Techniques: The scanner, top-down and bottom-up parsing, syntax directed translation, Symbol table organization, Hash table organization, Linked List and Tree structured symbol tables, symbol table organization for structures and records.	04	15
	Feb			04	
				03	
3	Feb	UNIT-III :	Memory Allocation: Static and dynamic memory allocation, array allocation and access, allocation for strings, structure allocation, common and equivalence allocation. Compilation of expressions.	04	15
	Mar			03	
				03	
				02	
				03	
4	Mar	UNIT-IV :	Compilation of control structures: Control transfers,	04	15
				04	

	April		procedural calls, conditional execution, iteration control constructs	03 04	
5	April	UNIT-V :	Error detection, indication and recovery. Compilation of I/O statements: Compilation of I/O list, compilation of FORMAT list, the I/O routine, file control.	04 03 03 02 03	15
6	May	UNIT- VI :	Code optimization: Major issues, optimizing transformations, local optimizations, program flow analysis, Global optimization, writing compilers.	04 04 03 04	15

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Msc .-Ist Semester-3st

3S : Data Mining and Data Warehousing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Introduction, Data Mining Functionalities, Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	Data Warehouse and OLAP Technology: Overview, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Data Generalization and Concept Description.	04 04 03 04	15
3	Aug Sep	UNIT-III :	Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.	04 03 03 02 03	15

4	Sep Oct	UNIT-IV :	Classification and Prediction: Issues, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation. Prediction: Linear Regression, Nonlinear Regression, Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor.	04 04 03 04	15
5	Oct	UNIT-V :	Cluster Analysis: Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data. Mining Time-Series Data, Mining Sequence Patterns in Biological Data	04 03 03 02 03	15
6	Nov	UNIT- VI :	: Graph Mining, Social Network Analysis and Multirelational Data Mining. Mining Object, Spatial, Multimedia, Text, and Web Data, Data Mining Applications, Trends in Data Mining	04 04 03 04	15

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Msc .-2nd Semester-3st

3S : Computer Graphics

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	. Geometry and line generation: Introduction, points and lines, planes and coordinates, Line segments, perpendicular line segments, vectors, pixels and frame buffers, vector generation, character generation, displaying the frame buffer. Graphics primitive: Introduction, display devices, primitive operations, the Display-File Interpreter, normalized device coordinates, Display-file structure, Display control, Text line style primitives.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. : Polygon: Introduction, Polygon , Polygon representation, Entering polygon, An inside test, filling polygon, Antialiasing. Transformations: Introduction, matrices, scaling transformations, sin and cos, sum of angles, identifiers, rotation, homogeneous coordinates and translation, rotation about an arbitrary point, other transformations, display procedures	04 04 03 04	15
3	Aug Sep	UNIT-III :	Segments: Introduction, the segment table, segment creation, closing a segment, deleting a segment, renaming a segment, visibility, image transformations, saving and showing segments, other display file structures, some raster techniques, Windowing and clipping: Introduction, viewing transformation, implementation, clipping, clipping the	04 03 03 02 03	15

			<p>polygon, adding clipping to the system, a voiding division, generalized clipping, position relative to an arbitrary line, multiple windowing,</p>		
4	Sep Oct	UNIT-IV :	<p>Interaction : Introduction, hardware, input devices, handling algorithm, event handling, sample devices, the detectability attributes, simulating a locator with a pick and pick with a locator, Echoing, Interactive techniques. Three dimension: Introduction, 3D Geometry, primitives and transformations, rotation about an arbitrary axis, parallel projection, perspective projection, viewing parameters, conversion to view plane coordinates, The 3D viewing transformation, , special projection.</p>	<p>04 04 03 04</p>	15
5	Oct	UNIT-V :	<p>Hidden surfaces and lines: Introduction, back face removal, the painter algorithm, collection of polygons, remembering the style, the hidden surface check, decomposition into triangles, comparing two triangles, The minima test, Overlapping edges, containment of points, finding a point in the triangle plane, comparing of the entire triangle, establishing depth order, geometrical sorting, linked list, sorting the triangles.</p>	<p>04 03 03 02 03</p>	15
6	Nov	UNIT- VI :	<p>Shading: Introduction, diffusion, illumination, point source illumination, specular reflection, transparency and shadows. Curves: Introduction, curve generation, implementation, interpolating polygons, E-splines, B-Splines and Curves.</p>	<p>04 04 03 04</p>	15

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Msc .-2nd Semester-3st

3S : Client-Server Computing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Networking in Java: Basics, Socket overview, Client-Server concepts, Proxy servers, Internet addressing, Java Networking classes and interfaces, InetAddress, TCP/IP Client Sockets, URL Connection, TCP/IP Server sockets, Creating TCP client server	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Java Database Connectivity: JDBC concepts, JDBC API, DriverManager, Connection, Statement and ResultSet classes with relevant methods. Prepared and Callable statements, Handling queries, inserts, deletes and updates to database. Displaying query results	04 04 03 04	15
3	Aug Sep	UNIT-III :	Servlets: Structure and lifecycle of Servlets, Servlet API: basics, Various classes & interfaces. Servlet requirements, writing. Running and debugging of Servlets, Concepts of Cookies, State and session management with Servlet API. Server side includes and request forwarding. Servlet chaining. Jdbc Servlets.	04 03 03 02 03	15
4	Sep	UNIT-IV :	JavaScript Overview, Variables, Operators, Data Types,	04	15

	Oct		Control Statements, Functions and Objects, The Window Object: Dialog Boxes, Status Bar Messages, Window Manipulations; The Document Object: Writing to Documents, Dynamic Documents, The Form Object: Working With Form Elements and Their Properties The String and RegExp Objects, Dates and Math ies The String and RegExp Objects, Dates and Math o	04 03 04	
5	Oct	UNIT-V :	Remote Method Invocation (RMI): Object serialization in Java, Concept of remote object, Architecture of RMI application, Java RMI package, classes & Interfaces, Client-Server application using RMI, RMI Servlets, RMI-JDBC Servlets.	04 03 03 02 03	15
6	Nov	UNIT- VI :	. Introduction to JSP; Simple JSP concepts, Request-time expressions. Advanced JSPs: Scripts. conditionals, loops, Try/Catch. Concept of Beans, Properties, Bean instances & serialization; Bean Scopes, Writing Beans, Introspection, Beans & Scriplets..	04 04 03 04	15

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Msc .-2nd Semester-3st

3S : Distributed Operating System

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Introduction to distributed systems: goals of distributed system, hardware and software concepts, design issues. Communication in distributed systems: Layered protocols, ATM networks, the client-server model, remote procedure call and group communication.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Synchronization in distributed systems: Clock Synchronization, mutual exclusion, Election Algorithms, the Bully algorithm, a ring algorithm, atomic transactions, dead lock in distributed systems, distributed dead lock prevention, and distributed dead ock detection.	04 04 03 04	15
3	Aug Sep	UNIT-III :	Processes and processors in distributed systems: Threads, system, models, processor allocation, scheduling in distributed system, fault tolerance and real time distributed systems.	04 03 03 02 03	15
4	Sep Oct	UNIT-IV :	Distributed file systems: Distributed file systems design, distributed file system implementation, trends in distributed file systems. Distributed shared memory: What is shared	04 04 03	15

			memory, consistency models, page based distributed shared memory, shared variable, distributed shared memory, object based DSM.	04	
5	Oct	UNIT-V :	Case Study : AMOEBA : Introduction to AMOEBA, objects and capabilities in AMOEBA, Process Management in AMOEBA, Memory Management in AMOEBA, Communication in AMOEBA. The AMOEBA servers : The Bullet Server - Interface and Implementation, The Directory Server – Interface and Implementation, The Replication Server, The Run Server, The Boot Server, The TCP/IP Server, Other Servers	04 03 03 02 03	15
6	Nov	UNIT- VI :	Case study MACH: Introduction to MACH, Process management, in MACH, Memory management in MACH, communication in MACH, UNIX emulation in MACH. Case study DCE: Introduction to DCE threads, RPC's, Time service, directory service, security service, distributed file system.	04 04 03 04	15

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Msc .-2nd Semester-3st

3S : Theory of Computation

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Strings, alphabets and languages, Graphs and trees, Inductive proofs, set notations, relations, Finite automata and regular Expression: Finite state system, Non deterministic finite automata, Finite automata with ϵ -moves. Deterministic finite automata, equivalence between NFA and DFA, Conversion of NFA to DFA	04 03 03 02 03	15
2	July - Aug	UNIT-II :	Regular set and regular expression, Two way finite automata, finite automat with output, Applications of finite automata. Equivalence of RE and FA, Inter conversion, pumping lemma, closure property of regular sets, Regular grammars, Right linear and Left linear grammar, equivalence between Regular linear grammar and FA inter conversion between RE and RG	04 04 03 04	15
3	Aug Sep	UNIT-III :	Context free grammar, derivation trees, Chomsky Normal Form, Greibach Normal Form. Push Down Automata: Definition, model, acceptance of CFL, equivalence of CFL and PDA , Interconversion, Enumeration of properties of CFL.	04 03 03 02 03	15
4	Sep Oct	UNIT-IV :	Turing Machine: Definition, model, Design of turing machine, computable languages and function, Techniques of	04 04 03	15

			turing machine construction, Modifications of Turing machine, Church's Hypothesis.	04	
5	Oct	UNIT-V :	, Chomsky Hierarchy of languages, Linear bounded automata and context sensitive languages, Introduction of DCFL and DPDA, Decidability of problems.	04 03 03 02 03	15
6	Nov	UNIT- VI :	. I: Undecidability : Properties of recursive & non recursive enumerable languages, universal turing machine, post correspondence problem, introduction to recursive function theory.	04 04 03 04	15

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Msc .-2nd Semester-4st

4S : Artificial Intelligence and Expert Systems

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	Prolog Programming: Introduction to turbo prolog, introduction to language, structure of language, cut, fail, recursion, lists and complex structures, interactive programming, expert system in prolog.	04	15
	Jan			03	
				03	
				02	
				03	
2	Jan	UNIT-II :	Introduction: Definition of AI, AI technique, tic-tac-toe, pattern recognition, level of the model, criteria for success, problems and problem spaces, defining the problems, production systems, control strategies, heuristic search, problem characteristics, decomposition of problems, solution steps, predictability, absolute and relative solutions.	04	15
	Feb			04	
				03	
				04	
3	Feb	UNIT-III :	Basic problem solving methods, reasoning, problem trees and graphs, knowledge representation, matching indexing with variables, heuristic functions, weak methods, problem reduction, constraints satisfaction, means-ends analysis, analysis of search algorithms.	04	15
	Mar			03	
				03	
				02	
				03	
4	Mar	UNIT-IV :	Game Playing: Minimax search procedure, adding alphabeta cutoffs, additional refinements, waiting for quiescence, secondary search, using book moves limitations.	04	15
	April			03	

				04	
5	April	UNIT-V :	Knowledge representation using predicate logic: representing simple facts in logic, augmenting the representation, structural representation of knowledge: some common knowledge structures, choosing the level of representation, finding the right structure as needed, declarative representation	04 03 03 02 03	15
6	May	UNIT- VI :	. Natural Language Understanding: Concept of understanding, keyword matching, syntactic and semantic analysis, understanding, language generation and matching translation. General concepts of implementation of AI systems. Introduction to pattern recognition. Rule based systems, semantics of CFL, semantic network, frames, frame kit. Application, introduction to knowledge engineering, artificial neural network: introduction, learning: single and multilayer networks	04 04 03 04	15

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Msc .-2nd Semester-4st

4S : Design and Analysis of Algorithms

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	Introduction: algorithm, writing algorithms in SPARKS, structured program, analyzing algorithms, Divide and conquer: The general method, Binay Search, Finding minimum and maximum, merge sort, quick sort, selection sort, Strassen's matrix multiplication.	04	15
	Jan			03	
				03	
				02	
				03	
2	Jan	UNIT-II :	. Greedy Method: The general method, Optimal storage on tapes, Knapsack problem, Job sequencing with deadlines, Optimal merge patterns, minimum spanning trees, Single source shortest path. Dynamic programming: General method, multistage graph, all pair shortest paths, Optimal binary search trees, 0/1 knapsack , Travelling salesperson problem, flow shop scheduling.	04	15
	feb			04	
				03	
3	Feb	UNIT-III :	Basic Search and Traversal techniques: General method, code optimization, AND/OR graph, game trees, biconnected components and depth first search , Back tracking : General method, 8-queens problem, sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem.	04	15
	Mar			03	
				03	
				02	
				03	
4	Mar	UNIT-IV :	Branch and bound: General method, 0/1 knapsack problem, Travelling salesperson, efficiency considerations, Algebraic simplification and transformations: General method,	04	15
	April			03	

			evaluation and interpolation, fast Fourier transform, modular arithmetic	04	
5	April	UNIT-V :	Lower bound theory: comparison trees for sorting and searching, Oracle and adversary arguments, techniques for algebraic problems, some lower bounds and parallel computation.	04 03 03 02 03	15
6	May	UNIT- VI :	NP-Hard and NP-Complete problems: basic concept, cook's theorem, NP-Hard graph problem, NP-Hard scheduling problem, NP-Hard code generation problem.	04 04 03 04	15

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Msc .-2nd Semester-4st

4S : Network Security

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	. Introduction: Terminology, Notation, Networking Security	04	15
			Attacks, Layers And Cryptography, Authorization, Tempest,	03	
			Keys, Viruses, Worms, Trojan Horses, Multilevel Model of	03	
			Security, Legal Issues	02	
				03	
2	Jan feb	UNIT-II :	. Cryptography: Introduction, Breaking an Encryption	04	15
			Scheme, Types of Cryptographic Function, Respective	04	
			Algorithms, Standards and Modes of Operation, Hashes and	03	
			Message Digests.	04	
3	Feb Mar	UNIT-III :	Authentication: Overview of Authentication System,	04	15
			Password-based Authentication, Address-based	03	
			Authentication, Cryptographic Authentication Protocols,	03	
			Keys, Trusted Intermediaries, Authentication of People,	02	
			Security Handshake Pitfalls: Login Only, Mutual	03	
4	Mar	UNIT-IV :	Standards: Kerberos V4: Tickets, Kerberos V5: ASN.1, Names,	04	15

	April		Delegation of Rights, Ticket Lifetimes, Key Versions, Optimizations. Cryptographic Algorithms, Kerberos V5 Messages, Real Time Communication Security: IPSec: AH & ESP: Overview of IPSEC, IP and IPV6, AH (Authentication Header), ESP (Encapsulating Security Payload)	04 03 04	
5	April	UNIT-V :	E-mail Security: Distribution Lists, Store and Forward, Security Services for E-Mail, Establishing Keys, Privacy, Authentication of Source, Message Integrity, Non Repudiation, Proof of Submission, Proof of Delivery, Message Flow Confidentiality, Anonymity, Containment. PEM and S/MIME, PGP	04 03 03 02 03	15
6	May	UNIT- VI :	Firewalls: Packet Filters, Application Level Gateways, Encrypted Tunnels, Comparisons. Security Systems: Netware V3, Netware V4, Microsoft Windows Security. Web Issues: URLs/URIs, HTTP, Cookies. Web Security Problems.	04 04 03 04	15

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Msc .-2nd Semester-4st

4S : Mobile Communications

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	. Mobile Communication: Applications, History, Market, Simplified Reference Model. Frequencies, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular System.	04	15
	Jan			03	
				03	
				02	
				03	
2	Jan feb	UNIT-II :	. Medium Access Control: Need, SDMA, FDMA, TDMA, CDMA, Comparison of S/T/F/CDMA. Telecommunica	04	15
				04	
				03	
				04	
3	Feb	UNIT-III :	,. Satellite Systems: History, Applications, Basics, Routing, Localization, Handover, Examples. Broadcast Systems: Overview, Cyclical Repetition of Data, Digital Audio Broadcasting, Digital Video Broadcasting, C	04	15
	Mar			03	
				03	
				02	
				03	
4	Mar	UNIT-IV :	Wireless LAN: Infrared Versus Radio Transmission, Infrastructure and Adhoc Network, IEEE 802.11, HIPERLAN, Bluetooth.	04	15
	April			04	
				03	

				04	
5	April	UNIT-V :	Layers: Mobile Network Layer: Mobile IP, DHCP, Mobile Adhoc Networks. Mobile Transport Layer: Traditional TCP, Classical TCP improvements, TCP over 2.5/3G Wireless Networks.	04 03 03 02 03	15
6	May	UNIT- VI :	. Support For Mobility: File Systems, World Wide Web, Wireless Application Protocol, i-Mode, SyncML, WAP2.0.	04 04 03 04	15

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Msc .-2nd Semester-4st

4S : Digital Image Processing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	. I : Introduction: Definition, Origins, Examples: X-ray	04	15
	Jan		Imaging, Ultraviolet Band, Visible and Infrared Bands,	03	
			Microwave Band, and Radio Band Imaging; Fundamental	03	
			Steps, Components of an Image Processing System Digital	02	
			Image Fundamentals: Elements of Visual Perception, Light	03	
	and the Electromagnetic Spectrum, Image Sensing and				
	Acquisition, A Simple Image Formation Model; Image				
	Sampling and Quantization; Basic Relationships Between				
	Pixels; Linear and Nonlinear Operations.				
2	Jan	UNIT-II :	: Image Enhancement in the Spatial Domain: Basic Gray Level	04	15
	feb		Transformations; Histogram Processing - Histogram	04	
			Equalization, Histogram Matching (Specification), Local	03	
			Enhancement; Enhancement Using Arithmetic/Logic	04	
			Operations; Basics of Spatial Filtering, Smoothing Spatial		
			Filters: Smoothing Linear, Smoothing Order-Statistics Filters;		
			Sharpening Spatial Filters : The Laplacian, The Gradient;		
			Combining Spatial Enhancement Methods		
3	Feb	UNIT-III :	Image Enhancement in the Frequency Domain: Introduction	04	15
	Mar		to the Fourier Transform and the Frequency Domain:	03	
			OneDimensional Fourier Transform and its Inverse,	03	
			TwoDimensional DFT and Its Inverse, Filtering in the	02	

			Frequency Domain, Correspondence between Filtering in the Spatial and Frequency Domains; Smoothing and Frequency-Domain Filters - Ideal , Butterworth, and Gaussian Lowpass Filters; Sharpening Frequency Domain Filters - Ideal , Butterworth, and Gaussian Highpass Filters, Laplacian in the Frequency Domain, Unsharp Masking, High-Boost Filtering, and High-Frequency Emphasis Filtering; Homomorphic Filtering; Implementation: Additional Properties of the 2-D Fourier Transform, Inverse Fourier Transform Using a Forward Transform Algorithm, Need for Padding, Convolution and Correlation Theorems, The Fast Fourier Transform;	03	
4	Mar April	UNIT-IV :	Image Restoration: Model of the Image Degradation/ Restoration Process, Noise Models: Restoration in the Presence of Noise Only Spatial Filtering: Mean, Order-Statistics, and Adaptive Filters; Periodic Noise Reduction by Frequency Domain Filtering: Bandreject, Bandpass, and Notch Filtering; Estimating the Degradation Function - Estimation by Image Observation, Experimentation and Modeling; Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Geometric Mean Filter; Geometric Transformations: Spatial Transformations, Gray-Level Interpolation	04 04 03 04	15
5	April	UNIT-V :	Color Image Processing: Color Fundamentals, Color Models; Pseudocolor Image Processing; Full-Color Image Processing, Color Transformations: Formulation, Color Complements, Color Slicing, Tone and Color Corrections, Histogram Processing; Smoothing and Sharpening, Color Segmentation, Noise in Color Images. Morphological Image Processing:	04 03 03 02 03	15

			Preliminaries, Dilation and Erosion, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms: Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening, Skeletons, Pruning; Extensions to Gray-Scale Images.		
6	May	UNIT- VI :	. image Segmentation: Detection of Discontinuities: Point, Line, Edge Detection; Edge Linking and Boundary Detection: Local Processing, Global Processing via the Hough Transform, Global Processing via Graph-Theoretic Techniques; Thresholding: Role of Illumination, Basic Global Thresholding, Basic Adaptive Thresholding, Optimal Global and Adaptive Thresholding, Use of Boundary Characteristics for Histogram Improvement and Local Thresholding, Thresholds Based on Several Variables; Region-Based Segmentation: Region Growing, Region Splitting and Merging	04 04 03 04	15

Msc .-2nd Semester-4st**4S : Software Testing**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	. Testing: Introduction and Outline - Introduction to testing and test outline, sample application, incremental testing approach, outline approach steps, evaluation and schedule estimation.	04	15
	Jan			03	
				03	
				02	
				03	
2	Jan feb	UNIT-II :	Introduction to test outline to test cases, creating test cases, documentation short cuts, introduction to using tables and spreadsheets, sample application, Documenting test cases.	04	15
				04	
				03	
				04	
3	Feb	UNIT-III :	Introduction to test outline to test cases, creating test cases, documentation short cuts, introduction to using tables and spreadsheets, sample application, Documenting test cases.	04	15
	Mar			03	
				03	
				02	
				03	
4	Mar	UNIT-IV :	Testing Web Applications: Introduction, sample application, functional and usability issues, configuration and compatibility testing, reliability and availability, security	04	15
	April			04	
				03	

			testing, database testing, post implementation testing.	04	
5	April	UNIT-V :	Reducing the No. of test cases: Introduction, prioritization guidelines, priority category scheme, Risk analysis, interviewing to identify problem areas, combination schemes, tracking selected test cases.	04 03 03 02 03	15
6	May	UNIT- VI :	Creating Quality Software: Introduction, development environmental infrastructure, software testing environment, software testing tools, applying software standards to test documentation.	04 04 03 04	15

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Msc .-Ist Semester-Ist

1S : Digital Systems and Microprocessor

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Representation of integers and floating point nos., Boolean Algebra: laws, simplification of logic equations using Boolean laws, SOP and POS, standard forms of SOP and POS, Karnaugh Maps don't care conditions in K-map	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Design of Arithmetic circuits: Half Adder, half subtractor, full adder, full subtractor, parallel binary adder, subtraction using 1's and 2's compliment schemes, use of adder as subtractor, controlled parallel adder, ALU IC 74181.	04 04 03 04	15
3	Aug Sep	UNIT-III :	Design of Arithmetic circuits: Half Adder, half subtractor, full adder, full subtractor, parallel binary adder, subtraction using 1's and 2's compliment schemes, use of adder as subtractor, controlled parallel adder, ALU IC 74181	04 03 03 02 03	15
4	Sep Oct	UNIT-IV :	Flip Flops: construction and working of RS, JK, MS-JK, D and T Flip flops. Shift registers and Counters: Buffer register,	04 04 03	15

			controlled buffer register, shift registers: SISO, SIPO, PISO, PIPO, bidirectional shift register, ring counter, twisted ring counter, applications of shift registers; Counters: asynchronous counter designs, synchronous counter, UP/DOWN counters, lock out in counters	04	
5	Oct	UNIT-V :	Overview of microcomputer system, evolution of microprocessors, architecture of 8086 microprocessor, pin diagram, signal description, register organisation, concept of pipelining, memory segmentation, memory address generation, modes of operation of 8086 (minimum and maximum).	04 03 03 02 03	15
6	Nov	UNIT- VI :	. Stack structure, interrupts in 8086 microprocessor, interrupt responses, Interrupt Vector Table, H/W and S/W interrupt processing; Interfacing: absolute and linear decoding, I/O mapped I/O and Memory Mapped I/O, memory interfacing (Even and Odd Banks), interfacing of keyboards, interfacing of displays, interfacing if ADC and DAC, address mapping.	04 04 03 04	15

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Department of Computer Science

Teaching Plan Session-2021-22

Msc .-Ist Semester-Ist

1S : Net Technologies and C#

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Understanding .net: The C# environment: origins of .net technology, .net framework, the common language runtime, framework base classes, user and program interfaces, visual studio .net, .net languages, benefits, c# and .net	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Overview of C#: namespaces, comments, aliases for namespaces, command-line arguments, program structure; Literals, variables and data types, operators, expressions, Decision making and branching, looping, methods in c#, Array handling, string manipulation, structures and enumerations	04 04 03 04	15
3	Aug Sep	UNIT-III :	Classes and objects: Principle of OOP, Access modifiers, constructors, destructors, Nesting of classes; Inheritance and Polymorphism: multilevel inheritance, hierarchical inheritance, overriding, hiding methods, abstract methods and classes, sealed classes and methods; Interfaces: defining, extending and implementing interfaces, interfaces and inheritance, explicit interface implementation, abstract class and interfaces.	04 03 03 02 03	15
4	Sep	UNIT-IV :	Operator overloading: unary, binary, comparison, Delegates	04	15

	Oct		and events; Console I/O operations: console class, console inputoutput, formatted output. Errors and Exceptions: types of errors, exceptions, exception handling codes, multiple catch statements, exception hierarchy, catch handler, finally statement, nested try blocks.	04 03 04	
5	Oct	UNIT-V :	Multithreading in c#: Introduction, System. Threading namespace, scheduling, synchronizing threads, thread pooling. File Manipulation: Managing File System, Moving, copying, deleting files, Reading, writing to files, Reading Drive information, File Security	04 03 03 02 03	15
6	Nov	UNIT- VI :	. Data Access with .Net: ADO.net overview, Database connections, commands, the Data Reader, the DataSet class, populating a DataSet, persisting a DataSet.	04 04 03 04	15

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Msc .-Ist Semester-Ist

1S : Operating System

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Services, Types, User-O.S. Interface: Command Interpreter, Graphical User Interface; System Calls; System Programs; Operating System Structure: Simple, Layered Approach; Micro-kernels, Modules; Virtual Machine; System	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Process Management: Process Concept, Process States, Process Control Block, Process Scheduling: Schedulers, Context Switch; Operations on Process: Creation, Termination, Inter Process Communication; Threads: Concept, Benefits; CPU Scheduling: Burst Cycle, Types of Scheduling, Scheduler, Dispatcher, Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, Priority Scheduling, Round-Robin, [multiple processor	04 04 03 04	15
3	Aug Sep	UNIT-III :	Process Synchronization and Deadlocks: Critical Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors. Deadlock: System Model, Deadlock Characterization, Resource Allocation Graph, Methods for handling Deadlock: Prevention, Avoidance and Detection; Recovery from Deadlock: Process Termination	04 03 03 02 03	15

4	Sep Oct	UNIT-IV :	Memory Management: [Basic Hardware, Address Binding]; Logical and Physical Address Space, Swapping, Contiguous Allocation, Dynamic Storage Allocation: First-fit, Best-Fit, Worst-fit; Fragmentation; Paging; Segmentation. Virtual Memory: Introduction, Virtual Address Space, Demand Paging, Copy-on-write, Page Replacement: Concept, Page Replacement Algorithms: FIFO, Optimal Page Replacement, LRU, Second-Chance Page Replacement; Thrashing, I/O Interlock.	04 04 03 04	15
5	Oct	UNIT-V :	File System: File: Concept, Attributes, Operations; File Organization and Access: Sequential, Index Sequential, Indexed, Direct or Hash File. Directory: Operations, Structures. Protection: Access Control and Permissions. File System Structure, Allocation Methods, Free Space Management. Disk Structure, Disk Scheduling Algorithms: FCFS, SSTF, SCAN, C-SCAN, LOOK. [Disk Management, Swap Space Management], RAID: Concept. I/O Systems: I/O Hardware, Interrupts, DMA, Application I/O Interface, Kernel I/O	04 03 03 02 03	15
6	Nov	UNIT- VI :	.. : Distributed File System: Concept, Naming and Transparency, Remote File Access, Stateful Vs Stateless Service, File Replication, Remote Login, Remote File Transfer, Data Migration, Computation Migration, Process Migration. Embedded Operating Systems: Embedded Systems: Definition, Requirements and Constraints, Organization of Embedded System; Characteristics of Embedded Operating Systems.	04 04 03 04	15

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Msc .-Ist Semester-Ist

1S : Computer Networks

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Digital Communication: Advantages; Data Transmission: Modes: Parallel, Serial: Asynchronous, Synchronous, Isochronous; Transmission Media: Guided and unguided; Modulation: Amplitude, Phase Shift, Frequency, QAM; Multiplexing: FDM, WDM, TDM, STDM, CDM; Switching: Circuit, Message, Packet; Delays in Packet Switched Network, Packet Loss; Network Reference Models: OSI: Layered Architecture and Services, TCP/IP: Layered Architecture and Services	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Application Layer: Principles of Application Layer Protocols; Processes: Client-Server Model, Socket Interface; Services required by Application Layer; HTTP: Introduction, RTT, HTTP Handshake, types of HTTP Connections, HTTP Messages, Authentication and Cookies; FTP: Service Model, FTP Commands; Electronic Mail; SMTP; DNS: Services and	04 04 03 04	15
3	Aug Sep	UNIT-III :	Transport Layer: Transport-Layer Services and Principles; Multiplexing and Demultiplexing Applications; Connectionless Transport – UDP; Principles of Reliable of Data Transfer (RDT); Stop-and-wait and Pipelined protocols; GBN protocol; Connection-Oriented Transport: TCP; Flow	04 03 03 02 03	15

			Control; Principles of Congestion Control; Approaches towards Congestion Control; TCP Congestion Control		
4	Sep Oct	UNIT-IV :	Network Layer: Introduction; Network Service Model: Datagram, Virtual Circuit; Routing Principles; Routing Algorithms: Classifications; Hierarchical Routing; Internet Protocol: IP Addressing, IPv4: Classes and Packet format, DHCP; ICMP; Routing in the Internet: RIP, OSPF, BGP; Router; IPv6; Multicast Routing	04 04 03 04	15
5	Oct	UNIT-V :	Data Link Layer: Introduction; Services; Error Detection and Correction; Multiple Access Protocols and LANs; LAN Addresses and ARP; Ethernet; Hubs, Bridges and Switches; Wireless LANs: IEEE 802.11; The Point-to-Point Protocol; ATM, X.25 and Frame Relay	04 03 03 02 03	15
6	Nov	UNIT- VI :	. Network Security and Management: Secured Communication: Threats and Characteristics; Cryptography: Principles of Cryptography, Symmetric Key Cryptography, Public Key Cryptography; Privacy, Authentication, Integrity, Nonrepudiation; Digital Signature; Key Distribution and Certification. Areas of Network Management; Network Management Architecture; Internet Network Management Framework; SMI, MIB, SNMP.	04 04 03 04	15

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Msc .-Ist Semester-2st

2S : Java Programming

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	Introduction to java, Java development tools, Java and WWW, Java applications, java building elements: Identifiers, Keywords, variables, constants, operators. Data types and type casting and type conversion. Control Structures: Simple if, If..else, switch statement, Loop structure : For , Do..while, while , loop control using break and continue	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	Objects and classes: class variable, instance variable, class methods, Access specifier, access modifiers. Methods: main method, creating methods, calling methods, overloading methods, abstraction, recursion. Object: Initialization of object using constructors, parameterized constructor, Dynamic Memory allocation, Garbage collection. Passing objects to methods.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Packages: creating and importing packages, Arrays : Declaration, initialization, sorting searching, array of objects. String: String class, StringBuffer, StringTokenizer. Command line arguments. Inheritance: super class, subclass , super keyword, this keyword, final modifier, abstract class, Method overriding. Interface: implementing interfaces.	04 03 03 02 03	15
4	Mar	UNIT-IV :	Applet: Life cycle of an applet, APPLET tag, passing	04 04	15

	April		arguments to an applet, paint, repaint, update methods. Graphics class, AWT class hierarchy, Frames, Layout managers, components, containers. Color class, Font class	03 04	
5	April	UNIT-V :	Exception Handling : Error and Exception class, Error handling routine, try , catch , throw, throws, finally, uncaught exceptions, built-in exception, nested try-catch, user defined exception. Thread: Thread class, Runnable interface, states, priority and synchronization. Java I/O classes, File handling.	04 03 03 02 03	15
6	May	UNIT- VI :	. : User Interface: Button, Label, TextField, TeatArea, Choice, List, CheckBox, CheckBox Group, Dialog Boxes, Menu Multiple Windows, Event handling: Event Delegation model, Adapter classes, Event classes, Event Listener Interfaces, Handling Mouse and Keyboard events.	04 04 03 04	15

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Msc .-Ist Semester-2st

2S : Data Structures

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	Introduction, Types of Data Structures, Linear & Nonlinear data structures, Arrays: Arrays as ADT, 1D, 2D, Multidimensional Arrays, Memory Representation and Applications. Linked List : Concept , Operations : Insert, Delete, Traversal, Static implementation using arrays, Dynamic implementation , Doubly Linked list, Circular list, Linked list applications : Merging of two linked lists.	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	Stacks: Introduction, Push and Pop operations, Stack implementation using array, Stack applications, Infix to Postfix conversion of expression, Expression evaluation, Recursion. Queues: Introduction, Insert and Delete operations, Queue implementation using array, Types – Priority Queue, Circular queue, Dequeue, Queue applications: CPU Scheduling Algorithms FCFS , Round Robin algorithm, Stacks and Queues as Linked Lists	04 04 03 04	15
3	Feb Mar	UNIT-III :	Trees: Terminology and Concepts , Binary Tree Representation, Static implementation using arrays , Linked representation, Binary Search Tree, Operations on Binary search tree - Insert, Delete, Tree Traversals, Representing, Threaded binary trees, Height-balanced trees, AVL Rotations. Searching: Sequential binary tree searches. Unit	04 03 03 02 03	15

			IV : Searching and Sorti		
4	Mar April	UNIT-IV :	Searching and Sorting :Searching, Concept and need, Techniques, Linear search, Binary search, Indexed sequential search, Sorting, Concept and Need, Performance criteria, Bubble sort, Insertion Sort, Selection Sort, Shell Sort, Quick Sort, Heap Sort, Merge Sor	04 04 03 04	15
5	April	UNIT-V :	Graphs :Terminology and concepts, Graph Representation: Adjacency matrix, Adjacency list, Adjacency multi-list, Traversals: Depth first and Breadth first. Minimum spanning tree, shortest path algorithm, topological ordering, sparse matrices, linked list implementation of graph and graph traversal.	04 03 03 02 03	15
6	May	UNIT- VI :	Indexing: B-tree indexing, Multilevel indexing, B+ tree, Hashing, Collision processing, Bucket hashing, Dynamic hashing, Linear hashing, Extendible hashing, Tries.	04 04 03 04	15

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Msc .-Ist Semester-2st

2S : Software Engineering

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	. System Concept: Definition, Characteristics of System,	04	15
	Jan		Elements of System; Types of System: Physical or Abstract	03	
			Systems, Open or Closed Systems, Man-made Information	03	
			Systems; Subsystem. System Analyst: Role; Skills:	02	
			Interpersonal, Technical; Information Gathering Tools (Fact Finding Techniques); Feasibility Study. Introduction to	03	
		Software Engineering: Definition and Characteristics of Software; Software Application Domains; Software Engineering: Definition, Layered Model.			
2	Jan	UNIT-II :	Software Process Framework; Umbrella Activities. Process	04	15
			Models: SDLC (Waterfall); Incremental; Evolutionary Models:	04	
	Feb		RAD, Prototyping, Spiral; Concurrent Development Model; Components based Development Model. Agility: Agile Process: Assumptions, Agility Principles, Human Factors. Software Engineering Practice: Essence of Practice, Core Principles, Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles.	03 04	
3	Feb	UNIT-III :	Requirements Engineering: Requirements Engineering Tasks:	04	15
			Inception, Elicitation, Elaboration, Negotiation, Specification,	03	
	Mar		Validation. Requirements Management; Steps in	03	

			Requirements Engineering. Requirements Analysis: Objectives; Requirements Modeling Approaches: Scenario-Based Modeling: Use-Case; Class Models: E-R Diagram, Class Diagrams; Flow Oriented Modeling: DFD, CFD; Behavioral Models: State Diagram, Sequence Diagrams	02 03	
4	Mar April	UNIT-IV :	Software Design: Design Process and Quality; Design Concepts: Abstraction, Architecture, Modularity, Information Hiding, Functional Independence, Refinement. Component Level Design: Component-Definition; Object-oriented View, Traditional View, Cohesion, Coupling. Designing Traditional Components: Graphical Design – Notations (Flow Chart), Tabular Design – Notations (Decision Table), Program Design Language (Structured English or Pseudo-code). User Interface Design: Rules; Interface Design Models; Interface Analysis.	04 04 03 04	15
5	April	UNIT-V :	Software Quality: Definition; Garvin’s Quality Dimensions; McCall’s Quality Factors; ISO 9126 Quality Factors. Software Quality Assurance: Elements, Goals, ISO 9001-2000 Quality Standards. Software Metrics: Attributes, Metrics for Requirements Model: Function-based Model (FP). Metrics for Specification Quality, Metrics for Design Model: Architectural Design Metrics. Metrics for Object-Oriented Design, UserInterface Design Metrics, Metrics for Source Code, Metrics for Testing, Metrics for Maintenance.	04 03 03 02 03	15
6	May	UNIT- VI :	Software Testing: Need, Verification and Validation, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging, Test Characteristics. White Box Testing: Flow Graph Notations, Test Cases, Control Structure Testing.	04 04 03 04	15

			Black Box Testing: Graph-based Testing Methods, Equivalence Partitioning, Boundary Value Analysis, Orthogonal Array Testing.		

2S : Discrete Mathematical Structures

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec Jan	UNIT-I :	. Mathematical logic: Introduction, statements and notations, connectives – negation, conjunction, disjunction, Statement formulas and truth tables, conditional, bi-conditional, well formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal and principal normal forms, completely parenthesized infix and polish notations, Theory of inference for statement calculus – validity using truth table, rules of inference, consistency of premises and indirect method of proof.	04 03 03 02 03	15
2	Jan Feb	UNIT-II :	Set theory: Basic concepts of set theory, representation of discrete structures, relations and ordering: relations, properties of binary relations in a set, relation matrix and graph of a relation, partition and covering of a set, equivalence relation, compatibility relations, composition of binary relations, Functions – composition of functions, Inverse function.	04 04 03 04	15
3	Feb Mar	UNIT-III :	Algebraic Structures: Algebraic systems: Examples and general properties, Semigroups and monoids, Grammar and Languages, Polish expressions and their compilation, Groups- Definition and examples, subgroups and	04 03 03 02	15

			homomorphism, cosets and Lagrange's theorem, Group codes – the communication model and basic notions, generation of codes by using parity checks, error recovery in group codes	03	
4	Mar April	UNIT-IV :	Lattices and Boolean algebra: Lattice as POSETs, definition, examples and properties, Lattice as algebraic systems, sublattices, Direct product and homomorphism, Special lattices, Boolean algebra - definition and examples, subalgebra, Direct product and homomorphism, Boolean functions, representation and minimization of Boolean Finite state machines	04 04 03 04	15
5	April	UNIT-V :	Graph theory: Basic concepts of graph theory – definitions, paths, reachability and connectedness, matrix representation, Storage representation and manipulation of graphs- trees, representation and operations, list structures and graphs, Simple precedence grammars-syntax terminology, a view of parsing, notion and use of precedence relations, formal definiti	04 03 03 02 03	15
6	May	UNIT- VI :	Fault detection in combinational switching circuits – Faults in combinational circuits, Notions of Fault detection, Algorithm for generating a fault matrix, procedure for detection of faults; Introduction to computability theory: Finitestate acceptors and regular grammars, Turing machines and	04 04 03 04	15

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Department of Computer Science

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Msc .-Ist Semester-2st

2S : : Compiler Construction

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	. Introduction to Compilers: Overview, typical compiler Structure, implementation. Programming Language Grammars: Elements of formal language grammars, derivation, reduction, syntax tree, ambiguity, regular grammars and expressions.	04	15
	Jan			03	
				03	
				02	
				03	
2	Jan	UNIT-II :	Scanning and Parsing Techniques: The scanner, top-down and bottom-up parsing, syntax directed translation, Symbol table organization, Hash table organization, Linked List and Tree structured symbol tables, symbol table organization for structures and records.	04	15
	Feb			04	
				03	
				04	
3	Feb	UNIT-III :	Memory Allocation: Static and dynamic memory allocation, array allocation and access, allocation for strings, structure allocation, common and equivalence allocation. Compilation of expressions.	04	15
	Mar			03	
				03	
				02	
				03	
4	Mar	UNIT-IV :	Compilation of control structures: Control transfers, procedural calls, conditional execution, iteration control constructs	04	15
	April			04	
				03	

				04	
5	April	UNIT-V :	Error detection, indication and recovery. Compilation of I/O statements: Compilation of I/O list, compilation of FORMAT list, the I/O routine, file control.	04 03 03 02 03	15
6	May	UNIT- VI :	Code optimization: Major issues, optimizing transformations, local optimizations, program flow analysis, Global optimization, writing compilers.	04 04 03 04	15

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Msc .-2nd Semester-3st

3S : Data Mining and Data Warehousing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Introduction, Data Mining Functionalities, Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	Data Warehouse and OLAP Technology: Overview, A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Data Generalization and Concept Description.	04 04 03 04	15
3	Aug Sep	UNIT-III :	Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining Various Kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.	04 03 03 02 03	15
4	Sep	UNIT-IV :	Classification and Prediction: Issues, Classification by	04 04	15

			Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation. Prediction: Linear Regression, Nonlinear Regression, Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor.	03 04	
5	Oct	UNIT-V :	Cluster Analysis: Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data. Mining Time-Series Data, Mining Sequence Patterns in Biological Data	04 03 03 02 03	15
6	Nov	UNIT- VI :	: Graph Mining, Social Network Analysis and Multirelational Data Mining. Mining Object, Spatial, Multimedia, Text, and Web Data, Data Mining Applications, Trends in Data Mining	04 04 03 04	15

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Msc .-2nd Semester-3st

3S : Computer Graphics

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	. Geometry and line generation: Introduction, points and lines, planes and coordinates, Line segments, perpendicular line segments, vectors, pixels and frame buffers, vector generation, character generation, displaying the frame buffer. Graphics primitive: Introduction, display devices, primitive operations, the Display-File Interpreter, normalized device coordinates, Display-file structure, Display control, Text line style primitives.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. : Polygon: Introduction, Polygon , Polygon representation, Entering polygon, An inside test, filling polygon, Antialiasing. Transformations: Introduction, matrices, scaling transformations, sin and cos, sum of angles, identifiers, rotation, homogeneous coordinates and translation, rotation about an arbitrary point, other transformations, display procedures	04 04 03 04	15
3	Aug Sep	UNIT-III :	Segments: Introduction, the segment table, segment creation, closing a segment, deleting a segment, renaming a segment, visibility, image transformations, saving and showing segments, other display file structures, some raster techniques, Windowing and clipping: Introduction, viewing transformation, implementation, clipping, clipping the	04 03 03 02 03	15

			<p>polygon, adding clipping to the system, a voiding division, generalized clipping, position relative to an arbitrary line, multiple windowing,</p>		
4	Sep	UNIT-IV :	<p>Interaction : Introduction, hardware, input devices, handling algorithm, event handling, sample devices, the detectability attributes, simulating a locator with a pick and pick with a locator, Echoing, Interactive techniques. Three dimension: Introduction, 3D Geometry, primitives and transformations, rotation about an arbitrary axis, parallel projection, perspective projection, viewing parameters, conversion to view plane coordinates, The 3D viewing transformation, , special projection.</p>	<p>04 04 03 04</p>	15
5	Oct	UNIT-V :	<p>Hidden surfaces and lines: Introduction, back face removal, the painter algorithm, collection of polygons, remembering the style, the hidden surface check, decomposition into triangles, comparing two triangles, The minima test, Overlapping edges, containment of points, finding a point in the triangle plane, comparing of the entire triangle, establishing depth order, geometrical sorting, linked list, sorting the triangles.</p>	<p>04 03 03 02 03</p>	15
6	Nov	UNIT- VI :	<p>Shading: Introduction, diffusion, illumination, point source illumination, specular reflection, transparency and shadows. Curves: Introduction, curve generation, implementation, interpolating polygons, E-splines, B-Splines and Curves.</p>	<p>04 04 03 04</p>	15

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Msc .-2nd Semester-3st

3S : Client-Server Computing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Networking in Java: Basics, Socket overview, Client-Server concepts, Proxy servers, Internet addressing, Java Networking classes and interfaces, InetAddress, TCP/IP Client Sockets, URL Connection, TCP/IP Server sockets, Creating TCP client server	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Java Database Connectivity: JDBC concepts, JDBC API, DriverManager, Connection, Statement and ResultSet classes with relevant methods. Prepared and Callable statements, Handling queries, inserts, deletes and updates to database. Displaying query results	04 04 03 04	15
3	Aug Sep	UNIT-III :	Servlets: Structure and lifecycle of Servlets, Servlet API: basics, Various classes & interfaces. Servlet requirements, writing. Running and debugging of Servlets, Concepts of Cookies, State and session management with Servlet API. Server side includes and request forwarding. Servlet chaining. Jdbc Servlets.	04 03 03 02 03	15
4	Sep	UNIT-IV :	JavaScript Overview, Variables, Operators, Data Types,	04	15

			Control Statements, Functions and Objects, The Window Object: Dialog Boxes, Status Bar Messages, Window Manipulations; The Document Object: Writing to Documents, Dynamic Documents, The Form Object: Working With Form Elements and Their Properties The String and RegExp Objects, Dates and Math ies The String and RegExp Objects, Dates and Math o	04 03 04	
5	Oct	UNIT-V :	Remote Method Invocation (RMI): Object serialization in Java, Concept of remote object, Architecture of RMI application, Java RMI package, classes & Interfaces, Client-Server application using RMI, RMI Servlets, RMI-JDBC Servlets.	04 03 03 02 03	15
6	Nov	UNIT- VI :	. Introduction to JSP; Simple JSP concepts, Request-time expressions. Advanced JSPs: Scripts. conditionals, loops, Try/Catch. Concept of Beans, Properties, Bean instances & serialization; Bean Scopes, Writing Beans, Introspection, Beans & Scriplets..	04 04 03 04	15

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Msc .-2nd Semester-3st

3S : Distributed Operating System

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Introduction to distributed systems: goals of distributed system, hardware and software concepts, design issues. Communication in distributed systems: Layered protocols, ATM networks, the client-server model, remote procedure call and group communication.	04 03 03 02 03	15
2	July - Aug	UNIT-II :	. Synchronization in distributed systems: Clock Synchronization, mutual exclusion, Election Algorithms, the Bully algorithm, a ring algorithm, atomic transactions, dead lock in distributed systems, distributed dead lock prevention, and distributed dead ock detection.	04 04 03 04	15
3	Aug Sep	UNIT-III :	Processes and processors in distributed systems: Threads, system, models, processor allocation, scheduling in distributed system, fault tolerance and real time distributed systems.	04 03 03 02 03	15
4	Sep	UNIT-IV :	Distributed file systems: Distributed file systems design, distributed file system implementation, trends in distributed file systems. Distributed shared memory: What is shared	04 04 03	15

			memory, consistency models, page based distributed shared memory, shared variable, distributed shared memory, object based DSM.	04	
5	Oct	UNIT-V :	Case Study : AMOEBA : Introduction to AMOEBA, objects and capabilities in AMOEBA, Process Management in AMOEBA, Memory Management in AMOEBA, Communication in AMOEBA. The AMOEBA servers : The Bullet Server - Interface and Implementation, The Directory Server – Interface and Implementation, The Replication Server, The Run Server, The Boot Server, The TCP/IP Server, Other Servers	04 03 03 02 03	15
6	Nov	UNIT- VI :	Case study MACH: Introduction to MACH, Process management, in MACH, Memory management in MACH, communication in MACH, UNIX emulation in MACH. Case study DCE: Introduction to DCE threads, RPC's, Time service, directory service, security service, distributed file system.	04 04 03 04	15

Msc .-2nd Semester-3st**3S : Theory of Computation**

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	July	UNIT-I :	Strings, alphabets and languages, Graphs and trees, Inductive proofs, set notations, relations, Finite automata and regular Expression: Finite state system, Non deterministic finite automata, Finite automata with ϵ -moves. Deterministic finite automata, equivalence between NFA and DFA, Conversion of NFA to DFA	04 03 03 02 03	15
2	July - Aug	UNIT-II :	Regular set and regular expression, Two way finite automata, finite automat with output, Applications of finite automata. Equivalence of RE and FA, Inter conversion, pumping lemma, closure property of regular sets, Regular grammars, Right linear and Left linear grammar, equivalence between Regular linear grammar and FA inter conversion between RE and RG	04 04 03 04	15
3	Aug Sep	UNIT-III :	Context free grammar, derivation trees, Chomsky Normal Form, Greibach Normal Form. Push Down Automata: Definition, model, acceptance of CFL, equivalence of CFL and PDA , Interconversion, Enumeration of properties of CFL.	04 03 03 02 03	15
4	Sep	UNIT-IV :	Turing Machine: Definition, model, Design of turing machine, computable languages and function, Techniques of	04 04 03	15

			turing machine construction, Modifications of Turing machine, Church's Hypothesis.	04	
5	Oct	UNIT-V :	, Chomsky Hierarchy of languages, Linear bounded automata and context sensitive languages, Introduction of DCFL and DPDA, Decidability of problems.	04 03 03 02 03	15
6	Nov	UNIT- VI :	. I: Undecidability : Properties of recursive & non recursive enumerable languages, universal turing machine, post correspondence problem, introduction to recursive function theory.	04 04 03 04	15

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4S : Artificial Intelligence and Expert Systems

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	Prolog Programming: Introduction to turbo prolog, introduction to language, structure of language, cut, fail, recursion, lists and complex structures, interactive programming, expert system in prolog.	04	15
	Jan			03	
				03	
				02	
				03	
2	Jan	UNIT-II :	Introduction: Definition of AI, AI technique, tic-tac-toe, pattern recognition, level of the model, criteria for success, problems and problem spaces, defining the problems, production systems, control strategies, heuristic search, problem characteristics, decomposition of problems, solution steps, predictability, absolute and relative solutions.	04	15
	Feb			04	
				03	
3	Feb	UNIT-III :	Basic problem solving methods, reasoning, problem trees and graphs, knowledge representation, matching indexing with variables, heuristic functions, weak methods, problem reduction, constraints satisfaction, means-ends analysis, analysis of search algorithms.	04	15
	Mar			03	
				03	
				02	
				03	
4	Mar	UNIT-IV :	Game Playing: Minimax search procedure, adding alphabeta cutoffs, additional refinements, waiting for quiescence, secondary search, using book moves limitations.	04	15
	April			03	

				04	
5	April	UNIT-V :	Knowledge representation using predicate logic: representing simple facts in logic, augmenting the representation, structural representation of knowledge: some common knowledge structures, choosing the level of representation, finding the right structure as needed, declarative representation	04 03 03 02 03	15
6	May	UNIT- VI :	. Natural Language Understanding: Concept of understanding, keyword matching, syntactic and semantic analysis, understanding, language generation and matching translation. General concepts of implementation of AI systems. Introduction to pattern recognition. Rule based systems, semantics of CFL, semantic network, frames, frame kit. Application, introduction to knowledge engineering, artificial neural network: introduction, learning: single and multilayer networks	04 04 03 04	15

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4S : Design and Analysis of Algorithms

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	Introduction: algorithm, writing algorithms in SPARKS, structured program, analyzing algorithms, Divide and conquer: The general method, Binay Search, Finding minimum and maximum, merge sort, quick sort, selection sort, Strassen's matrix multiplication.	04	15
	Jan			03	
				03	
				02	
				03	
2	Jan	UNIT-II :	. Greedy Method: The general method, Optimal storage on tapes, Knapsack problem, Job sequencing with deadlines, Optimal merge patterns, minimum spanning trees, Single source shortest path. Dynamic programming: General method, multistage graph, all pair shortest paths, Optimal binary search trees, 0/1 knapsack , Travelling salesperson problem, flow shop scheduling.	04	15
	Feb			04	
				03	
3	Feb	UNIT-III :	Basic Search and Traversal techniques: General method, code optimization, AND/OR graph, game trees, biconnected components and depth first search , Back tracking : General method, 8-queens problem, sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem.	04	15
	Mar			03	
				03	
				02	
				03	
4	Mar	UNIT-IV :	Branch and bound: General method, 0/1 knapsack problem, Travelling salesperson, efficiency considerations, Algebraic simplification and transformations: General method,	04	15
	April			03	

			evaluation and interpolation, fast Fourier transform, modular arithmetic	04	
5	April	UNIT-V :	Lower bound theory: comparison trees for sorting and searching, Oracle and adversary arguments, techniques for algebraic problems, some lower bounds and parallel computation.	04 03 03 02 03	15
6	May	UNIT- VI :	NP-Hard and NP-Complete problems: basic concept, cook's theorem, NP-Hard graph problem, NP-Hard scheduling problem, NP-Hard code generation problem.	04 04 03 04	15

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4S : Network Security

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	. Introduction: Terminology, Notation, Networking Security Attacks, Layers And Cryptography, Authorization, Tempest, Keys, Viruses, Worms, Trojan Horses, Multilevel Model of Security, Legal Issues	04	15
				03	
	03				
	02				
	03				
2	Jan Feb	UNIT-II :	. Cryptography: Introduction, Breaking an Encryption Scheme, Types of Cryptographic Function, Respective Algorithms, Standards and Modes of Operation, Hashes and Message Digests.	04	15
				04	
				03	
3	Feb	UNIT-III :	Authentication: Overview of Authentication System, Password-based Authentication, Address-based Authentication, Cryptographic Authentication Protocols, Keys, Trusted Intermediaries, Authentication of People, Security Handshake Pitfalls: Login Only, Mutual Authentication, Integrity / Encryption for Data, Mediated Authentication, Performance Considerations.	04	15
				03	
	Mar			03	
				02	
				03	
4	Mar	UNIT-IV :	Standards: Kerberos V4: Tickets, Kerberos V5: ASN.1, Names,	04	15

	April		Delegation of Rights, Ticket Lifetimes, Key Versions, Optimizations. Cryptographic Algorithms, Kerberos V5 Messages, Real Time Communication Security: IPSec: AH & ESP: Overview of IPSEC, IP and IPV6, AH (Authentication Header), ESP (Encapsulating Security Payload)	04 03 04	
5	April	UNIT-V :	E-mail Security: Distribution Lists, Store and Forward, Security Services for E-Mail, Establishing Keys, Privacy, Authentication of Source, Message Integrity, Non Repudiation, Proof of Submission, Proof of Delivery, Message Flow Confidentiality, Anonymity, Containment. PEM and S/MIME, PGP	04 03 03 02 03	15
6	May	UNIT- VI :	Firewalls: Packet Filters, Application Level Gateways, Encrypted Tunnels, Comparisons. Security Systems: Netware V3, Netware V4, Microsoft Windows Security. Web Issues: URLs/URIs, HTTP, Cookies. Web Security Problems.	04 04 03 04	15

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4S : Mobile Communications

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	. Mobile Communication: Applications, History, Market, Simplified Reference Model. Frequencies, Signals, Antennas, Signal Propagation, Multiplexing, Modulation, Spread Spectrum, Cellular System.	04	15
	Jan			03	
				03	
				02	
				03	
2	Jan	UNIT-II :	. Medium Access Control: Need, SDMA, FDMA, TDMA, CDMA, Comparison of S/T/F/CDMA. Telecommunica	04	15
	Jan			04	
	Feb			03	
3	Feb	UNIT-III :	,. Satellite Systems: History, Applications, Basics, Routing, Localization, Handover, Examples. Broadcast Systems: Overview, Cyclical Repetition of Data, Digital Audio Broadcasting, Digital Video Broadcasting, C	04	15
	Mar			03	
				03	
				02	
				03	
4	Mar	UNIT-IV :	Wireless LAN: Infrared Versus Radio Transmission, Infrastructure and Adhoc Network, IEEE 802.11, HIPERLAN, Bluetooth.	04	15
	April			04	
				03	

				04	
5	April	UNIT-V :	Layers: Mobile Network Layer: Mobile IP, DHCP, Mobile Adhoc Networks. Mobile Transport Layer: Traditional TCP, Classical TCP improvements, TCP over 2.5/3G Wireless Networks.	04 03 03 02 03	15
6	May	UNIT- VI :	. Support For Mobility: File Systems, World Wide Web, Wireless Application Protocol, i-Mode, SyncML, WAP2.0.	04 04 03 04	15

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4S : Digital Image Processing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	. I : Introduction: Definition, Origins, Examples: X-ray	04	15
	Jan		Imaging, Ultraviolet Band, Visible and Infrared Bands,	03	
			Microwave Band, and Radio Band Imaging; Fundamental	03	
			Steps, Components of an Image Processing System Digital	02	
			Image Fundamentals: Elements of Visual Perception, Light	03	
			and the Electromagnetic Spectrum, Image Sensing and		
			Acquisition, A Simple Image Formation Model; Image		
			Sampling and Quantization; Basic Relationships Between		
			Pixels; Linear and Nonlinear Operations.		
2	Jan	UNIT-II :	: Image Enhancement in the Spatial Domain: Basic Gray Level	04	15
	Feb		Transformations; Histogram Processing - Histogram	04	
			Equalization, Histogram Matching (Specification), Local	03	
			Enhancement; Enhancement Using Arithmetic/Logic	04	
			Operations; Basics of Spatial Filtering, Smoothing Spatial		
			Filters: Smoothing Linear, Smoothing Order-Statistics Filters;		
			Sharpening Spatial Filters : The Laplacian, The Gradient;		
			Combining Spatial Enhancement Methods		
3	Feb	UNIT-III :	Image Enhancement in the Frequency Domain: Introduction	04	15
	Mar		to the Fourier Transform and the Frequency Domain:	03	
			OneDimensional Fourier Transform and its Inverse,	03	
			TwoDimensional DFT and Its Inverse, Filtering in the	02	

			Frequency Domain, Correspondence between Filtering in the Spatial and Frequency Domains; Smoothing and Frequency-Domain Filters - Ideal , Butterworth, and Gaussian Lowpass Filters; Sharpening Frequency Domain Filters - Ideal , Butterworth, and Gaussian Highpass Filters, Laplacian in the Frequency Domain, Unsharp Masking, High-Boost Filtering, and High-Frequency Emphasis Filtering; Homomorphic Filtering; Implementation: Additional Properties of the 2-D Fourier Transform, Inverse Fourier Transform Using a Forward Transform Algorithm, Need for Padding, Convolution and Correlation Theorems, The Fast Fourier Transform;	03	
4	Mar April	UNIT-IV :	Image Restoration: Model of the Image Degradation/ Restoration Process, Noise Models: Restoration in the Presence of Noise Only Spatial Filtering: Mean, Order-Statistics, and Adaptive Filters; Periodic Noise Reduction by Frequency Domain Filtering: Bandreject, Bandpass, and Notch Filtering; Estimating the Degradation Function - Estimation by Image Observation, Experimentation and Modeling; Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Geometric Mean Filter; Geometric Transformations: Spatial Transformations, Gray-Level Interpolation	04 04 03 04	15
5	April	UNIT-V :	Color Image Processing: Color Fundamentals, Color Models; Pseudocolor Image Processing; Full-Color Image Processing, Color Transformations: Formulation, Color Complements, Color Slicing, Tone and Color Corrections, Histogram Processing; Smoothing and Sharpening, Color Segmentation, Noise in Color Images. Morphological Image Processing:	04 03 03 02 03	15

			Preliminaries, Dilation and Erosion, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms: Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening, Skeletons, Pruning; Extensions to Gray-Scale Images.		
6	May	UNIT- VI :	. image Segmentation: Detection of Discontinuities: Point, Line, Edge Detection; Edge Linking and Boundary Detection: Local Processing, Global Processing via the Hough Transform, Global Processing via Graph-Theoretic Techniques; Thresholding: Role of Illumination, Basic Global Thresholding, Basic Adaptive Thresholding, Optimal Global and Adaptive Thresholding, Use of Boundary Characteristics for Histogram Improvement and Local Thresholding, Thresholds Based on Several Variables; Region-Based Segmentation: Region Growing, Region Splitting and Merging	04 04 03 04	15

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4S : Software Testing

Sr. No.	Month	Name of Unit	Topics Names	Required Lecture	Total Lects.
1	Dec	UNIT-I :	. Testing: Introduction and Outline - Introduction to testing and test outline, sample application, incremental testing approach, outline approach steps, evaluation and schedule estimation.	04	15
	Jan			03	
				03	
				02	
				03	
2	Jan	UNIT-II :	Introduction to test outline to test cases, creating test cases, documentation short cuts, introduction to using tables and spreadsheets, sample application, Documenting test cases.	04	15
	Feb			04	
				03	
3	Feb	UNIT-III :	Introduction to test outline to test cases, creating test cases, documentation short cuts, introduction to using tables and spreadsheets, sample application, Documenting test cases.	04	15
	Mar			03	
				03	
				02	
				03	
4	Mar	UNIT-IV :	Testing Web Applications: Introduction, sample application, functional and usability issues, configuration and compatibility testing, reliability and availability, security	04	15
	April			03	

			testing, database testing, post implementation testing.	04	
5	April	UNIT-V :	Reducing the No. of test cases: Introduction, prioritization guidelines, priority category scheme, Risk analysis, interviewing to identify problem areas, combination schemes, tracking selected test cases.	04 03 03 02 03	15
6	May	UNIT- VI :	Creating Quality Software: Introduction, development environmental infrastructure, software testing environment, software testing tools, applying software standards to test documentation.	04 04 03 04	15

