Teaching Plan
Academic Year 2015-16

Class : **M.Sc. Computer Science I yr.** **Semester: II**
Subject : **Data Structures Algorithms & Analysis** **Paper No: VII (07)**
Periods per Week : **Th.__04__ Pract. __04__**
Week (Total) : **15**

Week	Topic to be covered
1	**Unit-I** Data structures basics, Mathematical/algorithmic notations & functions, Complexity of algorithms, String processing: storing strings, Linear arrays and their representation in memory, traversing linear arrays.
2	Inserting & deleting operations, Multidimensional arrays, Record structures and their memory representation.
3	Stacks and their array representation. Arithmetic expressions: Polish notation, Recursion. Tower of Hanoi problem.
4	**Unit II** Queues. Representation of queue, Insert & delete operations on queue, Deques, Priority queues.
5	Linked lists and their representation in memory, traversing a linked list, searching a linked list. Memory allocation,
6	Insertion deletion operations on linked lists. Header linked lists, Two-way linked lists. Circular linked list
7	**Unit-III** Trees, Binary trees & and their representation in memory, Traversing binary trees. Traversal algorithms,
8	Header nodes: threads. Binary search trees, searching, inserting and deleting in binary trees.
9	Heap and heapsort. Path length & Huffman's' algorithm. General trees.

10	**Unit-IV** Graph theory, sequential representation of graphs, Linked representation, operations
11	Traversing the graphs graphs and its variants, breadth first search, depth first search.
12	Greedy method, single source shortest path, minimum spanning trees, Prims' algorithm.
13	**Unit-V** Sorting, Time and Space Complexity of sorting, Insertion Sort, Selection Sort.
14	Merging & Merge-sort, Radix sort, Hashing. Divide and conquer,
15	Binary search with its variants, Quick sort, Linear search and Binary search algorithms.

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Teaching Plan
Academic Year 2015-16

Class : M.Sc. Computer Science I yr. **Semester: II**
Subject : Software Engineering and Testing **Paper No VIII (08)**
Periods per Week : Th.__04__ Pract. __04__
Week (Total) : 15

Week	Topic to be covered
1	**Unit-I:** **S/w Engineering Fundamentals:** Definition of Software, The birth of s/w engineering, s/w Product:, Software development paradigms, software Characteristics and Application. Software Development life cycle, water fall model, Prototyping, Incremental & Spiral model, 4th Generation Techniques
2	**Project Management:** Concepts, Software Process and Project Metrics; Software Measurements;
3	Software Projects Planning: Objectives, Scope and Resources. Software Project Estimating, Decomposition Techniques. Empirical Estimation Models: COCOMO Model, Software Equation. Project Scheduling and Tracking.
4	**Unit-II:** **Software Requirements and Analysis:** System Engineering, Product Engineering: Characteristics of a Good SRS, Requirement analysis, Principal,
5	Software prototyping, Specification and its review. Analysis modeling: data modeling, mechanics for structured analysis, system analysis tools and techniques, DFD, ER-Diagrams. Data Dictionary (DD),
6	**System Design:** Design concept and principles and its elements, effective modular design, Cohesion & Coupling, Feature of modern graphics interface (GUI). Design Methods: data design, interface design guidelines, procedural design.
7	**Unit-III:** **Software Quality Assurance:** Definition of Quality and factors, QA, SQA, Software Quality Metrics, Process and Product Quality, The SEI Process Capability Maturity Model (CMM), ISO ,Six-Sigma.

8	Software Quality Assurance, Need for SQA, SQA Activities, Building blocks of SQA, SQA Planning & Standards, Software Reliability, Reliability Measures.
9	**Introduction to Software Testing:** Need of s/w testing, Error, fault and failure. s/w Testing fundamentals, Testing objectives, test information flows, Testing lifecycle, Test Cases – Test case designing (Concept & introduction should be covered here)
10	**Unit-IV:** **Levels of Testing** Unit Testing, Integration Testing, System Testing, Acceptance Testing, Alpha testing & Beta testing, Static vs. Dynamic testing, Manual vs. Automatic testing, Testers workbench, 11 steps of testing process (Only steps should be covered)
11	**Different types of Testing:** Installation Testing, Usability testing, Regression testing, Performance testing, Load testing, stress testing, Security testing, Static & Dynamic testing, Static testing techniques,
12	Review types : Informal Review, Technical or peer review, Walkthrough, Inspection, static analysis, Review meeting and reporting , Review guidelines & Review checklist, Data flow analysis, Control flow analysis, Cyclometric Analysis, Dynamic testing – need & Advantages.
13	**Unit-V:** **Black Box & White Box Testing (Test Case Design Techniques):** *Functional Testing (Black Box)*, Equivalence partitioning, BVA, Decision table based testing, Cause-Effect graphing, Syntax testing (Concept & Test case generation only),
14	*Structural Testing (White Box)*, Coverage testing, Statement coverage, Branch & decision coverage, Path coverage, Validation testing Activities, Low level testing, High level testing, Black box Vs. White Box. **Object Oriented Testing:** Issues in OO testing, class testing, GUI testing, Object Oriented Integration & system testing.
15	**Computer Aided Software testing tools (CAST):** Static Testing Tools, Dynamic Testing Tools, Characteristics of Modern Tools. e.g. WinRunner, LoadRunner, Rational ROBO.

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Teaching Plan
Academic Year 2015-16

Class : M.Sc. Computer Science I yr. **Semester: II**
Subject : Advance Computer Networks **Paper No: IX (09)**
Periods per Week : Th.__04__ Pract. __04__
Week (Total) : 15

Week	Topic to be covered
1	**Unit-I:** **Introduction:** Layered network architecture, review of ISO-OSI Model. Data communication techniques: Pulse Code Modulation, (PCM), Data modems, Multiplexing techniques-Frequency-Division, Time-Division Transmission Media – Wires, Cables, Radio, Links, Satellite Links, Fiber-Optic Links.
2	**Asynchronous Transfer Mode (ATM):** Cells, Header and Cell Formats, Layers in ATM, Class 1,2,3,4 Traffic Random Access Data Networks, Concept of Random Access,
3	Pure ALOHA: Throughput Characteristics Slotted ALOHA, throughputs for Finite and Infinite, Population S-ALOHAS. MARKOV Chain Model for S-ALOHA.
4	**Unit-II:** **Local Area Networks (LANs):** IEEE 802.4 and 802.5 Protocols, Performance of Ethernet and Token ring protocols, FDDI Protocol, Distributed Queue Dual Bus (DQDB)protocol.
5	**Network Layer Protocols:** Design issues: Virtual Circuits and Datagrams.
6	**Routing Algorithms:** Optimality Principle, Shortest Path Routing-Dijkstra, Bellman-Ford and Floyd-Warshall Algorithm.
7	**Unit-III:** **Data Link Protocols:** Stop and Wait Protocols: Noise Free and Noisy Channels Performance and Efficiency, Verification of Protocols using Finite State Machine. HDLC Data Link Protocol.
8	Integrated Services Digital Network: Interfaces, Devices, Channel Structure. Dead Locks and their avoidance, Network Layer in ATM, Internetworking: Bridges, Routers and Gateways, Internet Architecture and Addressing.
9	**Transport Layer Protocols:** Design issues: Quality of Services, Primitives

	Connection Management: Addressing, Connection Establishment and Releases, Use of Timers, Flow Control and Buffering, Multiplexing, Crash Recovery.
10	Elements of TCP/IP Protocol: User Datagram Protocol Connection Management, Finite State Machine.
11	**Session Layer Protocols:** Dialog Management, Synchronization, OSI Session Primitives Connection Establishment.
12	**Unit-IV:** **Error Detection:** Parity Check Codes, Cyclic Redundancy Codes
13	**Queuing Models:** Data Traffic Characteristics: Poisson Process Birth-Death Process: Markov Chain Models M/M/1 Queues: Delay and Little's Formula M/M/S/K Queues: Average Queue Length, Delay and Waiting Time Blocking Probability. M/G/1 Queues, Imbedded Markov Chains, Poolaczek-Kinchin Transform Formula, Delay Formula Using Residual Service Time.
14	**Unit-V:** **Presentation and Application Layer Protocols**: Presentation Concepts NMPAbstract Syntax Notation-1 (ASN-1), Structure of Management, Management Information Base.
15	**Cryptography:** Substitution Transposition Ciphers, Data Encryption Standards (DES) Chaining, Breaking DAS, Public Key Cryptography and Authentication Protocols, Electronic Mail, World Wide Web.

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Teaching Plan
Academic Year 2015-16

Class : **M.Sc. Computer Science I yr.** **Semester: II**
Subject : **Numerical Techniques & Discrete Mathematics Structure**
Paper No: X(10)
Periods per Week : **Th.____ Pract. ____** **Test (Date):_____**
Week (Total) : **15** **Tutorials (Date):_____**

Week	Topic to be covered
1	**Unit-I:** **Error and Approximation in Numerical Computation:** Storage of Real Number and Integer, Error due to Storage, Significant Digits for Numerical, Types of Error: Absolute Error, Relative Error and Percentage Error, Round –off Error & Chopping.
2	**Matrix:** Different Types of Special Matrix, Laws of Matrix, Algebra of Matrices, Determinant and Rank of a matrix.
3	**Transcendental and polynomial equations.** Type of Equation, The roots of equations, definitions and examples, Method to solve Non-Linear Equation: Bisection method, Regula-falsi method, Secant method and Newton-Raphson Method. Rate of Convergence for all above methods.
4	**System of linear algebraic equations:** System of linear algebraic equation. Method to Solve Linear algebraic Equation: Cramers rule, Gauss elimination method, Triangularization Method, Jacobi-Iteration, Gauss–Seidel iterative method.
5	**Unit-II:** **Numerical differentiation and integration:** Numerical differentiation: methods based on finite differences. Numerical Integration: The trapezoidal rule, the simpson's rule and gauss-lengendre integration method.
6	**Numerical Solution of ordinary:** Differential equations. Ordinary differential equations of the first order basic concepts & various analytic methods (separable equation, equation educable to separable form, exact differential equation.
8	**Unit-III:** **Interpolation and approximation:** Interpolation with equal intervals: finite difference tables, The Gregory Newton formula for forward & backward interpolation.
9	Interpolation with unequal intervals: Newton's divided difference interpolation

	formula, Lagrange's interpolation, the least square approximation
10	**Unit-IV:** **Discrete structure:** Fundamentals set subsets and operations on sets; semi groups finite and infinite set, relation and properties of relations, equivalence relations.
11	**Boolean Algebra, Posets and lattices:** partial order relation, Poset, Lub, Gid, maximal and minimal elements of a posets. Def and examples of boolean algebra, lattices, distributive laws in lattices, complemented lattice's prepositional calculus, boolean functions , min and max, terms, simplification of boolean function with Karnaugh Map & Quine MC Cucky method.
12	**Introduction to Combinatorics:** Basic Theorems on permutations and combination, ordinary exponential generating functions recurrence equations.
13	**Unit-V:** **Graph And Algorithms:** Basics definition of graphs, connectivity of graph, cut points , cycles, hamiltonian graph , different characterization of trees, bipartite graphs, algorithms on graphs, Breadth First Search and Depth First Search
14	Dijkstra Algorithm for Shortest Path algorithms, Floyd's Algorithm for all Pairs of Shortest Paths, Kruskal's And Prim's Algorithm for Minimum Spanning Tree
15	**Finite State Machines and Languages:** finite state machines, semigroups ,machine languages and regular languages , simplification of machines.

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