| LEC# | TOPICS | |
|---|---|---|
| **Unit 1: Revision of DoA Basic Concepts** | | |
| 1 | Definition and Criteria of an Algorithm, Applications.<br>Asymptotic Notation, | WT1 |
| 2 | Solving Recurrences . | |
| **Unit 2: Divide and Conquer Approach** | | |
| 3 | Quick Sort.<br>Maximum Sub array Problem. | WT2 |
| **Unit 3: Randomized Algorithms** | | |
| 4 | Randomized Quick Sort. | |
| **Unit 4: Greedy Algorithms** | | |
| 5 | Fractional Knapsack Problem. | WT3 |
| 6 | Minimum Spanning Tree Algorithms – Prim's and Kruskal's Algorithms | |
| **Unit 5: Advanced Datastructures - I** | | |
| 7 | Union Find – Application in Kruskal's Algorithm | |
| **Unit 6: Dynamic Programming** | | |
| 8 | 0/1 Knapsack Problem | CAT1 (+WT1,2,3) |
| 9 | Matrix Chain Multiplication | |
| 10 | Longest Common Subsequence, | |
| **Unit 7: Back Tracking & Branch and Bound** | | |
| 11 | The 8 Queen Problem. | WT4 |
| 12 | Clique Problem. | |
| **Unit 8: Local search** | | |
| 13 | local search for Clique | WT5 |
| **Unit 9: Advanced Analysis Techniques - Amortized Analysis** | | |
| 14 | Aggregate Analysis.<br>The accounting Method<br>The Potential Method | WT6 |
| **Unit 10: Advanced Data Structers - II** | | |
| 15 | Binomial Heap | CAT2(+WT4,5,6) |
| 16 | Fibonacci Heap | |
| **Unit 11: Computational Geometry** | | |
| 17 | Line Segment<br>Determining Line Segments Intersection | WT7 |
| 18 | Convex Hull<br>Graham’s Scan and Jarvis’s March Algorithm | |
| **Unit 12: Number-Theoretic Algorithms** | | |
| 19 | Modular Arithmetic | WT8 |
| 20 | Solving Modular Linear Equations<br>The Chinese Remainder Theorem | |
| 21 | The RSA Public-Key Cryptosystem | |
| **Unit 13: Graph Algorithms** | | |
| 22 | All Pair Shortest Path Algorithm - The Floyd-Warshall | WT9 |

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|---|---|---|
| | Algorithm | |
| 23 | Flow Network | |
| 24 | The Ford-Fulkerson method<br>The Maximum-Bipartite-Matching Problem | |
| **Unit 14: String Matching** | | |
| 25 | The naive string-matching algorithm | CAT3(+WT 7,8,9) |
| 26 | The Rabin-Karp algorithm | |
| 27 | String matching with finite automata | |
| **Unit 15: NP-Completeness** | | |
| 28 | The classes P and NP<br>Decision Problems vs. Optimization Problems | EST (+ALL…) |
| 29 | Reducibility<br>3-CNF SAT problem to Clique & vertex cover | |
| **Unit 16: Approximation Algorithms** | | |
| 30 | The Vertex-Cover problem | |
| 31 | The Traveling-Salesman Problem<br>The Set-Covering Problem | |