Design and Analysis of Algorithm

SWAYAM Prabha Course Code-KCS 503

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COURSE OUTLINE	The basic Outlines of Design and Analysis of Algorithm course is to design new algorithms, prove their correctness, and analyze their asymptotic and absolute runtime and memory demands. This Course helps us to understand the basic techniques for designing algorithms, including the techniques of recursion, divide-and-conquer, greedy, dynamic programming, backtracking etc.

COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1	**Lecture 1**	Algorithms, Analyzing Algorithms
2	**Lecture 2**	Complexity of Algorithms, Growth of Functions and their Performance Measurements
3	**Lecture 3**	Sorting and Order Statistics
4	**Lecture 4**	Quick Sort
5	**Lecture 5**	Merge Sort
6	**Lecture 6**	Heap Sort
7	**Lecture 7**	Comparison of Sorting Algorithms
8	**Lecture 8**	Sorting in Linear Time
9	**Lecture 9**	Red-Black Trees & its Properties
10	**Lecture 10**	Red-Black Tree Insertion
11	**Lecture 11**	Red-Black Tree Deletion
12	**Lecture 12**	B –Tree and its Insertion

13	**Lecture 13**	B –Tree Deletion
14	**Lecture 14**	Binomial Heaps & its Properties, Operations
15	**Lecture 15**	Operations on Binomial Heaps
16	**Lecture 16**	Fibonacci Heaps & its Properties
17	**Lecture 17**	Operations on Fibonacci Heaps
18	**Lecture 18**	Divide and Conquer technique with examples such as sorting
19	**Lecture 19**	Divide and Conquer technique with examples such as Matrix Multiplication and Convex Hull
20	**Lecture 20**	Greedy Methods with examples such as Optimal Reliability Allocation, Huffman Codes.
21	**Lecture 21**	Greedy Methods with examples such as Fractional Knapsack, Task Scheduling and Travelling Salesman
22	**Lecture 22**	Minimum Spanning Tree: Prims & Kruskal Algorithm
23	**Lecture 23**	Single Source Shortest Path: Dijkstra Algorithm
24	**Lecture 24**	Shortest Path Algorithm: Bellman Ford
25	**Lecture 25**	Dynamic Programming with examples such as Knapsack Problem- Part 1
26	**Lecture 26**	Dynamic Programming with examples such as Knapsack Problem- Part 2
27	**Lecture 27**	Longest Common Subsequence problem- Part 1
28	**Lecture 28**	Longest Common Subsequence problem- Part 2
29	**Lecture 29**	Floyd Warshall Algorithm: Part 1
30	**Lecture 30**	Floyd Warshall Algorithm: Part 2
31	**Lecture 31**	Matrix Chain Multiplication Problem: Part 1
32	**Lecture 32**	Matrix Chain Multiplication Problem: Part 2
33	**Lecture 33**	Backtracking & Graph Coloring, Sum of Subsets

34	**Lecture 34**	N Queen problem and Hamiltonian Cycles
35	**Lecture 35**	Branch and Bound with examples such as TSP
36	**Lecture 36**	Branch and Bound with examples such as 0/1 Knapsack
37	**Lecture 37**	String Matching: Naïve and Rabin Karp Algorithm
38	**Lecture 38**	Knutt Morris Pratt and Boyer Moore Algorithm
39	**Lecture 39**	Theory of NP Completeness
40	**Lecture 40**	Approximation Algorithms & Randomized Algorithms
41	**Lecture 41**	Algebraic Computation & Fast Fourier Transform

References if Any:

1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, “Introduction to Algorithms”, Printice Hall ofIndia.

2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms",

3. Aho, Hopcraft, Ullman, “The Design and Analysis of Computer Algorithms” Pearson Education, 2008.

4. LEE "Design & Analysis of Algorithms (POD)",McGraw Hill

5. Richard E.Neapolitan "Foundations of Algorithms" Jones & Bartlett Learning

6. Jon Kleinberg and Éva Tardos, Algorithm Design, Pearson, 2005.

7. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples,Second Edition, Wiley, 2006.

8. Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1997

9. Robert Sedgewick and Kevin Wayne, Algorithms, fourth edition, Addison Wesley, 2011.

10. Harsh Bhasin,”Algorithm Design and Analysis”,First Edition,Oxford University Press.

11. Gilles Brassard and Paul Bratley,Algorithmics:Theory and Practice,Prentice Hall,1995.