Subject : Design and Analysis of Algorithms

Class : III -I Semester

Department : AI&DS and AI&ML

**Unit –I**

1. Distinguish between Algorithm and Pseudocode. L1 [CO1][12M]

2. Define Time Complexity iii) Space Complexity L1 [CO1][12M]

3. Explain the properties / characteristics of an algorithm with an example.

L1 [CO1][12M]

4. Explain strassen’s Matrix Multiplication with an example. L1 [CO1][12M]

5. Explain recursive functions algorithm analysis with an example. L1 [CO1][12M]

6. Explain the Asymptotic notations with example. L1 [CO1][12M]

7. How the performance of an Algorithm can be analyzed? Explain with the example.

L1 [CO1][12M]

8. Illustrate the tracing of quick sort algorithm for the following set of numbers: 25,   
 10, 72, 18, 40, 11, 64, 58, 32, 9. Derive its Time complexity. L1 [CO1][12M]

9. With a suitable algorithm, explain the problem of finding the maximum and   
 minimum items in a set of elements. L1 [CO1][12M]

10. Apply Merge Sort to sort the list a[1:10] = (31, 28, 17, 65, 35, 42, 86, 25, 45, 52). Draw the tree of recursive calls of merge sort, merge functions. Derive its time complexity. L1 [CO2][12M]

11. Write Divide – And – Conquer recursive Quick sort algorithm and analyze the algorithm for average time complexity. L1 [CO2][12M]

12. Distinguish between Merge sort and quick sort. L1 [CO2][12M]

14. Explain Recursive Binary search algorithm with suitable examples.

L1 [CO2][12M]

15. Discuss the time complexity of Binary search algorithm for best and worst case.

L1 [CO2][12M]

**Unit – II**

1. Solve the following instance of knapsack problem using greedy method. n = 7 (objects),m = 15, profits are (P1, P2, P3, P4, P5, P6, P7) = (10, 5, 15, 7, 6, 18, 3) and its corresponding weights are (W1, W2, W3, W4, W5, W6, W7) = (2, 3, 5, 7, 1, 4, 1).

L2 [CO2][12M]

2. Explain general method of Greedy strategy. L2 [CO2][12M]

3. Define i) Principles of optimality ii) Feasible solution iii) Optimal solution.

L2 [CO2][12M]

4. Distinguish between Prim’s and Kruskal’s spanning tree algorithm.

L2 [CO2][12M]

5. State the Greedy Knapsack? Write the algorithm for Greedy knapsack and also compute the time complexity. L2 [CO2][12M]

6. State the Job – Sequencing Deadline Problem. L2 [CO2][12M]

7. Explain Prim’s Minimum cost spanning tree algorithm with suitable example and also find the time complexity. L2 [CO2][12M]

8. Explain Kruskal’s Minimum cost spanning tree algorithm with suitable example and also find the time complexity. L2 [CO2][12M]

9. Describe the Dynamic 0/1 Knapsack Problem. Find an optimal solution for the dynamic programming 0/1 knapsack instance for n=3, m=6, profits are (p1, p2, p3 ) = (1,2,5), weights are (w1,w2,w3)=(2,3,4). L2 [CO2][12M]

10. What are the advantages and disadvantages of Divide – And – Conquer?

L2 [CO2][12M]

**Unit –III**

1. Find an optimal sequence to the n=5 Jobs where profits (P1,P2,P3,P4,P5) = (20,15,10,5,1) and deadlines (d1,d2,d3,d4,d5) =( 2,2,1,3,3). L3 [CO2][6M]
2. What is a Spanning tree? Explain with an example. L3 [CO2][6M]
3. What is a Minimum cost spanning Tree. Explain with an example. L3 [CO2][6M]
4. Explain 0/1 Knapsack problem with an example. L3 [CO2][6M]
5. Explain Fraction Knapsack problem with an example. L3 [CO2][6M]
6. Explain single source shortest path with an example. L3 [CO2][6M]