Roll No. ..... Total Pages : 04

BT-5/D-23 45262

DESIGN AND ANALYSIS OF ALGORITHMS
PC-CS-AIDS-303A

Time : Three Hours] [Maximum Marks : 75

Note : Attempt any *Five* questions.

1. Answer the following questions in brief :

(a) What is the priority queue ? Show with example. 3

(b) How does Huffman code is derived ? 3

(c) What is the relaxation in graph ? 3

(d) Explain P, NP and NP-hard complexity. 3

(e) What is merging network ? Explain. 3

2. (a) Describe the Activity Selection problem and use greedy method to solve the following problem : 7

Set of activity S = $\{a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_9, a_{10}, a_{11}\}$

I	1	2	3	4	5	6	7	8	9	10	11
s_i	1	3	0	5	3	5	6	8	8	2	12
f_i	4	5	6	7	8	9	10	11	12	13	14

(b) Describe the Travelling sales person problem and discuss, how to solve it using greedy algorithms ? 8

3. (a) Explain the basic steps of the dynamic programming approach. Find the optimal parenthesis of matrix chain multiplication where sequence of dimensions is :

A1 : 10×100, A2 : 100×5, A3 : 5×50 **8**

(b) Explain the breadth first search algorithm for graph traversal and write its pseudo code. **7**

4. (a) Describe single source shortest path algorithm for a given graph. Write the pseudo code of Bellman-ford algorithm also analyze its complexity. **7**

(b) Explain longest common subsequence problem with example. Write the pseudo code of the longest common subsequence problem using dynamic programming. Also analyze its complexity. **8**

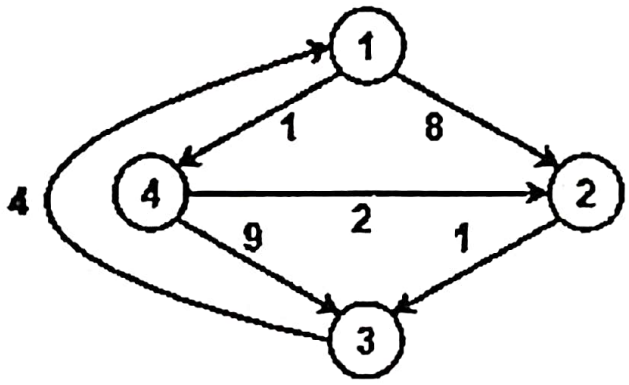
5. (a) What is maximum flow problem in a flow network ? Explain Ford-Fulkerson algorithm for finding maximum flow with example. **8**

(b) Explain maximum bipartite matching in detail. How it can be reduced to network flow ? **7**

6. (a) What is spanning tree ? Explain Prims algorithm with example to find the spanning tree of given graph. **8**

(b) Write the mathematical expression of Big-oh, Big-theta & Big-omega Asymptotic Notations. Explain it with the graph also. 7

7. (a) Explain the Floyd Warshall algorithm for finding the all pair shortest path in a graph. Find shortest path in following graph : 8



(b) Describe the task scheduling problem using greedy approach. Solve the following problem of task scheduling. 7

Task	Deadlines	Profit
T1	8	21
T2	2	23
T3	3	11
T4	5	9
T5	7	5
T6	1	17
T7	4	28
T8	6	14
T9	2	33

8. (a) Write the properties of red-black tree. Explain the insertion and deletion operation of red-black tree in detail. **7**

(b) What is Fibonacci heap ? Explain with example. **4**

(c) What is sorting network ? Explain it with example. **4**