B.E.(Computer Engineering) Sixth Semester (C.B.S.)
# Design & Analysis of Algorithms

P. Pages : 3

NRT/KS/19/3501

Time : Three Hours

0765

Max. Marks : 80

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Notes : 1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) What is algorithm? Explain different algorithm design Strategies in detail. **6**

    b) Find close form for $\sum\limits_{i=1}^{n} i\, a^i$ http://www.rtmnuonline.com **7**

OR

2. a) Solve the recurrence relation by using substitution method **7**
$$T(n) = 2T(n/2) + n/gn \qquad n > 1$$
$$= 1 \qquad\qquad n = 1$$

    b) Explain Master's method with example. **6**

3. a) Give stepwise operation of Heap sort on following input array. **9**
        A = (4, 8, 20, 17, 7, 25, 2, 13, 5)
        Write algorithm and also explain the complexity of heap sort algorithm

    b) Explain Bitonic sorting network. **5**

OR

4. a) Write an algorithm to search an element using binary search method. Find the location of 36 of the given array using binary search method. **7**
        $A = \langle 9, 12, 15, 24, 30, 36, 45, 70 \rangle$

    b) Illustrate the stepwise operation of merge sort for the input array. **7**
        $A = \langle 5, 13, 2, 25, 7, 17, 20, 8, 3 \rangle$

5. a) Explain greedy algorithm for job sequencing with deadline problem. Find best possible sequence for following deadline. **7**

Job	J_1	J_2	J_3	J_4	J_5	J_6	J_7
gain	35	20	18	16	12	10	8
deadline	3	1	3	4	2	2	1

http://www.rtmnuonline.com

b) Find minimum cost spanning tree & its cost using Kruskal's method. Also discuss its complexity. **6**
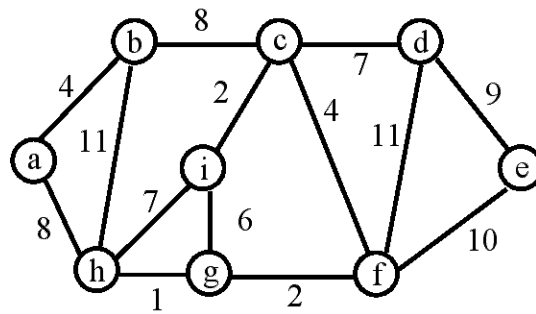
OR

6. a) What are optimal Huffman codes for following set of frequencies and discuss its complexity: **7**
   a : 14 b : 10 c : 8 d : 12 e : 6

b) What is significance of Knapsack problem? Implement three approaches on the following objects & Find out the profit value capacity = 30 No. of objects = 07. **6**

Object:	1	2	3	4	5	6	7
Weight:	4	6	10	14	2	8	2
Profit :	20	15	20	28	8	18	6

7. a) Explain basic principle of Dynamic programming & principle of optimality. Also explain the difference between Dynamic programming & Greedy algorithm. **7**

b) For the following multistage graph, obtain a recurrence relation for finding the shortest path from source vertex to destination vertex. Also explain the calculation for shortest path. **7**
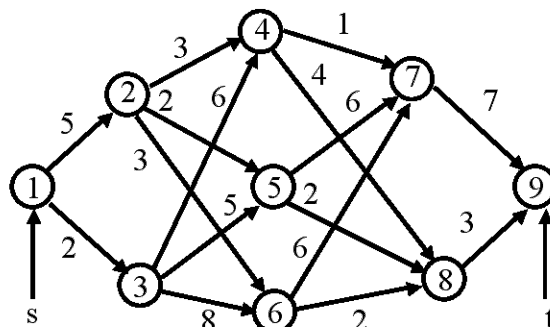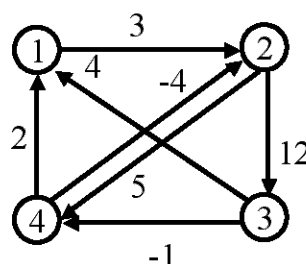

Fig. 7 (b)

OR

8. a) Find all Pair shortest path using Floyd's Warshall algorithm for given directed graph. **7**

b) Write a recurrence equation for LCS, & find the LCS of following sequence. **7**
   X = SOLUTION
   Y = RECURSION

9. a) Calculate the shortest path from source to destination in following Travelling salesman **7**
   problem. The distance matrix is as follows.

0	10	15	20
5	0	9	10
6	13	0	12
8	8	9	10

   b) Implement graph coloring on following graph & generate space tree if number of **6**
   permitted colours = 3
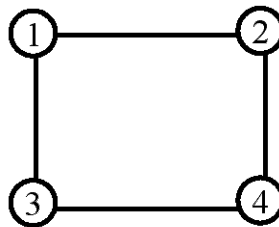
OR

10. a) Write BFS & DFS and show its sequence with example. **7**

    b) Explain how backtracking technique can be applied to solve 4 – queens problem. **6**

11. a) Write an algorithm for non-deterministic sorting & non-deterministic searching. **7**

    b) Explain P, NP, NP-hard & NP-complete. **6**

OR

12. a) State & explain Cook's theorem. Also explain its importance. **7**

    b) Write a note on decision and optimization problem. **6**

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