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10CS43

Fourth Semester B.E. Degree Examination, Dec.2015/Jan.2016

Design and Analysis of Algorithms

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. What is an algorithm? Explain the notion of algorithm with an example. **(06 Marks)**

b. Explain the asymptotic notations with examples. **(06 Marks)**

c. Write an algorithm for selection sort. Analyze its efficiency. **(08 Marks)**

2 a. What is divide and conquer? Explain the general method of divide and conquer. **(06 Marks)**

b. Write an algorithm for merge sort. Analyze its efficiency. **(08 Marks)**

c. Apply quick sort on following list and draw recursive call tree : 5, 3, 1, 9, 8, 2, 4, 7. **(06 Marks)**

3 a. What is minimum cost spanning tree? Apply Prim's and Kruskal's algorithm on Fig. Q3(a). **(10 Marks)**

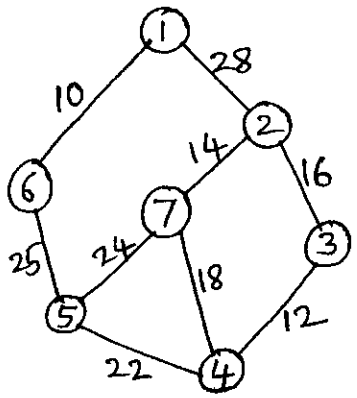

Fig.Q3(a)

b. Write Dijkstra's shortest path algorithm. Apply Dijkstra's algorithm on Fig. Q3(b) to obtain shortest paths. **(10 Marks)**

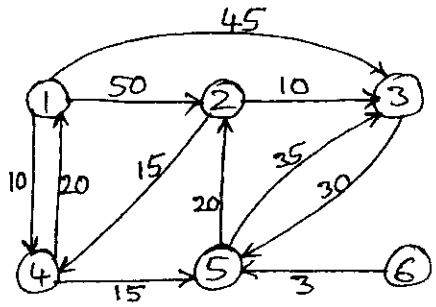

Fig.Q3(b)

4 a. Explain dynamic programming. Find transitive closure using Warshall's algorithm for the digraph Q4(a). **(06 Marks)**

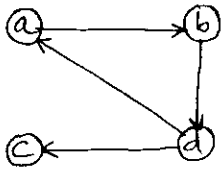

Fig.4Q(a)

b. Find all pair shortest paths using Floyd's algorithm for the graph Fig. Q4(b). **(08 Marks)**

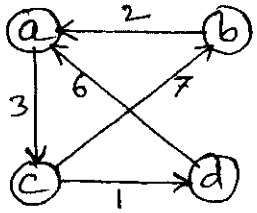

Fig.Q4(b)

c. Find the optimal solution for the following instance of knapsack problem using dynamic programming. **(06 Marks)**

Item	Weight	Value
1	2	12
2	1	10
3	3	20
4	2	15

Capacity W = 5

PART – B

5 a. Explain different decrease and conquer approaches using example. **(06 Marks)**

b. Differentiate between DFS and BFS. **(04 Marks)**

c. Write Horspool's algorithm for string matching. Find the pattern : BARBER. In the text : JIM_SAW_ME_IN_A_BARBERSHOP. **(10 Marks)**

6 a. What is decision tree? Draw the decision tree for three element selection sort and estimate its lower bound. **(10 Marks)**

b. Explain following with examples :
i) P problems ii) NP problems iii) NP – complete problems. **(10 Marks)**

7 a. What is back tracking? Draw the state space tree for 4 – queen's problem. **(08 Marks)**

b. What is branch and bound method? Apply branch and bound to the following instance of assignment problem : **(06 Marks)**

Job 1	Job 2	Job 3	Job 4	
9	2	7	8	Person a
6	4	3	7	Person b
5	8	1	8	Person c
7	6	9	4	Person d

c. Explain approximation algorithm for traveling salesman problem. **(06 Marks)**

8 a. What is PRAM? Explain PRAM algorithm with example. **(06 Marks)**

b. Explain various computational models. **(06 Marks)**

c. What is list ranking? Explain different types of list ranking. **(08 Marks)**

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