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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)

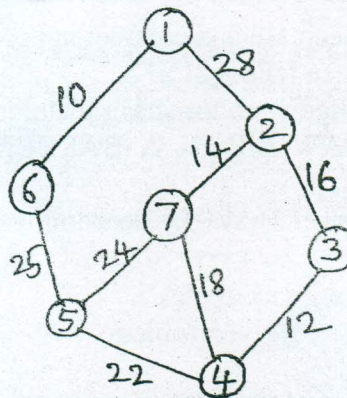


Fig.Q3(a)

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

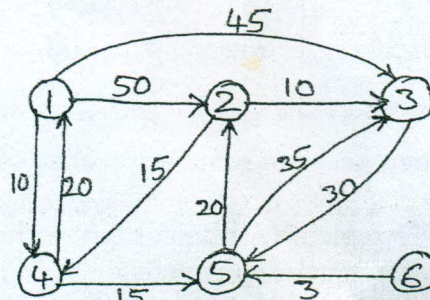


Fig.Q3(b)

Important Note : 1. On completing your answers, carefully draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.



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

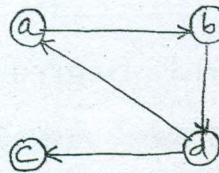


Fig.4Q(a)

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

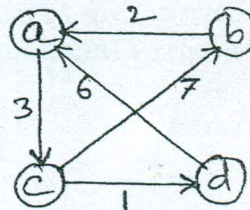


Fig. Q4(b)

- 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 Person b Person c Person d	
6	4	3	7		
5	8	1	8		
7	6	9	4		

- 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)
