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Question Paper Code : 75492

5 Year M.Sc. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Fifth Semester

Software Engineering

ESE 053 – DESIGN AND ANALYSIS OF ALGORITHMS

(Regulation 2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate time complexity from space complexity.

2. What are the basic Asymptotic Efficiency Classes?

3. State the principle of Optimality.

4. What are Multistage graphs?

5. What are the tree traversal techniques? Give an example.

6. What are connected components?

7. What is a FLFO branch-and-bound algorithm?

8. What is Backtracking?

9. What is meant by polynomial reductions?

10. What is meant by Absolute Approximations and E-Approximations?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Let A[1..n] be a sorted array of n distinct integers. Give a divide and conquer algorithm that can find an index i such that $A[i] = i$ (if one exists) with running time O (log n). (10)

(ii) Derive the complexity of Merge sort. (6)

Or

(b) Write the algorithm of Quick Sort. Find the best case, worst case and average case time complexities of the algorithm. Also find the kth smallest element of n elements with time complexity less than that of Quick Sort algorithm. (16)

12. (a) (i) Devise an algorithm to make a change for 1655 using the Greedy strategy. The coins available are (1000, 500, 100, 50, 20, 10, 5}. (8)

(ii) Describe the general characteristics of Dynamic programming algorithm. (8)

Or

(b) (i) Write the traveling salesman problem with an algorithm. (8)

(ii) Write an algorithm for All pair shortest paths and compute its complexity. (8)

13. (a) Write the Prims algorithm, find the minimum cost spanning tree for weighted graph shown in Fig. 13(a). (16)

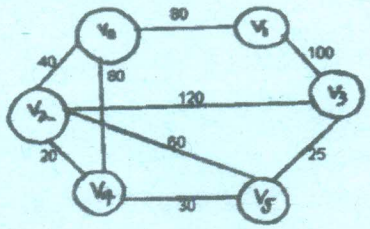

Fig. 13(a)

Or

(b) (i) For the graph, show in Fig 13. b(i) draw the DFS and BFS. (10)

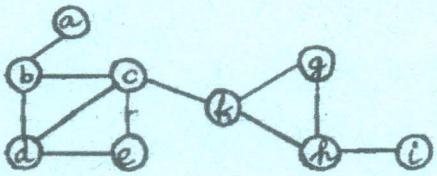

Fig. 13(b)(i)

(ii) Find all articulation points for the graph show in Fig 13. b(i). (6)

14. (a) (i) Solves Eight Queens problem using Backtracking approach. (10)

(ii) Apply backtracking technique to solve the 3-colouring problem for the following graph. Show in Fig 14. a(ii) (6)

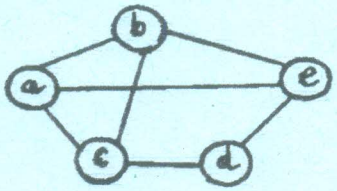

Fig. 14(a)(ii)

Or

(b) Find an optimal solution for the following knapsack problem using Branch and Bound method. (16)

Capacity W is 10, Upper bound is $100

Item	Weight	Value
1	4	$40
2	7	$42
3	5	$25
4	3	$12

15. (a) Define classes P, NP and NP complete. Describe Clique Decision Problem. Prove CDP is NP complete. (16)

Or

(b) Explain with an example the need for Approximation algorithms and how they can be used for NP hard problems. (16)