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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fourth Semester, B.E. - Computer Science and Engineering

Make-up Examination; July - 2016

Analysis and Design of Algorithms

Time: 3 hrs

Max. Marks: 100

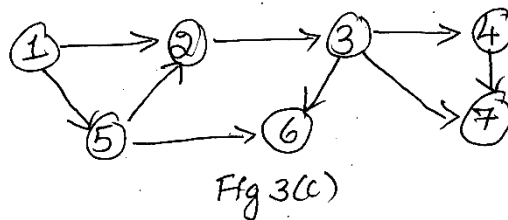
Note: Answer FIVE full questions, selecting ONE full question from each unit.

UNIT - I

- 1 a. Define an algorithm. With the help of a flow chart explain the various stages of algorithmic problem solving. 10
- b. List and explain with an example the methods of representing a graph. 6
- c. Write an algorithm to compute the GCD of two numbers using Euclid's algorithm. 4
- 2 a. Explain the different types of asymptotic notations. 6
- b. Write a recursive algorithm to find the factorial of a given number. Also, find its time complexity. 6
- c. What is Brute force method? Write the algorithm for selection sort and analyze its efficiency. 8

UNIT - II

- 3 a. Write merge sort algorithm and find its efficiency. 10
- b. Distinguish between DFS and BFS. 4
- c. Apply the source removal algorithm to the diagraph in Fig. 3(c) to solve the topological sorting problem. 6

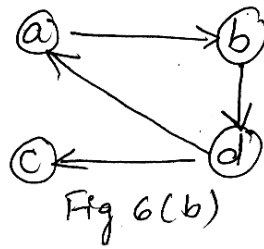


- 4 a. Write a presort based algorithm to check the element uniqueness in an array and obtain its efficiency. 8
- b. Construct an AVL tree for the list 5, 6, 8, 3, 2, 4, 7 by successive insertions. 6
- c. Construct heap for the list 2, 9, 7, 6, 5, 8 by bottom up algorithm. 6

UNIT - III

- 5 a. Sort the elements of the array 13, 11, 12, 13, 12, 12 using distribution counting method. 6
- b. Apply Horspool's algorithm to search for the pattern BAOBAB in text, BESS_KNEW_ABOUT_BAOBABS. 6
- c. For the input 30, 20, 56, 75, 31, 19 and hash function $h(K) = K \text{ mod } 11$ construct open hash table and closed hash table. 8

- 6 a. Compute $C(6, 3)$ by applying the dynamic programming algorithm. 4
- b. Write Warshall's algorithm. Apply the algorithm to the graph shown in Fig. 6(b),



10

- c. Write Floyd's algorithm for all pair shortest path problems. 6

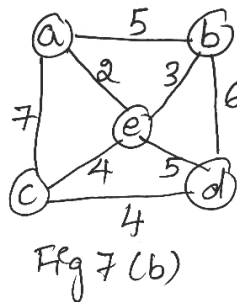
UNIT - IV

- 7 a. Compute the optimal solution to the knapsack instance by dynamic programming approach.

Item	Weight	Value	
1	2	\$12	
2	1	\$10	Capacity $W = 5$
3	3	\$20	
4	2	\$15	

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- b. Apply Prim's algorithm to the graph of Fig. 7(b) to find the minimum spanning tree.



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- 8 a. Construct a Huffman code for the following data,

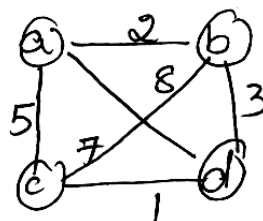
Character	A	B	C	D	-
Probability	0.4	0.1	0.2	0.15	0.15

6

- b. What are decision trees? Explain the concept of decision trees for sorting with an example. 6
- c. Distinguish between P, NP, NP-complete problems. Give examples for each. 8

UNIT - V

- 9 a. What is backtracking method? Write state space tree of solving four-queen's problem by backtracking. 6
- b. Apply the branch-and-bound algorithm to solve the travelling salesman problem for the following graph. 8



8

- c. Apply the nearest neighbor algorithm to the instance defined by the distance matrix below.
Start the algorithm at the first city.

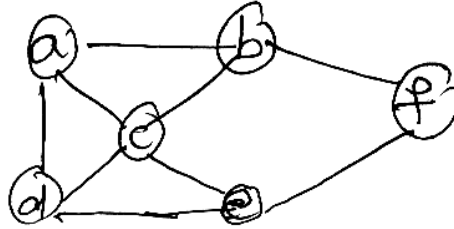
$$\begin{bmatrix} 0 & 1 & 3 & 6 \\ 1 & 0 & 2 & 3 \\ 3 & 2 & 0 & 1 \\ 6 & 3 & 1 & 3 \end{bmatrix}$$

6

- 10 a. Explain the parallel algorithm for postfix computation.

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- b. Apply backtracking to the problem of finding a Hamiltonian circuit in the following graph.



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