



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

*(An Autonomous Institution affiliated to VTU, Belagavi)*

**Fourth Semester Information Science and Engineering**

**Semester End Examination; June - 2017**

**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**

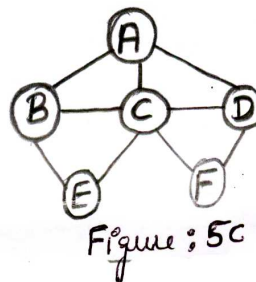
- 1. a State and explain the properties of algorithm. 6
- b. What are the important problem types? Explain any one in detail. 7
- c. List the fundamental data structures. Explain stacks in detail. 7
- 2. a. What is Analysis framework? 12
- b. Explain best case, worst case and average case analysis. 4
- c. Give general plan for analyzing the efficiency of recursive algorithms. 4

**UNIT - II**

- 3. a. What is Brute force algorithmic strategy? 5
- b. Give an algorithm for selection sort. 5
- c. Write an algorithm for Brute force string matching. 5
- d. Give strengths and weaknesses of Brute force algorithm. 5
- 4. a. Trace the quick sort algorithm to sort the list 'Q, U, E, S, T, I, O, N' in alphabetical order. 10
- b. Explain the concept of Divide-and-Conquer. 5
- c. Give an algorithm for merge sort. 5

**UNIT - III**

- 5. a. What is graph? Give applications of graph. 6
- b. Compare DFS and BFS. 6
- c. For the following graph, draw the DFS forest. Show tree edges and back edges clearly. 4



- d. Apply Insertion sort to sort the list S, O, R, T, I, N, G in alphabetical order. 4
- 6. a. What are the three different methods by which transformations can be applied using Transform-and-Conquer method? 6

- b. Construct a heap for the list 1, 8, 6, 5, 3, 7, 4 by using the bottom up algorithm. 8
- c. Construct an AVL tree by successive insertion 1, 2, 3, 4, 5, 6. 6

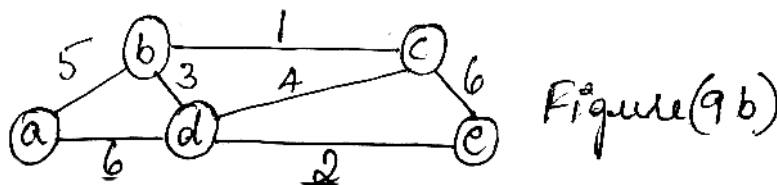
**UNIT - IV**

- 7 a. What is the concept of Time-and-Space trade off? Explain different techniques that are useful in improving time efficiency. 10
- b. For the input 30, 20, 56, 75, 31, 19 and hash function  $h(k) = k \text{ mod } 11$ . Construct the open hash table. 10
- 8 a. Differentiate between Divide-and-Conquer and Dynamic Programming. 5
- b. Give any two properties of Dynamic approach. 4
- c. Apply Warshall's algorithm to find the transitive closure of the digraph defined by the following adjacency matrix. 11

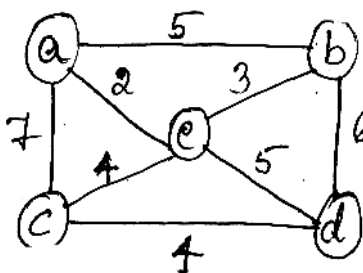
$$\begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

**UNIT - V**

- 9 a. Differentiate Greedy method with Dynamic programming. 4
- b. Apply Kruskal's algorithm to find a minimum spanning tree of a given graph. 10



- c. Apply Prim's algorithm for the following graph and obtain minimum spanning tree. 6



- 10 a. What do you mean by lower bound? What are different methods of establishing lower bounds? 5
- b. Distinguish between Backtracking and Branch-and-Bound techniques. 6
- c. Obtain all possible solutions to 4-Queen's problem. Establish the relationship between the two solutions. 4
- d. Define NP-class problems. 5

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