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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belgaum)
Fourth Semester, B.E. - Information Science and Engineering
Semester End Examination; June - 2016
Analysis and Design of Algorithms

Time: 3 hrs   Max. Marks: 100

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.
      ii) Missing data may be assumed suitably.

UNIT - I

1 a. What is an algorithm? With a neat flow diagram explain the process of analysis and design of algorithm.   10

 b. Write the general plan for analyzing efficiency of Non recursive algorithms.   6

 c. Design a simple algorithm for the String-Matching problem.   4

2 a. Define time complexity and space complexity. Write an algorithm for adding 'n' natural numbers and find the time and space required by that algorithm.   10

 b. Illustrate general plan for analyzing Time efficiency of Recursive algorithms with an example.   10

UNIT - II

3 a. Describe brute force approach. What are the advantages and disadvantages of this approach?   6

 b. Write a simple brute force string matching algorithm.   4

 c. Write an efficient and exhaustive search algorithm for the traveling salesmen problem.   10

4 a. Write a pseudo code for Depth - first search technique.   8

 b. Explain the working principle of Binary search algorithm with an example.   12

UNIT - III

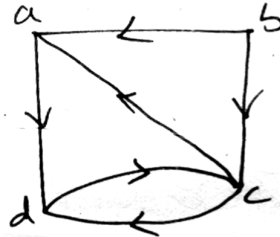5 a. Define balanced search tree. Write an algorithm for insert-item into binary search tree.   10

 b. Explain bottom-up heap sort algorithm with an example. Analyze its efficiency. 10

6. a. Give an example to explain to Horspool's algorithm and construct a shift table for it.   10

 b. Design a presorting-based algorithm to find the distance between the two closest numbers in an array of 'n' numbers. Compare the efficiency of this algorithm with Brute-force algorithm.   10

UNIT - IV

7 a. Explain dynamic programming. Write Huffman tree construction algorithm.   10

 b. Write the formula to find the shortest path using Floyd's approach. Use Floyd's method to solve the below all pairs shortest paths problem.   10

$$\begin{bmatrix} 0 & \infty & 3 & \infty \\ 2 & 0 & \infty & \infty \\ \infty & 7 & 0 & 1 \\ 6 & \infty & \infty & 0 \end{bmatrix}$$

8 a. Write Warshall's algorithm. Apply Warshall's algorithm to find the transitive closure of the following figure,   10

  b. Using Floyd's algorithm, solve all-pairs shortest path problem for the graph whose weight matrix is given below,   10

$$\begin{bmatrix} 0 & 2 & \infty & 1 & 8 \\ 6 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 4 & \infty \\ \infty & \infty & 2 & 0 & 3 \\ 3 & \infty & \infty & \infty & 0 \end{bmatrix}$$

UNIT - V

9 a. What are decision Trees? Explain how decision trees are used in sorting algorithms?   10

  b. What is branch and bound? Explain with an example how it is different from back tracking?   10

10 a. Write a short note on P, NP, NP - complete problems.   10

  b. Explain back-tracking problem. Apply the same to solve the following instances of the subset-sum problem: $S = \{3,5,6,7\}\{d = 15\}$.   10

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