



P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Fourth Semester, B.E. - Computer Science and Engineering
Semester End Examination; May/June - 2018
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

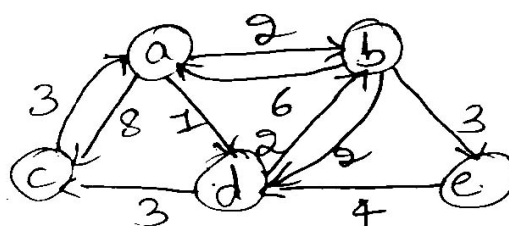
- 1 a. Define Algorithm. Write an algorithm to find GCD of 2 numbers using Euclid’s method. 6
- b. Write the flow chart depicting the algorithm design and analysis process. 6
- c. Write an algorithm of sequential search. Discuss its worst case, best case and average case efficiencies. 8
- 2 a. Define Asymptotic notations (O , Ω , θ) and give example for each. 6
- b. Write a non-recursive algorithm to find the product of 2 matrices. Discuss its time complexity. 6
- c. Give a recursive algorithm to find the solution for tower of Hanoi problem. Discuss its time complexity. 8

UNIT - II

- 3 a. Write an algorithm to sort the elements using merge sort. Discuss its time complexity. 8
- b. Apply quick sort and trace the algorithm for the following sequence : 6
 5, 3, 1, 9, 8, 2, 4, 7.
- c. Write an algorithm for insertion sort. 6
- 4 a. Write Depth first search algorithm. 6
- b. Discuss Topological sorting algorithm with an example using source removal method. 6
- c. Write heap sort algorithm using bottom up approach method. 8

UNIT - III

- 5 a. Explain Horspool’s algorithm along with the algorithm for generating shift values. Trace it for the pattern FORCE in the text NOTHING_IS_BETTER_THAN_BRUTE_FORCE_METHOD. 12
- b. Explain open hashing technique with a suitable example. 8
- 6 a. Compute the Binomial coefficient for $N = 5$, $C = 3$ using dynamic programming. 5
- b. Apply Floyd’s algorithm on the following graph and write the formula used to solve the given problem. 10



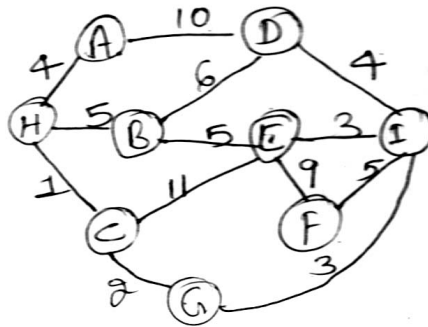
- c. Write Warshall’s algorithm. 5

UNIT - IV

7 a. Construct the table to obtain the maximum profit for a 0/1 knapsack problem using following data: 10

$N = 5, W_i = [3, 5, 2, 6, 4], P_i = [6, 3, 1, 8, 2], C = 11.$

b. Apply Prim's algorithm on the following graph and show all the intermediate spanning traces generated



- 8 a. Explain Huffman's algorithm with a suitable example. 6
- b. Write Kruskal's algorithm to find the minimum cost spanning tree. 8
- c. Explain P and NP problems with the definition. 6

UNIT - V

- 9 a. Explain the central principle of backtracking by taking 4 queen's problems as an example. 10
Explain the state space solution path along with algorithm.
- b. Explain list ranking and graph problems. 10
- 10 a. Solve the following instance of Knapsack problem using branch and bound algorithm $N = 4,$ 10
 $W_i = [4, 7, 5, 3],$ value = [40, 42, 25, 12], the capacity of the Knapsack $W = 10.$
- b. Explain polynomially reducible and NP complete problem in detail with an example. 10

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