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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

Semester End Examination; June/July - 2015

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) Assume suitable missing data if any.

UNIT - I

1. a. Explain various asymptotic notations used in analyzing the algorithm. Show that $3n+7=O(n^2)$ 10

   b. What is an algorithm? Write a non recursive algorithm to find whether the elements in an array are unique. Analyze its time complexity. 10

2 a. With the help of a flow chart explain the various stages of algorithm design and analysis process. 10

   b. Write the Bubble sort algorithm and discuss its time complexity. 10

UNIT – II

3 a. Write the merge sort algorithm and analyze is time complexity. Apply the algorithm to sort the list {310, 285, 179, 652, 351, 423, 861, 254, 450, 520} in ascending order. 10

   b. Write the quick sort algorithm and apply the same to sort the following list in ascending order {65, 70, 75, 80, 85, 60, 55, 50, 45}. 10

4. a. Write bottom up heap sort algorithm. Analyze its time complexity. Apply the algorithm to sort list {65, 70, 75, 80, 85, 60, 55, 50, 45} in ascending order. 10

   b. Write an algorithm for depth first search. Illustrate it on the graph shown in Fig. 4(b).

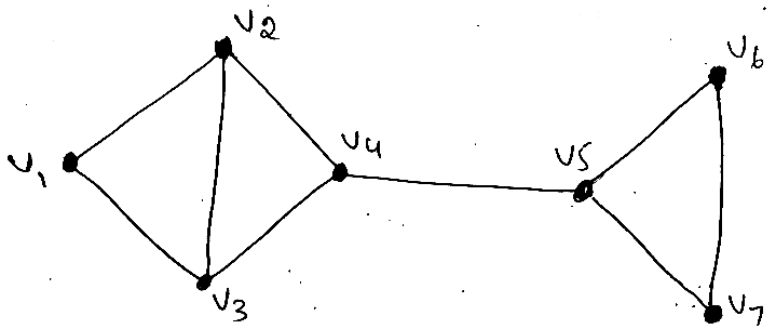

Fig. 4(b) 10

UNIT - III

5. a. Write Horspool's string matching algorithm. Illustrate it with an example. 10

   b. What is dynamic programming? Write an algorithm to find all pair shortest paths. Apply the algorithm to the graph shown in Fig. 5(b). 10

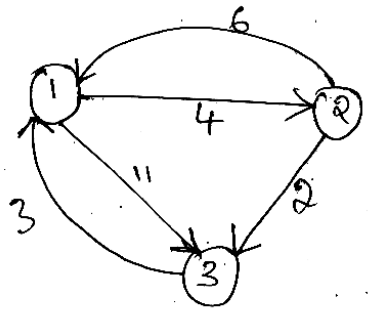

Fig. 5(b)

6. a. Define Hashing. Briefly explain open Hashing with an example. 10

   b. Write Warshall's algorithm. Apply the algorithm to the graph shown in Fig. 6(b). 10

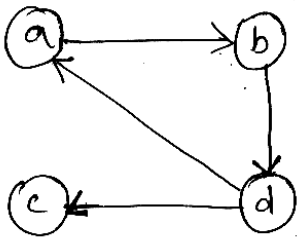

Fig. 6(b)

UNIT - IV

7. a. Write a Prim's algorithm to construct minimum cost spanning tree. Apply the algorithm to the graph shown in Fig. 7 (a). 10

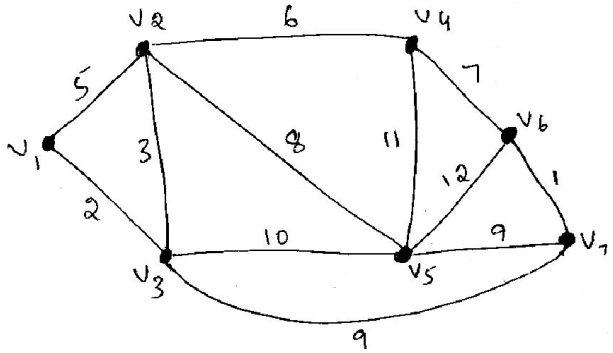

Fig. 7(a)

Contd…3

b. Explain Huffman's algorithm. Construct the Huffman codes for a file containing the following letters with their frequencies. 10

Letter	A	B	C	D	E
Frequency	40	20	15	14	11

8. a. Write an algorithm to find single source shortest path problem using greedy technique. Apply the algorithm to the graph shown in Fig. 8(a) taking 'A' as source vertex. 10

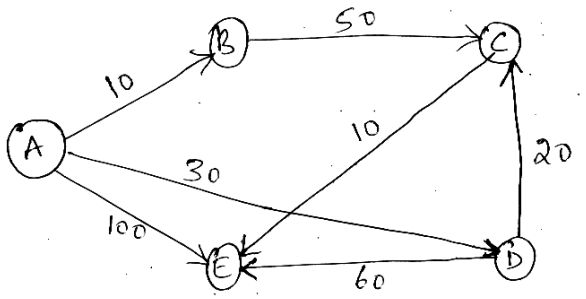

Fig. 8(a)

b. What is decision tree? Explain the concept of decision trees for sorting algorithms. 10

UNIT - V

9 a. What is Backtracking technique? Explain how 4 queens problem can be solved using backtracking. 10

b. Briefly explain branch and bound. Explain with an example how travelling salesman problem can be solved using branch and bound. 10

10a. Briefly explain how sum of subsets problem can be solved using backtracking. Illustrate it on the following instance 10

S = {3, 5, 6, 7} and d = 15.

b. What is PRAM? Briefly explain prefix computation problem with an example. 10

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