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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/July - 2015

Analysis and Design of Algorithm

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. Discuss the properties of algorithms with example and write note on important problem types. 10

   b. Define Big O, Big Ω and Big O and prove that if $t_1(n) \in Og_1(n)$ and $t_2(n) \in Og_2(n)$ then $t_1(n) + t_1(n) + t_2(n) \in O \text{ Max } \{g_1(n), g_2(n)\}$. 10

2 a. Discuss the general plan for analysis of recursive and non – recursive algorithm. 10

   b. Solve the following recurrences

   i) $M(n) = 2\,m(n-1)+1 \quad n > 1,\ m(1) = 1$ 8

   ii) $A(n) = A(n) = A(n_{/2}) + 1 \quad n > 1,\ A(1) = 0$

   c. Define recurrence relation with an example 2

UNIT - II

3 a. Write an algorithm for bubble sort, analysis's efficiency and apply the same on 3, 41, 52, 26, 38, 57, 9, 49, 10

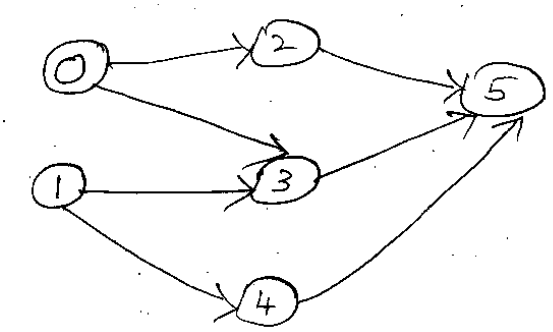
   b. Write an algorithm for quick sort, discuss the worst case, average case and best case efficiency of quick sort 10

4 a. Write an algorithm for binary search and draw the binary tree with ten nodes labeled 0,1,2,…9 is such a way that inorder and postorder traversal will list

   9, 3, 1, 0, 4, 2, 7, 6, 8, 5 (inorder)

   9, 1, 4, 0, 3, 6, 7, 5, 8, 2 (postorder) 10

   b. Write the algorithm for DFS traversal and perform topological sorting on the given graph



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Contd…2

UNIT – III

5 a. Write an algorithm for checking element uniqueness and computing a mode. 10

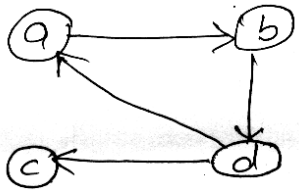
b. Explain the concept of balanced search tree with suitable examples. 10

6. a. Write an algorithm for distributing counting sort and apply an {b, c, d, c, b, a, a, b } 10

b. Write Horspool's string matching algorithm and apply on BESS_KNEW_ ABOUT_BAO BABS BAO BAB. The pattern string is BAO BAB. 10

UNIT - IV

7 a. Write Warshall's algorithm to find transitive closure and apply the same on



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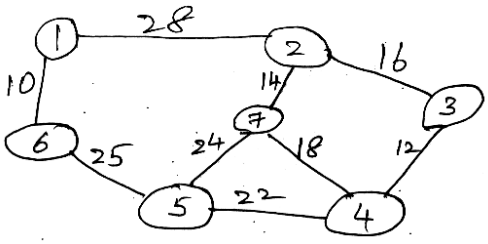
b. Apply dynamic knapsack algorithm to solve the following problem

Item	Weight	value
1	7	42
2	3	12
3	4	40
4	5	25
	W = 10	

10

8.a. Write kruskal's algorithm to find minimum cost spanning tree and apply the same on



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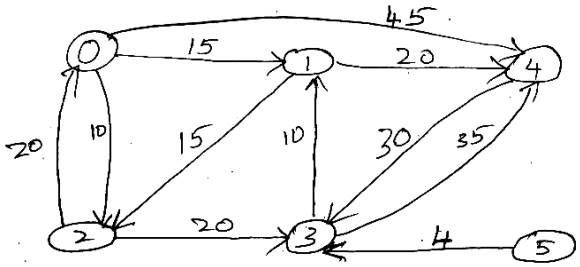
b. Write Dijkstra's single source shortest path algorithm and apply the same on the given graph taking the source as 5



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c. Compare and contrast Kruskal's with Prim's algorithm. 3

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Contd…3

UNIT - V

9 a. Discuss the methods of establishing lower bound with examples 10

b. Draw the decision tree for sorting problem and define P, NP, NP Complete Problems 10

10.a. Show how back tracking solves 4x4 queens problem and apply back tracking on subset problem S = {1, 3, 4, 5} d = 11. 10

b. Apply branch and bound to knapsack problem given below. 10

Item	1	2	3	4	5	6
Weight	5	7	2	4	5	1
Value	40	35	18	4	10	2
W = 15						

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