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BCS-042

BACHELOR OF COMPUTER APPLICATIONS (BCA) (Revised)

Term-End Examination

00006

June, 2016

BCS-042 : INTRODUCTION TO ALGORITHM DESIGN

Time : 2 hours *Maximum Marks : 50*

Note : *Question no. 1 is **compulsory**, carrying 20 marks. Answer any **three** questions from the rest.*

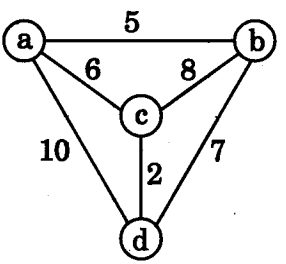
1. (a) What is an algorithm ? Briefly explain time complexity and space complexity of an algorithm. *5*

(b) Define notation Ω (Big Omega). If $f(n) = 2n^3 + 3n^2 + 1$ and $g(n) = 2n^2 + 3$, then show $f(n) = \Omega(g(n))$. *4*

(c) Arrange the following growth rates in increasing order : *2*

$$O(n^2), O(3^n), O(n), O(\log n)$$

(d) Draw all minimum spanning trees of the following weighted connected graph : *4*



(e) Write linear search algorithm and explain its best case, worst case and average case time complexity. *5*

2. (a) Given the following list of 8 integers, sort them using insertion sort. Determine the number of comparisons required by the algorithm. Also find the total number of assignment operations in this process. *8*

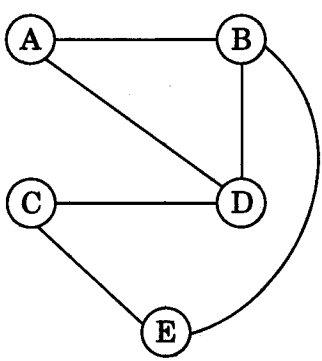
10	7	12	6	8	15	25	11

(b) Write any four characteristics of greedy algorithm. *2*

3. (a) What is recurrence relation ? Draw a recursion tree for recurrence

$$T(n) = 2T(n-1) + 1.$$ *4*

(b) Write adjacency list and adjacency matrix representation of the following graph : *6*



4. (a) Write binary search algorithm and search the value 28 in the following list, using binary search algorithm and show the steps : 5

1, 7, 18, 27, 28, 30, 39

(b) Write Prim's algorithm for finding minimum spanning tree. Find the complexity of this algorithm. 5

5. (a) Define the following terms : 4

(i) Connected graph

(ii) Cycle in an undirected graph

(b) Consider the following fractional knapsack problem :

M = 20;

Profits

$(P_1, P_2, P_3) = (25, 24, 15)$

$(w_1, w_2, w_3) = (18, 15, 10)$

Show the running of the greedy algorithm for fractional knapsack. 6