No. of Printed Pages : 3

BCS-042

BACHELOR OF COMPUTER APPLICATIONS (BCA) (Revised)

Term-End Examination

03931

June, 2017

BCS-042 : INTRODUCTION TO ALGORITHM DESIGN

Time : 2 hours *Maximum Marks : 50*

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

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1. (a) Write the linear search algorithm and analyse its time complexity in worst case. *4*

   (b) Arrange the following functions in increasing growth order : *2*

   (i) $O(n^3)$

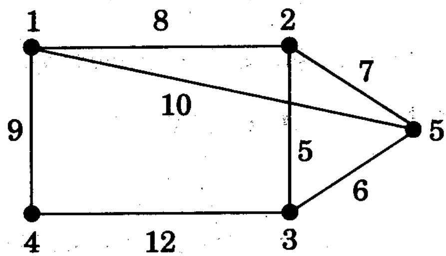
   (ii) $O(2^n)$

   (iii) $O(\log n)$

   (iv) $O(\sqrt{n})$

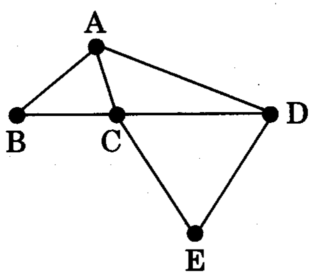
   (c) Write the recursive algorithm to calculate x^n using Divide and Conquer. *4*

(d) What is Minimum Cost Spanning Tree (MCST) ? Apply Prim's algorithm to find MCST for the following graph : *4*

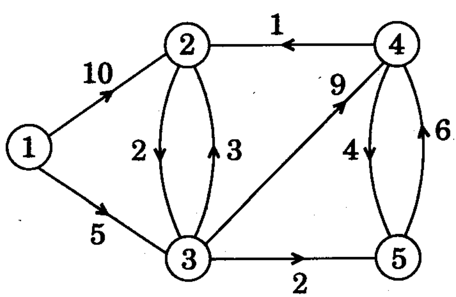


(e) Show that the worst case time complexity of Quick sort is $O(n^2)$, where n is the size of array elements. *3*

(f) Create adjacency list for the following graph : *3*



2. (a) Apply Dijkstra's algorithm to find the single source shortest path for the following graph : *5*



(b) Apply the Merge sort algorithm to sort the following list : 5

15, 8, 6, 12, 20, 7, 18, 5

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

$$T(n) = 3T\left(\frac{n}{2}\right) + n.$$ 5

(b) Write the Breadth First search algorithm and calculate its time complexity. 5

4. (a) Find the time complexity of the following code : 5

```
for (i = 1; i < = n; i ++)
  {
     if (A[i] > B[i])
      print A[i];
  }
```

(b) Find the optimal solution to the fractional knapsack problem for n = 5,

M(capacity of knapsack) = 10 and

$(p_1, p_2, p_3, p_4, p_5) = (12, 32, 40, 30, 50)$

$(w_1, w_2, w_3, w_4, w_5) = (4, 8, 2, 6, 1)$ 5

5. Explain the following terms with examples : 10

(a) Space Complexity

(b) Asymptotic Notation

(c) Binary Search

(d) Master Method for Solving Recurrence