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BCS-042

BACHELOR OF COMPUTER APPLICATIONS (BCA) (Revised)

Term-End Examination

June, 2021

BCS-042 : INTRODUCTION TO ALGORITHM DESIGN

Time : 2 hours *Maximum Marks : 50*

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

1. (a) Arrange the following classes of algorithms in increasing order of growth : *3*

(i) $O(n^3)$

(ii) $O(n \log n)$

(iii) $O(n^2)$

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

(b) Write the recurrence relation for the following recursive function : *5*

```
Fib (int n)
  {
   if (n == 0) return 0;
   if (n == 1) return 1;
   else
   return (Fib (n – 1) + Fib (n – 2));
  }
```

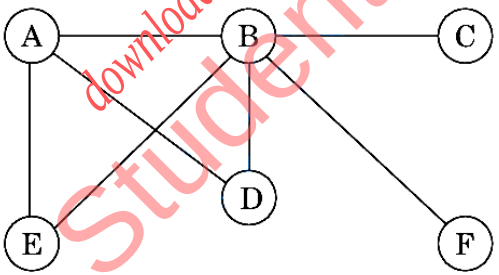
(c) Sort the following list of elements using 'Insertion Sort'. Also, show intermediate steps.

28, 6, 29, 90, 5, 42, 80 *6*

(d) Write the recurrence relation for the best case of Quicksort algorithm and solve it using Master method. *6*

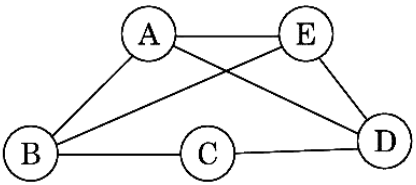
2. (a) Write the pseudocode for computing GCD (m, n) and find its time complexity. *4*

(b) Write the pseudocode for Breadth First Search (BFS) and traverse the following graph using BFS from starting node A. *6*



3. (a) What is Greedy Technique ? Explain the types of problems solved by using this technique. *4*

(b) Find the adjacency list for the following graph : *3*



(c) With the help of an example, explain the 'Merge-Sort' technique. *3*

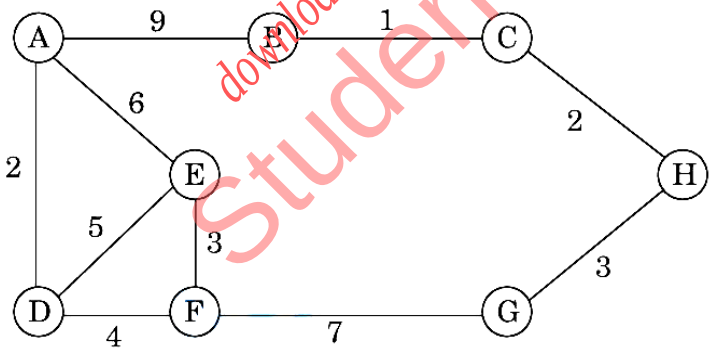
4. (a) What is a single source shortest path problem ? Briefly explain the generic algorithm for solving it. *5*

(b) Explain the following terms with an example for each : *5*

(i) Complete Graph

(ii) Dynamic Programming Technique

5. (a) Find the minimum cost spanning tree for the following graph using Kruskal's algorithm : *7*



(b) Define Recurrence Relation and Initial Condition for Factorial Function. *3*