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BCS-042

BACHELOR OF COMPUTER APPLICATIONS (BCA)

(Revised)

Term-End Examination

December, 2021

BCS-042 : INTRODUCTION TO ALGORITHM DESIGN

Time : 2 Hours *Maximum Marks : 50*

Note : *(i) Question **No. 1** is compulsory which carries 20 marks.*

*(ii) Answer any **three** questions from the rest.*

1. (a) State True or False :

$O(n \log_2 n)$ is better than $O(n^2)$ but not as food as $O(n)$. 2

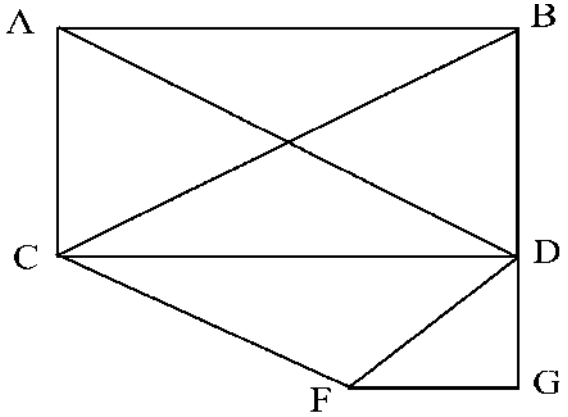
(b) Write the names of the following symbols : 2

$\theta, \Omega, \forall, \in$

(c) Define O (big Oh) notation. By using the basic definition O (big Oh), show that : 4

$$6x^2 + 6x + 1 = O(x^2)$$

(d) Create an adjacency matrix for the following graph : 3



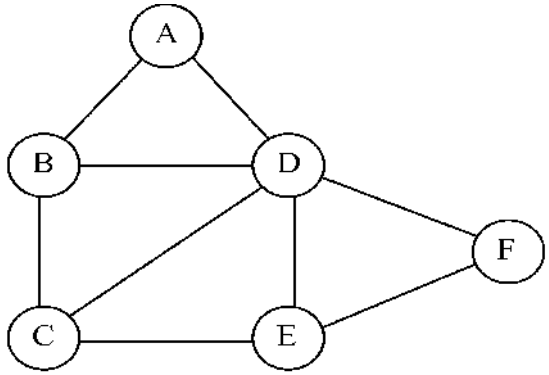
(e) Multiply 10056 × 2037 using divide and conquer technique. Apply Karatsuba's method. 4

(f) Briefly explain any ***two*** different approaches to solve the recurrence relation. 5

2. (a) Arrange the following growth rate in increasing order : 2

$O(2^n),\ O(n^3),\ n!,\ \sqrt{n}$

(b) (i) Traverse the following graph using BFS. The starting node is A : 4



(ii) Perform the complexity analysis of the above algorithm. 4

3. (a) Explain the basic concept of quick sort algorithm and apply it to sort the following list of numbers : 7

15 10 5 4 25 35 7 8

Show all the intermediate steps.

(b) Define the term backtracking and enlist any ***two*** problems that can be solved by backtracking. 3

4. (a) Write a recurrence relation for the following recursive factorial function : 3

```
int fact (int n)
  {
    if (n = = 1)
       return 1
else
    return n * fact (n – 1)
  }
```

(b) State Horner's rule for polynomial evaluation and apply the rule for evaluating the following polynomial expression : 7

$$p(x) = 6x^7 + 7x^6 - 5x^5 + 3x^3 + 6x^2 + 8x + 7$$

Show stepwise iteration.

5. (a) How many comparisons are needed for binary search algorithm in a set of 64 elements ? 3

(b) Write Prim's algorithm to solve minimum cost spanning tree problem and explain. 7