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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 good as $O(n)$. 2

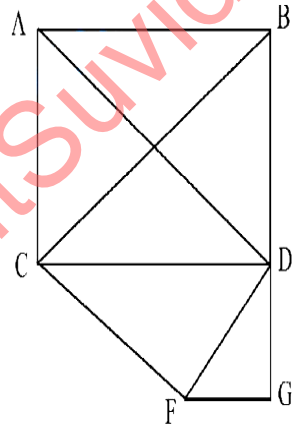
(b) Write the names of the following symbols : 2

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

(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

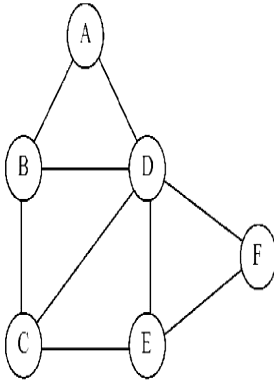
(f) Briefly explain any **two** different approaches to solve the recurrence relation. 5

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

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

P. T. O.

- (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