BCS-042

BACHELOR OF COMPUTER APPLICATIONS (BCA) (Revised)

Term-End Examination

June, 2022

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) Define basic efficiency classes in context of running time. *3*

(b) Perform linear and binary search to find 15 in a given list of numbers as below :

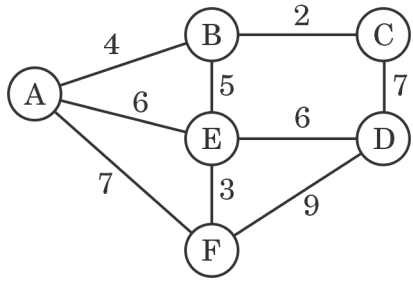
5 7 9 12 13 15 21 25

Count the number of comparisons in both the search methods. *6*

(c) Define a recurrence relation. Draw a recurrence tree for the following recurrence relation : *5*

$T(n) = 2T(n/2) + 1$

(d) Apply Kruskal's algorithm to find out the minimum cost spanning tree. *6*



Starting vertex is A.

2. (a) Arrange the following functions in increasing order : *2*

$$\log_2^n,\ n\log_2^n,\ n^2,\ 5n + 7$$

(b) List any two applications of BFS/DFS. *2*

(c) Write the algorithm for left to right binary exponentiation evaluation and apply the algorithm for evaluating a^{280}. Show all the steps. *6*

3. (a) For the function defined by

$$f(n) = 6n^2 + 8n + 6,$$

show that $f(n) = O(n^2)$. *4*

(b) Show that Dijkstra's algorithm may not work if edges can have negative weight. *3*

(c) Traverse the complete graph on four vertices using BFS and write the sequence of vertices that would be visited by the graph traversal algorithm. *3*

4. (a) Write a recurrence relation for Fibonacci series problem. *3*

(b) Write and apply Mergesort algorithm to sort the following list of integer numbers. *7*
Show all the intermediate steps.

15, 8, 7, 4, 25, 30, 5, 13

5. (a) Write any two cases of the Master method with formal notations. *4*

(b) Write recurrence relations for matrix multiplication using Strassen's method and solve it using the Master method. *6*