No. of Printed Pages : 5

BCS–042

BACHELOR OF COMPUTER APPLICATIONS (BCA)

(GOAL)

Term-End Examination

June, 2026

BCS-042 : INTRODUCTION TO ALGORITHM DESIGN

Time : 3 Hours *Maximum Marks : 100*

Note : *(i) There are three Sections in this question paper.*

(ii) Section A contains seven questions of 4 marks each. Attempt any ***five*** *questions.*

(iii) Section B contains seven questions of 10 marks each. Attempt any ***five*** *questions.*

(iv) Section C contains three questions of 15 marks each. Attempt any ***two*** *questions.*

Section—A

(Short Answer Type Questions)

1. Define an Algorithm. What are the analysis issues of an algorithm ? 4

2. What is recursion ? Write recursive algorithm to compute factorial of a number. 4

3. Explain adjacency list representation of a graph with a suitable example. 4

4. Apply the merge sort algorithm to sort the following list : 4

   10, 5, 6, 4, 20, 25

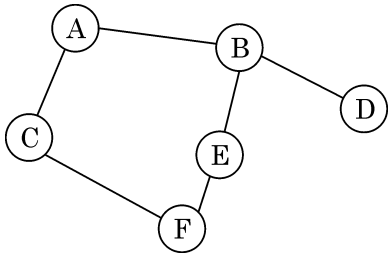
5. Explain branch and bound technique with the help of a suitable example. 4

6. Solve the following recurrence relation using Recursion tree method : 4

   $T(n) = 2T(n - 1) + 1; T(0) = 0$

   Find the tight solution of the recurrence.

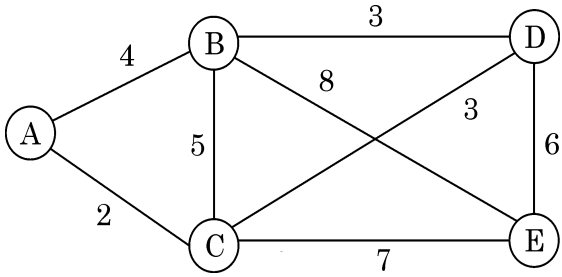
7. For the following graph, find the sequence of traversal from the node 'A' using Depth First Search (DFS) method : 4



Section—B

(Medium Answer Type Questions)

8. What is Minimum Cost Spanning Tree (MCST) ? Find MCST of the following graph using Prim's algorithm : 10



9. Apply insertion sort method to arrange the following list of elements in ascending order. Show all the intermediate steps : 10

55, 25, 10, 5, 6, 30, 50, 60, 4, 20

10. Find an optimal solution for the knapsack instance $n = 7$ and $m = 15$ where : 10

    $(p_1, p_2, ... p_7) = (10, 5, 15, 7, 6, 18, 3)$

    $(w_1, w_2, ... w_7) = (2, 3, 5, 7, 1, 4, 1)$

11. Write an algorithm to multiply two square matrices of order $n \times n$ and find its time complexity. 10

12. Explain binary search algorithm with the help of a suitable example. Also, do the best case, average case and worst case time complexity analysis of it. 10

13. Explain right to left binary exponentiation with the help of a suitable example. 10

14. Evaluate $p(x) = 3x^4 + 2x^3 + 5x + 3$ at $x = 2$ using Horner's rule. Show all the intermediate steps. 10

Section—C

(Long Answer Type Questions)

15. (a) Write EUCLID's algorithm for GCD and find GCD (595, 252) by Euclid's algorithm. 8

    (b) Explain quick sort algorithm with the help of a suitable example. 7

16. (a) Apply selection sort algorithm to sort the following list of elements in ascending order. Also, discuss best case, average case and worst case time complexity of selection sort algorithm : 8

    20, 15, 30, 10, 5, 35, 50, 4, 3

    (b) Explain Breadth First Search algorithm with the help of suitable example. 7

17. Write short notes on any *three* of the following : 15

    (a) Backtracking

    (b) Dynamic Programming

    (c) Greedy method

    (d) Adjacency Matrix

× × × × ×