

END TERM EXAMINATION

SECOND SEMESTER [BCA] MAY-JUNE 2026

Paper Code: BCA-106

Subject: Data Structure and Algorithms Using C
(Batch 2025 Onwards)

Time: 3 Hours

Maximum Marks: 60

Note: Attempt five questions in all including Q.No.1 which is compulsory.
Select one questions from each unit.

Q1. Answer the following (Attempt any four)

(4X5=20)

- (i) Explain four Dynamic memory allocation functions with examples.
- (ii) What are priority queues? Explain two real time applications.
- (iii) Explain Adjacency Matrix and Incidence Matrix by taking a suitable example.
- (iv) Explain Binary Search Tree and construct a Binary Search Tree from the following set of key values. 20,10,45,15,35,40.
- (v) Explain Warshall's algorithm with suitable example.

UNIT I

- Q2. a) Explain the concepts of row-major order and column-major order for storing two-dimensional array in memory. Given the array $Arr[2][3] = \{20, 30, 40, 50, 60, 70\}$, illustrate how the elements are arranged in memory using both storage methods. (5)
- b) Write a program in C to implement the following functions: Insert a node at end, delete node at a specific location on Doubly linked list. (5)
- Q3. a) Explain a sparse matrix and its various types with example. Give function to convert it into its 3-tuple memory representation. (5)
- b) Write a program in C to implement the following functions: Reversal of Linked List, Add node at the beginning on Single linked list.. (5)

UNIT II

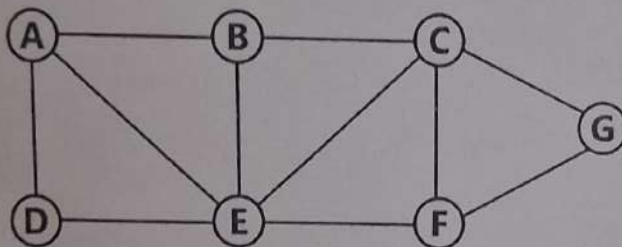
- Q4. a) Explain the concept of Hashing. Describe any two hashing techniques and any two methods of collision resolution. (5)
- b) Evaluate the following postfix expression: $ABC+DE*/- for A=2, B=5, C=3, D=2, E=4$. Show stack at each step. (5)
- Q5. a) Write a program or algorithm to perform QuickSort. Show all the passes for the following array: 35,15,25,40,55,10 (5)
- b) Write an algorithm to convert infix expression to postfix expression. Convert the following infix expression into postfix expression using stack:
 $A + (B * C - (D / E ^ F) + G) * H$
Note: ^ symbol is used for exponent. (5)

UNIT III

- Q6. a) Explain the following types of binary trees. For each type, give an example and write its preorder traversal: Full Binary Tree, Complete Binary Tree, Expression Binary Tree. (5)
- b) Construct a Binary Tree from the following traversals: (5)
- Inorder: 10, 25, 35, 40, 45, 61, 68, 71
- Preorder: 45, 25, 10, 35, 40, 61, 71, 68
- Q7. a) What are the limitations of a Binary Search Tree (BST)? How does an AVL Tree overcome these limitations? Explain with a suitable example. (5)
- b) Construct a BTree of order 4 with the following key values (5)
- 1,4,7,10,17,21,31,25,19,20,28,42

UNIT IV

- Q8. Explain Graph Traversal techniques. Describe Breadth First Search (BFS) and Depth First Search (DFS) and for the given graph, give the traversal order using BFS and DFS (10)



- Q9. Define a Minimum Spanning Tree (MST). Explain Prim's and Kruskal's algorithms for finding the MST. Construct MST using Kruskal's algorithm for the following weighted graph. (10)

