

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur (GIET University)



B.C.A. (Second Semester - Regular) Examinations, May – 2026

BCA252001 - Data Structures using C

Time: 2 hrs

Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

	CO #	Blooms Level
a. Define Sparse Matrix. What is the difference between Sparse Matrix and Dense Matrix?	CO1	K1
b. What are the advantages of Linked List over Array?	CO2	K2
c. Define a complete binary tree with an example.	CO3	K2
d. What is sorting in data structure, and why is it needed?	CO4	K2
e. Why do collisions occur in hashing?	CO5	K1

PART – B

(10 x5=50 Marks)

Answer **ALL** questions

	Marks	CO #	Blooms Level
2. a. Write an algorithm to implement Stack PUSH and POP operations.	5	CO1	K2
b. Write an algorithm to convert an Infix expression to corresponding Postfix expression.	5	CO1	K2
(OR)			
c. How does Circular Queue overcome the limitations of Linear Queue? Write an algorithm to implement Circular Queue insert operation using array.	5	CO1	K2
d. Evaluate the expression 5 6 2 + * 12 4 / - in tabular form showing STACK after every step.	5	CO1	K3
3.a. Define Linked List. Explain the situations where a linked list is preferred over an array. Also discuss any two important applications of linked lists.	5	CO2	K2
b. Write an algorithm or C function to delete the last node from a singly linked list.	5	CO2	K3
(OR)			
c. Write an algorithm for insertion of a new node at the beginning of a singly linked list.	5	CO2	K2
d. Explain how polynomials can be represented using a linked list. Show the linked list representation of the give polynomial: $P(x)=5x^3+4x^2+2x+7$	5	CO2	K4
4.a. What is a binary search tree? Draw a BST with the following set of data, 50,30, 70, 20, 40, 60, 80,65,35,42	5	CO3	K2
b. Define AVL tree. Explain the different types of rotations used in an AVL tree to maintain balance after insertion or deletion, with suitable examples.	5	CO3	K3
(OR)			
c. What is tree traversal. Explain the in-order, preorder and post-order traversal.	5	CO3	K3
d. Discuss the properties of a B Tree. Construct a B-Tree of order 3 from following keys. 55, 23, 10, 92, 60, 20, 86, 12, 59, 15	5	CO3	K4

5.a.	Explain Bubble Sort algorithm with a suitable example. Mention its advantages and disadvantages.	5	CO4	K3
b.	Write an algorithm for Binary Search. Explain how it works with a sorted list using an example.	5	CO4	K3
(OR)				
c.	How Breadth First Search differs from Depth first search? Write the algorithm for Breadth First traversal of a graph.	5	CO4	K3
d.	Write the algorithm for Selection Sort and explain its working with an example.	5	CO4	K3
6.a.	Define hashing. Explain its importance in data structures with suitable examples.	5	CO5	K2
b.	What is a hash function? Explain the characteristics of a good hash function.	5	CO6	K2
(OR)				
c.	What is collision in hashing? Explain why collisions occur in hash tables.	5	CO5	K2
d.	Discuss the efficiency of hash-based data structures in terms of searching and insertion time.	5	CO6	K2

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