PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BCA DEGREE EXAMINATION DECEMBER 2025
(Second Semester)

Branch – COMPUTER APPLICATIONS

DATA STRUCTURES AND ALGORITHMS

Time: Three Hours   Maximum: 75 Marks

SECTION-A (10 Marks)
Answer ALL questions

ALL questions carry EQUAL marks   (10 × 1 = 10)

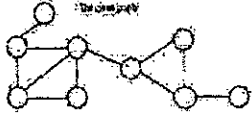| Module No.	Question No.	Question	K Level	CO
1	1	Representation of data structure in memory is known as: a) Structure b) Abstract data type c) Storage structure d) File structure	K1	CO1
	2	What is the time complexity of finding the maximum element in an unsorted array? a) O(n) b) O(log n) c) O(n^2) d) O(1)	K2	CO1
2	3	Which is one of the most commonly used collision resolution techniques? a) linear probing b) Indexing c) Separate chaining d) Sorting	K1	CO2
	4	Which of the following is not a stable sorting algorithm? a) Insertion sort b) Merge sort c) Bubble sort d) Selection sort	K2	CO2
3	5	In which type of Linked List can traversals be performed in both directions? a) Singly Linked List b) Circular Linked List c) Doubly Linked List d) None of the above	K1	CO3
	6	What is the time complexity to add a node at the beginning of the Linked List? a) O(1) b) O(log n) c) O(n) d) O(n log n)	K2	CO3
4	7	How many stacks are needed to implement a queue. Consider the situation where no other data structure like arrays, linked list is available to you. a) 1 b) 2 c) 4 d) 3	K1	CO4
	8	Which of the following properties is associated with a queue? a) First In Last Out b) First In First Out c) Last In First Out d) Last In Last Out	K2	CO4
5	9	In full binary search tree every internal node has exactly two children. If there are 100 leaf nodes in the tree, how many internal nodes are there in the tree? a) 25 b) 49 c) 99 d) 100	K1	CO5
	10	A binary tree in which if all its levels except possibly the last, have the maximum number of nodes and all the nodes at the last level appear as far left as possible, is called a) Full binary tree b) Binary Search Tree c) Threaded tree d) Complete binary tree	K2	CO5

SECTION - B (35 Marks)
Answer ALL questions
ALL questions carry EQUAL Marks   (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Describe briefly the three types of structures used for storing strings.	K2	CO1
		(OR)		
	11.b.	Explain the sparse matrix representation.		
2	12.a.	Given the input { 4371, 1323, 6173, 4199, 4344, 9679, 1989 } and a hash function of h(X)=X (mod 10) show the resulting: a. Separate Chaining hash table. b. Open addressing hash table using linear probing.	K3	CO2
		(OR)		
	12.b.	Show the result of inserting the keys 2,3,5,7,11,13,15,6,4 into an initially empty extendible hashing data structure with M=3.		
3	13.a.	Explain the operation of traversing linked list. Write the algorithm and give an Example.	K2	CO3
		(OR)		
	13.b.	Describe in detail about Dynamic memory management. What are the applications of linked list in dynamic storage management.		
4	14.a.	Write a function called 'push' that takes two parameters: an integer variable and a stack into which it would push this element and returns a 1 or a 0 to show success of addition or failure.	K3	CO4
		(OR)		
	14.b.	Write the algorithm for converting infix expression to postfix (polish) expression.		
5	15.a.	Explain Breadth First Search algorithm with example.	K3	CO5
		(OR)		
	15.b.	Create a binary search tree for the following numbers start from an empty binary search tree. 45,26,10,60,70,30,40 Delete keys 10,60 and 45 one after the other and show the trees at each stage.		

SECTION -C (30 Marks)
Answer **ANY THREE** questions
ALL questions carry **EQUAL** Marks   (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	List the various operations that can be performed on data structure. List out the areas in which data structures are applied extensively.	K2	CO1
2	17	Write an algorithm to implement insertion sort with suitable example.	K3	CO2
3	18	Explain the insertion operation in linked list. How nodes are inserted after a specified node.	K3	CO3
4	19	Construct an expression tree for the expression (a+b*c) + ((d*e+f)*g). Give the outputs when you apply inorder, preorder and postorder traversals.	K4	CO4
5	20	For the given graph, draw the DFS and BFS. Explain	K4	CO5

Z-Z-Z   END