

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)

BCA DEGREE EXAMINATION MAY 2024  
(Second Semester)

Branch - COMPUTER APPLICATIONS

**DATA STRUCTURES & 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	Efficiency of an algorithm is measured by ----- (i) Time and space complexity (ii) Time and Capacity complexity (iii) Line codes and heap usage (iv) Stack usage and number of functions used	K1	CO1
	2	Which of the following data structure can't store the non-homogeneous data elements? (i) Record (ii) Array (iii) Structure (iv) Pointer	K2	CO1
2	3	Which of the following is not a comparison sort? (i) Bubble sort (ii) Insertion sort (iii) Radix sort (iv) Quick sort	K1	CO2
	4	Time required to merge two sorted lists of size m and n, is----- (i) $O(m + n)$ (ii) $O(m - n)$ (iii) $O(m)$ (iv) $O(mn)$	K2	CO2
3	5	A linear collection of data elements given by means of pointers is called (i) Queue (ii) Stack (iii) Graph (iv) Linked list	K1	CO3
	6	Sometimes new data are to be inserted into a data structure but there is no available space, this situation is usually called as ----- (i) Non-availability (ii) Crash (iii) Overflow (iv) Underflow	K2	CO3
4	7	..... is very useful in situation when data have to stored and then retrieved in reverse order. (i) Stack (ii) Queue (iii) Linked list (iv) Doubly linked list	K1	CO4
	8	Given a 5 element queue Q (from front to back: 1, 3, 5, 7, 9), and an empty stack S, remove the elements one-by-one from Q and insert them into S, then remove them one-by-one from S and re-insert them into Q. The queue now looks like (from front to back) (i) 9, 7, 5, 3, 1 (ii) 5,3,7,9,1 (iii) 3,7,5,9,1 (iv) 1,3,5,7,9	K2	CO4
5	9	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 (i) Full binary tree (ii) Binary Search Tree (iii) Threaded tree (iv) Complete binary tree	K1	CO5
	10	The no of external nodes in a full binary tree with n internal nodes is? (i) n (ii) n+1 (iii) 2n+1 (iv) 2n	K2	CO5

Cont...

**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.	Write a procedure to find the location of the largest element and the location of second largest element in an array.	K2	CO1
		(OR)		
	11.b.	List the set of operations that can be performed on strings.		
2	12.a.	Write an algorithm for binary search with suitable example.	K3	CO2
		(OR)		
	12.b.	Write an algorithm to implement radix sort with suitable example.		
3	13.a.	Given a list 10,20,30,40, generalize the steps to delete a node from the beginning of the linked list, deletion of last node, a deletion of middle node in a list.	K2	CO3
		(OR)		
	13.b.	Give some (a) advantages and (b) disadvantages of using linked storage for storing strings.		
4	14.a.	A circular queue has a size of 5 and has 3 elements 10,20 and 40 where F=2 and R=4. After inserting 50 and 60, what is the value of F and R. Trying to insert 30 at this stage what happens? Delete 2 elements from the queue and insert 70, 80 & 90. Show the sequence of steps with necessary diagrams with the value of F & R.	K3	CO4
		(OR)		
	14.b.	Write an algorithm for Push and Pop operations on Stack using Linked list.		
5	15.a.	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.	K3	CO5
		(OR)		
	15.b.	Explain the various applications of Graphs.		

**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	Estimate the array representation of Sparse matrices.	K2	CO1
2	17	Develop an algorithm for merge sort. Sort the following using merge sort 34,45,89,23,38,76,12,28.	K3	CO2
3	18	Discuss the creating, searching, inserting and deleting an element using linked list with neat diagram.	K3	CO3
4	19	Find the postfix notation following expressions using : ((a + b) * c) – d. Show the stack trace. write the pseudo code.	K4	CO4
5	20	State the concept of graph traversal using depth first search algorithm.	K4	CO5

Z-Z-Z      END