

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCA DEGREE EXAMINATION DECEMBER 2024
(First 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	Which of the following is not the type of queue? a) Priority queue b) Single ended queue c) Circular queue d) Ordinary queue	K1	CO1
	2	Show which one of the following represents the Postorder Traversal of a Binary Tree? a) left->root-> right b)left->right->root c) right->root->left d) right-> left->root	K2	CO2
2	3	Choose the one that is exactly like a binary heap except that all nodes have 'd' children. a)skew-heap b)leftist-heap c)d-heap d)rightist-heap	K1	CO1
	4	_____ are binary trees with heap order, but there is no structural constraint on these trees and no information is maintained about the null path length of any node. a)skew-heaps b)leftist-heaps c)d-heaps d) Binomial queues	K2	CO2
3	5	Which algorithm is used to find the shortest path in an unweighted graph with all non-negative edge weights? a) Bellman-Ford Algorithm b) Prim's Algorithm c) Kruskal's Algorithm d) Dijkstra's Algorithm	K1	CO1
	6	_____ is a simple path from the source to the sink in a residual network. a) residual graph b) augmenting path c) residual edge d)back edge	K2	CO2
4	7	Which one of the following version, each item must be placed in a bin before the next item can be processed? a) online bin packing b) offline bin packing c) realtime bin packing d) optimal bin packing	K1	CO1
	8	Bellmann Ford Algorithm is an example for _____ a) Linear Programming b) Greedy Algorithms c) Dynamic Programming d) Branch and Bound	K2	CO2
5	9	Find out the correct property of splay tree. a) self adjusting binary search trees b) a tree with strings c) self adjusting binary trees d) a tree with probability distributions	K1	CO1
	10	How much time taken to construct a perfectly balanced 2-d tree? a) O(N) b) O(N log N) c) O(N ²) d) O(M log N)	K2	CO2

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.	Develop an algorithm to insert and delete a node in a doubly linked list.	K4	CO1
	(OR)			
	11.b.	i) Find out the value of a given postfix expression (1) $6\ 3\ 2\ 4\ +\ -\ *$ ii) Convert the following infix expression into corresponding postfix equivalent. $(A - B) + C * D / E - C$ (2) iii) Construct the binary tree for the following expression. (4) $Exp = ((a + b) - (c * d)) \% ((e \wedge f) / (g - h))$		
2	12.a.	Draw a binary heap tree and write a procedure to insert an element 'X' in to the heap.	K4	CO2
	(OR)			
	12.b.	Describe the operations of binomial queues with example.		
3	13.a.	Construct an acyclic graph and develop a pseudocode that representing course prerequisite structure for a state university using topological sort.	K3	CO3
	(OR)			
	13.b.	Analyze the Prim's algorithm to calculate the edges using minimum spanning tree.		
4	14.a.	Develop an algorithm to find optimal ordering of matrix multiplications.	K4	CO4
	(OR)			
	14.b.	Elucidate the closest-point problem of divide-and-conquer technique.		
5	15.a.	Discuss about the suffix tree and its applications to find the location of a pattern with example.	K6	CO5
	(OR)			
	15.b.	Formulate pairing heap data structure routine to merge two sub-heaps.		

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	Examine the various operations or routines performed on Binary Search Tree with example coding.	K4	CO1
2	17	Illustrate the property and operations of leftist heap with corresponding class skeleton.	K4	CO2
3	18	Design a pseudocode and construct the graph to find the shortest path using Dijkstra's algorithm.	K6	CO5
4	19	Analyze the Huffman's algorithm of a greedy technique used for file compression with example.	K4	CO3
5	20	Elaborate the basic operations that are used to color changes and tree rotations of red-black tree.	K6	CO5

Z-Z-Z

END