

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCA DEGREE EXAMINATION DECEMBER 2023
(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	In stack, deletions are performed at the end called _____. a. front b. rear c. top d. bottom	K1	CO1
	2	In a ____ traversal, work at a node is performed before its children are processed. a. preorder b. in order c. post order d. none of the above	K2	CO1
2	3	A complete binary tree of height h has between ____ and ____ nodes. a. $4^h, 4^{h+1}-1$ b. $2^h, 2^{h-1}-1$ c. $4^h, 4^{h-1}-1$ d. $2^h, 2^{h+1}-1$	K1	CO2
	4	By the heap-order property, the minimum element can always be found at the ____ node. a. left b. root c. leaf d. non-leaf	K2	CO2
3	5	The ____ for each edge in the event-node graph represents the amount of time that the completion of the corresponding activity can be delayed without delaying the overall time. a. slack time b. surplus time c. amortized time d. event time	K1	CO3
	6	Dijkstra's algorithm is an example of a _____. a. greedy algorithm b. divide-and-conquer approach c. backtracking algorithm d. branch-and-bound approach	K2	CO3
4	7	In ____ each item must be placed in a bin before the next item can be processed. a. offline bin packing b. online bin packing c. hashing d. de-hashing	K1	CO4
	8	In approximate bin packing, the ____ strategy places a new item in the tightest spot among all bins. a. first fit b. next fit c. best fit d. worst fit	K2	CO4
5	9	Operations on red-black trees take ____ in the worst case. a. $O(\log N)$ b. $2 \log(N + 1)$ c. $2 \log N$ d. $2 \log(N-1)$	K1	CO5
	10	The ____ has rotations such as zig, zig-zig and zig-zag. a. k-d tree b. top-down splay tree c. red-black tree d. suffix tree	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.	Describe binary tree and its operations.	K4	CO1
	(OR)			
	11.b.	Examine the functions of the queue ADT.		
2	12.a.	Explore the properties and operations on leftist heaps.	K4	CO2
	(OR)			
	12.b.	Analyze the operations of a binomial queue.		
3	13.a.	Interpret the Prim's algorithm for finding the minimum spanning tree.	K5	CO3
	(OR)			
	13.b.	Explain the maximum-flow algorithm with an example.		
4	14.a.	Evaluate the closest-points problem in the divide-and-conquer approach.	K5	CO4
	(OR)			
	14.b.	Estimate the best fit algorithm to solve the bin packing problem.		
5	15.a.	Discuss the functionality of pairing heaps.	K6	CO5
	(OR)			
	15.b.	Deliberate the working of suffix trees.		

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	Infer the operations of AVL trees.	K4	CO1
2	17	Examine the properties and operations of a binary heap.	K4	CO2
3	18	Explain Dijkstra's algorithm to solve the single-source shortest-path problem.	K5	CO3
4	19	Interpret the aspects of dynamic programming.	K5	CO4
5	20	Discuss about Red-Black trees and its operations.	K6	CO5

Z-Z-Z

END