22CMU207N / 22CMU207

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2024
(Second Semester)

Branch – **COMPUTER SCIENCE**

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	Which sorting algorithm has the worst-case time complexity of O(n^2)? a) Merge Sort b) Quick Sort c) Bubble Sort d) Insertion Sort	K1	CO2
	2	Which of the following is not a limitation of arrays? a) Fixed size b) Inefficient insertion and deletion c) Inability to hold elements of different types d) Difficulty in re sizing	K2	CO2
2	3	Which of the following search algorithms requires the array to be sorted? a) Linear Search b) Binary Search c) Depth-First Search d) Breadth-First Search	K1	CO3
	4	Which of the following data structures uses the Last In First Out (LIFO) principle? a) Queue b) Stack c) Linked List d) Tree	K2	CO3
3	5	In a queue, which operation adds an element to the end of the queue? a) Enqueue b) Dequeue c) Push d) Pop	K1	CO3
	6	In a binary tree, what is the maximum number of children a node can have? a) 0 b) 1 c) 2 d) Unlimited	K2	CO3
4	7	What is the main disadvantage of exhaustive search? a) It always finds the optimal solution b) It is computationally expensive c) It is not suitable for problems with large solution spaces d) It is difficult to implement	K1	CO4
	8	What problem-solving approach does dynamic programming often apply? a) Top-down b) Bottom-up c) Left-to-right d) Right-to-left	K2	CO4
5	9	What is the primary characteristic of the greedy technique? a) It exhaustively searches all possible solutions. b) It divides the problem into sub problems and solves each independently. c) It makes locally optimal choices at each step with the hope of finding a global optimum. d) It uses backtracking to explore all possible paths.	K1	CO5
	10	What is the time complexity of Dijkstra's algorithm? a) O(V) b) O(V log V) c) O(E log V) d) O(V^2)	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.	Explain what a data structure is and why it's important in computer science.	K2	CO1
		(OR)		
	11.b.	Explain sparse matrix with suitable example.		
2	12.a.	Construct binary search with example.	K3	CO2
		(OR)		
	12.b.	Analyze dynamic memory allocation with example.		
3	13.a.	Analyze the concept of a binary search tree (BST) with example.	K3	CO3
		(OR)		
	13.b.	Explain the concept of circular queue data structure in detail. Discuss its properties, operations, and the principle of First In First Out (FIFO).		
4	14.a.	Construct Travelling salesman problem in detail.	K4	CO4
		(OR)		
	14.b.	Build Depth first search with example.		
5	15.a.	Develop Prims algorithm with example.	K4	CO5
		(OR)		
	15.b.	Construct Hamiltonian circuit in detail.		

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	Analyze the bubble sort algorithm. Discuss its time complexity, advantages, and limitations.	K4	CO3
2	17	Survey the concept of a doubly linked list. Discuss its advantages and disadvantages compared to singly linked lists. Provide examples demonstrating the traversal and manipulation of a doubly linked list.	K4	CO4
3	18	Examine the heap sort concepts in detail.	K4	CO5
4	19	Classify the following dynamic programming algorithms i)wars halls algorithm ii)Floyd's algorithm	K4	CO5
5	20	Examine the Dijkstra algorithm with example.	K4	CO5

Z-Z-Z TTEND