(Please write your Enrollment Number) Enrollment No. 61

End-Term Examination
(CBCS)(SUBJECTIVE TYPE)(OffLine)
Course Name: B.TECH, Semester: 3rd
(December, 2024)

Subject Code: BCS 201	Subject: DATA STRUCTURES
Time :3 Hours	Maximum Marks :60

Note: Q1 is compulsory. Attempt one question each from the Units I, II, III & IV.

Q1		(2.5*8 =20)	CO Mapping
	a) What is a time-space trade-off? Provide an example.	2.5	(CO1)
	b) How is a two-dimensional array represented in memory?	2.5	(CO1)
	c) What are priority queues, and where are they used?	2.5	(CO2)
	d) Explain circular linked lists with their applications.	2.5	(CO2)
	e) Describe the concept of binary search trees with an example.	2.5	(CO3)
	f) What is merge sort? Discuss its efficiency.	2.5	(CO3)
	g) Explain the concept of spanning trees.	2.5	(CO4)
	h) What is collision resolution in hashing? Discuss one technique.	2.5	(CO4)
	UNIT I		**CO Mapping**
Q2	Write an algorithm to count inversions in an array. An inversion in an array is a pair of indices(i ,j) such that i<j and arr[i]>arr[j].	(10)	(CO1)
Q3	Describe the sorting of arrays using insertion sort. Write a program/algorithm to sort an array using this method.	(10)	(CO1)
	UNIT II		**CO Mapping**
Q4	What are queues? Discuss the difference between linear queues and circular queues with examples.	(10)	(CO2)
Q5	Explain the representation of stacks using linked lists. Write an algorithm to perform push and pop operations.	(10)	(CO2)
	UNIT III		**CO Mapping**
Q6	Construct an AVL tree by inserting the following elements 100,50,150,25,75,125,175,10,30,60. After constructing the tree delete the node with value 75. Show the rebalanced tree after deletion.	(10)	(CO3)
Q7	Explain B-trees. Discuss their advantages and write the steps for insertion in a B-tree.	(10)	(CO3)
	UNIT IV		**CO Mapping**
Q8	What is Dijkstra's algorithm? Explain its working with an example.	(10)	(CO4)
Q9	Given a complete graph with 5 vertices (1,2,3,4,5) and weighted edges where weight between two vertices i and j is equal to |i-j|. Find the minimum spanning tree for this graph using Prim's and Kruskal's algorithms.	(10)	(CO4)