Question Paper Code	13568

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025
Third Semester
Information Technology
(Common to Computer Science and Engineering, Computer Science and Engineering (IOT) &
Sixth Semester - Electrical and Electronics Engineering)
20ITPC301 - DATA STRUCTURES
Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)
Answer ALL Questions

|		Marks	K-Level	CO
1.	Which of the following real world scenarios would you associate with a stack data structure? (a) piling up of chairs one above the other (b) people standing in a line to be serviced at a counter (c) offer services based on the priority of the customer (d) tatkal Ticket Booking in IRCTC	1	K1	CO1
2.	Which of the following is an application of stack? (a) finding factorial (b) tower of Hanoi (c) infix to postfix (d) all of the above	1	K1	CO1
3.	How many null pointers exist in a circular singly linked list? (a) 0 (b)1 (c) 2 (d) 3	1	K1	CO2
4.	In the linked list each node contains a minimum of two fields. One field is a data field to store the data, the second field is? (a) Pointer to character (b) Pointer to integer (c) Pointer to node (d) Node	1	K1	CO2
5.	The balance factor of a node in a binary tree is defined as _____ (a) addition of heights of left and right subtrees (b) height of right subtree minus height of left subtree (c) height of left subtree minus height of right subtree (d) height of right subtree minus one	1	K1	CO3
6.	In a max-heap, the element with the greatest key is always in which node? (a) Leaf node (b) First node of left subtree (c) root node (d) First node of right subtree	1	K1	CO3
7.	The Data structure used in standard implementation of Depth First Search is? (a) Stack (b) Queue (c) Linked List (d) Tree	1	K1	CO4
8.	The travelling salesman problem can be solved using _____ (a) A spanning tree (b) A minimum spanning tree (c) Bellman – Ford algorithm (d) DFS traversal	1	K1	CO4
9.	In Prim's Algorithm, when an edge is added to the minimum spanning tree, the vertex connected by that edge is: (a) Removed from the graph (b) Marked as visited (c) Added to a stack (d) Both A and B	1	K1	CO5
10.	Which of the following real time examples is based on insertion sort? (a) arranging a pack of playing cards (b) database scenarios and distributes scenarios (c) arranging books on a library shelf (d) real-time systems	1	K1	CO6

PART - B (12 × 2 = 24 Marks)
Answer ALL Questions

11.	Define a stack.	2	K1	CO1
12.	Write down the basic operations that can be performed on a queue.	2	K1	CO1
13.	Give the significance of List ADT.	2	K1	CO2
14.	What are the types of Linked List?	2	K1	CO2
15.	State the properties of a Binary Tree. What are the different ways of representing a Binary Tree?	2	K1	CO3

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   **13568**

| 16.	List the applications of trees.	2	K1	CO3
17.	What is articulation point?	2	K1	CO4
18.	Compare BFS and DFS.	2	K2	CO4
19.	Write short notes on minimum spanning tree. Give an example.	2	K1	CO5
20.	Enlist some real-time applications of graph.	2	K1	CO5
21.	Define sorting. Mention the types of sorting.	2	K1	CO6
22.	What are the various factors to be considered in deciding a sorting algorithm?	2	K1	CO6

PART - C (6 × 11 = 66 Marks)
Answer ALL Questions

23.	a)	Explain Queue. Why is it known as FIFO? Write an algorithm to insert and delete an element from a simple Queue	11	K2	CO1

OR

	b)	IIustrate in detail about the circular queue and its implementation	11	K2	CO1

24.	a)	Outline an algorithm to insert a node at the beginning of the list and discuss the deletion operation from a linked list.	11	K2	CO2

OR

	b)	Explain how polynomial manipulations are performed and its operations with lists.	11	K2	CO2

25.	a)	Develop an AVL tree with the values 3, 1,4,5,9, 2, 8, 7, 0 into an initially empty tree. Write the code for inserting into an AVL tree.	11	K3	CO3

OR

	b)	Develop an algorithm to insert an item into a binary search tree. Create a binary search tree for the following numbers starting 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	11	K3	CO3

26.	a)	Explain graph traversal algorithm Depth First Search(DFS) with an example	11	K2	CO4

OR

	b) (i)	Explain topological sorting with an example.	6	K2	CO4
	(ii)	Explain Euler circuit with an example.	5	K2	CO4

27.	a)	Apply the bellman Ford algorithm for the following graph.	11	K3	CO5
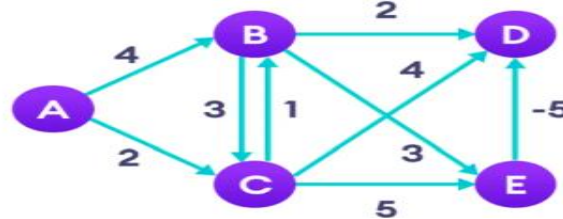
OR

	b)	Develop the Dijkstra algorithm for the following graph and find the shortest distance and path from 0 to 6.	11	K3	CO5
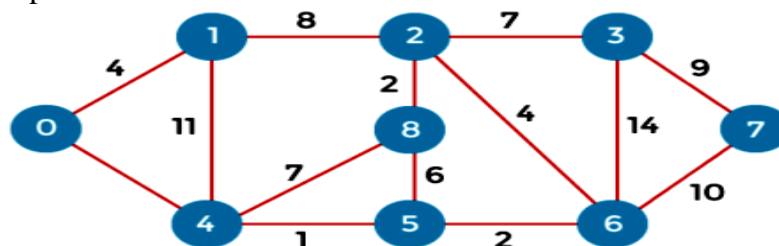
28.	a)	Illustrate with example the open addressing and chaining methods of collision resolution techniques in hashing.	11	K2	CO6

OR

	b)	IIustrate the working of the radix sort with an example.	11	K2	CO6

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

13568