Reg. No.															

Question Paper Code	14040

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Third Semester

Electronics and Instrumentation Engineering

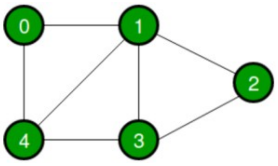
20ESIT301 - DATA STRUCTURES AND ALGORITHMS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

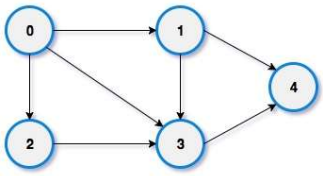
Answer ALL Questions

		Marks	K – Level	CO
1.	Which of the following is non-liner data structure? (a) Stack (b) List (c) Tree (d) Queue	1	K1	CO1
2.	A circular queue is implemented using an array of size 10. The array index starts with 0, front is 6, and rear is 9. The insertion of next element takes place at the array index. (a) 0 (b) 7 (c) 9 (d) 10	1	K1	CO1
3.	Minimum number of fields in each node of a singly linked list is_____. (a) 1 (b) 2 (c) 3 (d) 4	1	K1	CO2
4.	Which of the following is true about a node in a doubly-linked list? (a) Each node has only one pointerto the previous node (b) Each node can have more than two pointers (c) Each node points to the head of the list (d) Each node has two pointers: one to the next node and one to the previous node	1	K1	CO2
5.	In in-order traversal, the order of visiting nodes is (a) Right, Left, Root (b) Root, Left, Right (c) Left, Right, Root (d) Left, Root, Right	1	K1	CO3
6.	How many children does a binary tree have? (a) 2 (b) 0 or 1 or 2 (c) 0 or 1 (d) Any Number of Children	1	K1	CO3
7.	Which of the following is NOT a depth first traversal of the given graph:  (a) 0, 1, 2, 3, 4 (b) 1, 2, 3, 4, 0 (c) 3, 1, 0, 4, 2 (d) 4, 3, 2, 0, 1	1	K2	CO4
8.	Which algorithm needs initial preprocessing of arranging the edges weights in non-decreasing order to find the minimum spanning tree? (a) Kruskal (b) Prim (c) Warshall (d) Floyd	1	K1	CO4
9.	What is the primary advantage of Selection Sort over Bubble Sort? (a) Lower time complexity (b) Requires fewer swaps (c) Better for large data sets (d) Requires more memory	1	K1	CO5
10.	The time complexity of Binary Search on a sorted linked list is (a) O(1) (b) O(n) (c) O(log n) (d) O(n log n)	1	K1	CO5

PART - B (12 × 2 = 24 Marks)

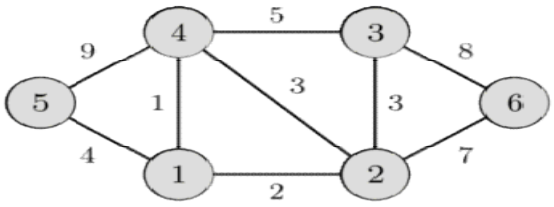
Answer ALL Questions

11.	Define ADT. Give an example.	2	K1	CO1
12.	Compare stack and queue.	2	K2	CO1
13.	Compare singly and doubly linked lists.	2	K2	CO2
14.	List the advantages of Array over Linked List.	2	K1	CO2
15.	Construct an expression tree for the expression (a + b * c).	2	K2	CO3
16.	Construct a B+ Tree for the given set of numbers with maximum degree 3. 12, 2, 45, 32, 15	2	K2	CO3

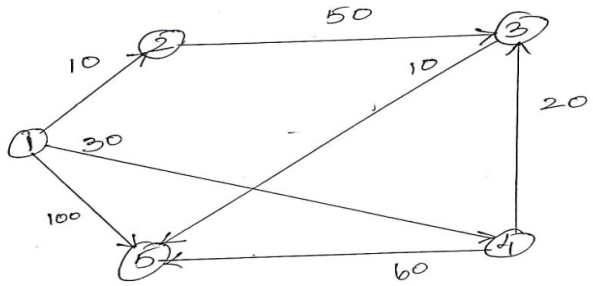
17.	Identify the adjacency matric for the given graph. 	2	K2	CO4
18.	What is minimum cost spanning tree?	2	K1	CO4
19.	Summarize the algorithm for selection sort.	2	K1	CO5
20.	List the advantages of using binary search over linear search.	2	K1	CO5
21.	What is the difference between static and dynamic hashing?	2	K2	CO6
22.	Define extendable hashing.	2	K1	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Write an algorithm to convert an infix expression to a postfix expression. Trace the algorithm to convert the infix expression (A + B) * C / D + E / F to a postfix expression.	11	K3	CO1
		OR			
	b)	Apply queue ADT to implement enqueue and dequeue operations with pseudocode.	11	K3	CO1
24.	a)	Write an algorithm and apply with suitable examples for the following operations in singly linked list with neat diagram. (a) Insert before an element (b) Insert an element as a first element (c) Delete after an element (d) Search an element	11	K3	CO2
		OR			
	b)	Illustrate an algorithm for adding the two polynomial equations $2x^2 + 5x^1 + 3x^0$ and $6x^2 + 3x^1 + 7x^0$ using linked list.	11	K3	CO2
25.	a)	Construct a binary search tree to insert the following elements 5, 2, 8, 4, 10, 9, 3, 6, 1, 7 and delete the elements 5, 10 and 4 from BST.	11	K3	CO3
		OR			
	b)	Build an AVL tree for inserting the values 50, 20, 60, 10, 8, 15, 32, 46, 11, 48 into an initially empty tree and delete the value 15.	11	K3	CO3
26.	a)	Apply prim's algorithm to find the minimum cost to connect all cities in the following graph. 	11	K3	CO4
		OR			

b) Apply Dijikstra's algorithm to compute the shortest path for the given graph. *11 K3 CO4*



27. a) Apply binary search algorithm to search the element 66, 100 and find its position from the given inputs. 33, 88, 55, 77, 99, 66, 11, 44, 22. *11 K3 CO5*

OR

b) Intrepret bubble sort algorithm for the given input and arrange the numbers in ascending order. 3, 8, 5, 7, 9, 6, 1, 4, 2. *11 K3 CO5*

28. a) Given input {431, 133, 613, 499, 434, 969, 199} and a hash function h(x) = x mod 10. Apply linear probing and quadratic probing and show the result for the given input. *11 K3 CO6*

OR

b) Apply separate chaining concept and show the result for the given input {2, 3, 5, 7, 11, 17, 19, 23, 29, 31}. *11 K3 CO6*