Reg. No.																

Question Paper Code	13210

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Third Semester

Information Technology

(Common to Computer Science and Engineering, Computer Science and Engineering (IoT), M.Tech - Computer Science and Engineering(5 Years Integrated) & Sixth Semester - Electrical and Electronics Engineering)

20ITPC301 - DATA STRUCTURES

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 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.	What is the value of the postfix expression 6 3 2 4 + – *: (a) 1 (b) 40 (c) 74 (d) -18	1	K2	CO1
3.	A pointer variable which contains the location at the top element of the stack is called _____ (a) Top (b) Last (c) Final (d) End	1	K1	CO1
4.	How many null pointers exist in a doubly linked list? (a) 0 (b) 1 (c) 2 (d) 3	1	K1	CO2
5.	Given two statements: (i) Insertion of an element should be done at the last node in a circular list (ii) Deletion of an element should be done at the last node of the circular list (a) Both are true (b) Both are False (c) First is false and second is true (d) None of the above	1	K1	CO2
6.	A linear collection of data elements where the linear node is given by means of pointer is called? (a) Linked list (b) Node list (c) Primitive list (d) Unordered list	1	K1	CO2
7.	Which type of traversal of binary search tree outputs the value in sorted order? (a) Pre-order (b) In-order (c) Post-order (d) None	1	K1	CO3
8.	The post-order traversal of the binary tree is DEBFCA. Find out the pre-order traversal. (a) ABFCDE (b) ADBFEC (c) ABDECF (d) ABDCEF	1	K1	CO3
9.	The number of edges from the root to the node is called _____ of the tree. (a) Height (b) Depth (c) Length (d) Width	1	K1	CO3
10.	A graph with all vertices having equal degree is known as a _____ (a) Multi Graph (b) Regular Graph (c) Simple Graph (d) Complete Graph	1	K1	CO4
11.	In most of the cases, topological sort starts from a node which has _____ (a) Maximum Degree (b) Minimum Degree (c) Any degree (d) Zero Degree	1	K1	CO4
12.	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
13.	Which of the following is an application of graphs? (a) Social Network Analysis (b) Routing Algorithms (c) Scheduling Problems (d) All of the above	1	K1	CO5

14.	Prim's Algorithm starts from: (a) The vertex with the highest weight (b) Any vertex of the graph (c) The vertex with the lowest weight (d) The center of the graph	*1*	*K1*	*CO5*
15.	Which algorithm is used to find the shortest path in a weighted graph? (a) Depth-First Search (b) Breadth-First Search (c) Dijkstra's Algorithm (d) Kruskal's Algorithm	*1*	*K1*	*CO5*
16.	Which of the following algorithms solves the all-pair shortest path problem? (a) Floyd's algorithm (b) Prim's algorithm (c) Dijkstra's algorithm (d) Warshall's algorithm	*1*	*K1*	*CO5*
17.	What is the advantage of selection sort over other sorting techniques? (a) It Is faster than any other sorting technique (b) It is scalable (c) It works best for inputs which are already sorted (d) It requires no additional storage space	*1*	*K1*	*CO6*
18.	How many passes does an insertion sort algorithm consist of? (a) N (b) N-1 (c) N+1 (d) N^2	*1*	*K1*	*CO6*
19.	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*
20.	What is the hash function used in the division method? (a) h(k) = k/m (b) h(k) = k mod m (c) h(k) = m/k (d) h(k) = m mod k	*1*	*K1*	*CO6*

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21.	Discuss about ADT.	*2*	*K2*	*CO1*
22.	List the applications of stack.	*2*	*K2*	*CO1*
23.	Difference between arrays and lists.	*2*	*K2*	*CO2*
24.	Write down the steps to modify a node in linked lists.	*2*	*K2*	*CO2*
25.	Discuss node, degree, siblings, depth/height, level with example.	*2*	*K2*	*CO3*
26.	State AVL Tree.	*2*	*K2*	*CO3*
27.	Illustrate graph and its representation. Give two applications of graphs.	*2*	*K2*	*CO4*
28.	State Euler circuits cut vertex and loop in a graph.	*2*	*K2*	*CO4*
29.	Illustrate spanning tree of a graph.	*2*	*K2*	*CO5*
30.	Distinguish between linear and binary search techniques.	*2*	*K2*	*CO6*

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

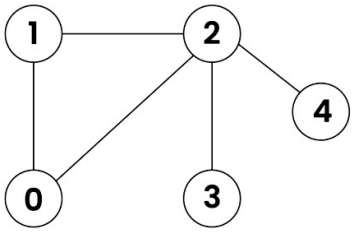
31.	a)	Write an algorithm to convert an infix expression (a+b)*c/d+e/f to a postfix expression.	*10*	*K2*	*CO1*
		OR			
	b)	Explain in detail about Stack and its operation with an algorithm.	*10*	*K2*	*CO1*
32.	a)	Explain the steps involved in insertion and deletion into a singly linked list(any 2 operations)	*10*	*K2*	*CO2*
		OR			
	b)	Write an algorithm to perform the following operations in a doubly linked list (i) insert a node after a given node (ii) delete the last node of the list	*10*	*K2*	*CO2*

33. a) Construct a B tree of order 5 by inserting the following elements: 3,14,7,1,8,5,11,17,13,6,23,12,20,26,4,16,18,24,25 and 19. *10 K3 CO3*

OR

b) Construct an AVL Tree with following elements: 10 15 9 12 13 79 45 36 22. *10 K3 CO3*

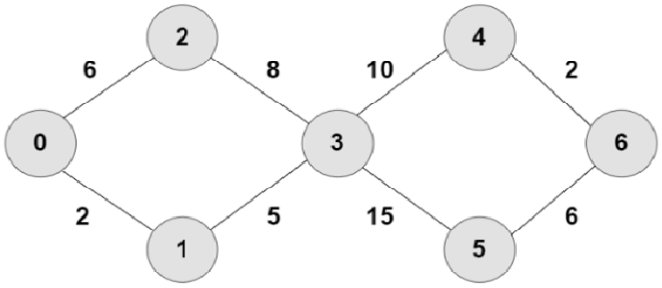
34. a) Interpret the following graph using BFS. *10 K2 CO4*



OR

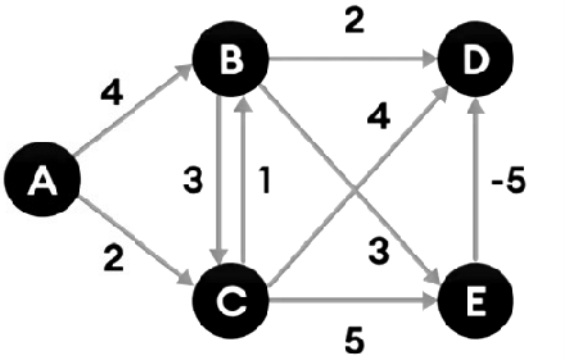
b) Explain in detail various representations of graphs with example. *10 K2 CO4*

35. a) Develop the Shortest Paths from Source to all Vertices using Dijkstra's Algorithm *10 K3 CO5*



OR

b) Explain bellman Ford algorithm for the example graph. *10 K3 CO5*



36. a) Write an algorithm for Insertion sort and perform insertion for the following elements: 39,9,45,6318,81,108,54,72,36. *10 K3 CO6*

OR

b) Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function h(x) = x mod 10. Prepare the resulting for the following: *10 K3 CO6*

(i) Open a hash table.
(ii) Open addressing hash table using linear probing.
(iii) Open addressing hash table using quadratic probing.
(iv) Open addressing hash table with second hash h2(x)= 7- (x mod 7).