



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
 [AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
 Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 60011

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2024

Third Semester

Computer Science and Engineering

U23IT302 – DATA STRUCTURES

(Common to EEE, ECE, IT & CST)

(Regulation 2023)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 – Evaluating
	K2 – Understanding	K4 – Analyzing	K6 – Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Whether the Queue is EMPTY or contain only on element for the specified condition, FRONT == REAR.	2	K1	CO1
2.	Give an algorithm (as a pseudocode)to delete the last node of a single linked list.	2	K2	CO1
3.	Evaluate the following postfix expression: 12 2 ^ 34 20 - + 5 *	2	K2	CO2
4.	Define a double ended queue and list its operations.	2	K2	CO2
5.	Construct a BST with the below specified values. 44, 13, 78, 94, 11, 57, 16, 21, 52 Does the BST is Height-balanced after insertion operations.	2	K3	CO3
6.	Find the height of the B ⁺ Tree in which every node is half full and containing 'n' values.	2	K3	CO3
7.	Define Euler path in a graph.	2	K2	CO4
8.	Translate the given adjacency matrix into a graph B(G) = [0 1 0 1 0; 1 0 0 1 1; 0 0 0 1 1; 1 1 1 0 1; 0 1 1 1 0]	2	K2	CO4
9.	Compare the complexities of linear and binary search. Justify how searching an element of 8 in the list of data items: 1 to 10 using binary search is more efficient.	2	K4	CO5
10.	List down the various hashing techniques and explain how mid square hashing is carried out with an example.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	Describe the following operations on a singly linked list with suitable examples. i. Insertion of a node at the last position. ii. Reversal of linked list in linear time i.e., $O(n)$. (OR)	5+8	K1	CO1

b)	Assume that every polynomial function is represented in the form of a linked list in which, every node of the list contain both degree and its corresponding coefficient.	13	K1	CO1
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For instance,

$A(x) = 4x^3 + 7x^1$, can be represented as



Give two such polynomial function, $A(x)$ and $B(x)$, desire an algorithm (pseudocode) that performs polynomial addition.

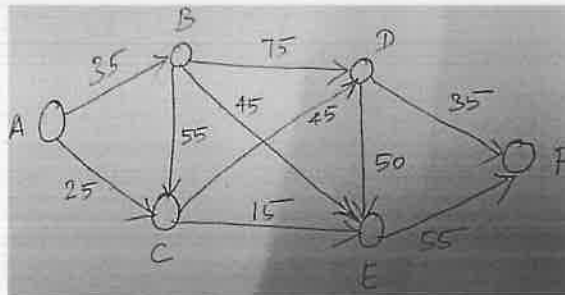
12. a)	Write an algorithm to convert an infix to postfix expression and trace the algorithm for infix to postfix conversion of the expression $a/b*c+d*e$. (OR)	13	K2	CO2
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b)	Give an algorithm (pseudocode) that finds number of nodes in a circular queue. What is its expected time complexities? Furthermore, draw an empty circular queue.	13	K2	CO2
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13. a)	Construct a height balanced AVL tree for the following set of data. 8,9,10,2,1,5,6,4,7,11,3,12 specify appropriate rotation at every stage of insertion. (OR)	13	K3	CO3
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b)	Construct a binary search tree using the values 465, 557, 913, 784, 856, 119, 378 and perform inorder, preorder and postorder traversals on the constructed BST.	13	K3	CO3
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14. a)	Using Dijkstra's algorithm, find the shortest path from vertex A to all other vertices in the graph given below. Analyze the expected time complexity of your algorithm if the priority queue (mentioned in your algorithm) is constructed using a MIN-HEAP.	13	K4	CO4
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(OR)

- b) Give an iterative procedure that perform Depth-First search (DFS) and Breadth – First Search (BFS) in a graph. 13 K4 CO4
15. a) Give an algorithm for Radix Sort. Using the algorithm sort the linked list of elements given below. Show the Linked List after each stage of the sorting process. 13 K4 CO5
- 45 → 72 → 95 → 77 → 23 → 56

(OR)

- b) Assume a hash table of size 11 and insert the following elements into the hash table: 53, 27, 95, 19, 76, 34, 48, 59 using
- Quadratic Probing
 - Separate Chaining methods
- Assume hash function $H(x) = x \% 13$. 13 K4 CO5

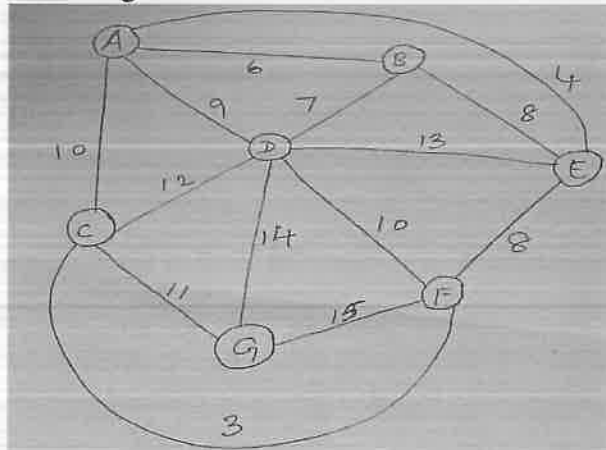
PART – C

(1 x 15 = 15 Marks)

- | Q.No. | Questions | Marks | KL | CO |
|--------|---|-------|----|-----|
| 16. a) | Every node of the double linked list contain a string which represents a song name. Create a doubly linked list to store the playlist of songs, write an algorithm to search for a song, delete a song and also display details of the previous and next song of the given song name. | 15 | K1 | CO1 |

(OR)

- b) Find the minimum cost spanning tree for the given graph using
- Kruskal's algorithm
 - Prims algorithm
- 15 K2 CO4



Analyze the time complexities of both Kruskal's algorithm and Prims algorithm.