Reg. No. | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024
Third Semester
CS22303 – DATA STRUCTURES
(Computer Science and Engineering)
(Regulation 2022)

TIME: 3 HOURS   **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Use list ADT for a variety of applications and classify them.	2
CO 2	Earn a thorough knowledge in Stack and Queue ADT and will appraise the applications in various real time scenarios.	3
CO 3	Distinguish linear and non-linear data structures, and appraise the use of Tree ADT.	3
CO 4	Appraise the usage of graph algorithms for various applications.	3
CO 5	Critically analyze the various hashing, searching and sorting algorithms.	4

PART- A (20 x 2 = 40 Marks)
(Answer all Questions)

		CO	RBT LEVEL
1.	State the advantages Abstract Data Type.	1	2
2.	List the applications of linked list.	1	2
3.	Build the routine to sort the aadhar card numbers using radix sort with n passes.	1	3
4.	Develop the routine to swap two adjacent elements by adjusting only the pointers.	1	3
5.	Mention the advantages of representing stacks using linked lists than arrays.	2	2
6.	Highlight the need of deQueue. Give the applications of deQueue.	2	2
7.	List the applications of stack.	2	2
8.	Evaluate the postfix expression 5 6 2 + * 1 2 4 / -	2	3
9.	Construct an expression tree for the expression 2*3/(2-1)+5*(4-1)	3	2
10.	Is heap a balanced a tree? Explain.	3	3

11.	Recall the recursive algorithm for post order traversal.	3	3
12.	Differentiate between Tree and B-Tree.	3	3
13.	How to find the height and depth of a node in a tree? Give example.	4	2
14.	Show the different ways to represent the graph.	4	2
15.	Distinguish between BFS and DFS.	4	3
16.	Enlist the steps to arrange the elements in a graph using Topological sort.	4	3
17.	Use the algorithm of Bubble Sort to sort the given elements 35, 23, 14, 9, 15, 45.	5	3
18.	What is the basic principle behind the Quick Sort?	5	3
19.	Show the result of running Shell Sort on the input 9, 8, 7, 6, 5, 4, 3, 2, 1.	5	3
20.	Give the significance of extendible hashing.	5	3

PART- B (5 x 10 = 50 Marks)

|		Marks	CO	RBT LEVEL
21. (a)	Determine to create an array with the maximum size of 10. Implement the array in Class with make use of invoking member functions of insertion, deletion and searching of elements from the array using C.	(10)	1	2
	(OR)			
(b)	State the polynomial representation $6x^3+9x^2+7x+1$ using linked list. Write the routine to add and multiply two polynomial and explain with suitable example.	(10)	1	2
22. (a)	How to overcome the limitations of linear queue from circular queue? Also, write a C program to demonstrate various operations of a circular queue.	(10)	2	3
	(OR)			

(b) Describe the process involved in the conversion of infix to postfix **(10)** 2 3
expression-using Stack. Also to show the result of converting the given infix
expression A - (B / C + (D % E * F) / G) * H to postfix.

23. (a) Show the result of inserting 2, 1, 4, 5, 9, 3, 6, and 7 into an empty AVL Tree. **(10)** 3 3
Diagrammatically representing the insertion of elements 10, 20 and 24 one
by one into the AVL Tree. Also, show the results of deleting the nodes 2 and
20 one after the other of constructed tree.

(OR)

(b) Define Binary Search Tree. Use the routine to solve the result of inserting the **(10)** 3 3
elements likely, 25,20,36,10,22,5,12,30,40,28,38,48 in the binary search tree
(initially empty). Show the result of deleting the root node and also show the
result of deleting the nodes 5, 30 and 40 (in the order).

24. (a) Find the shortest path for the following graph using Dijkstra's algorithm. **(10)** 4 3
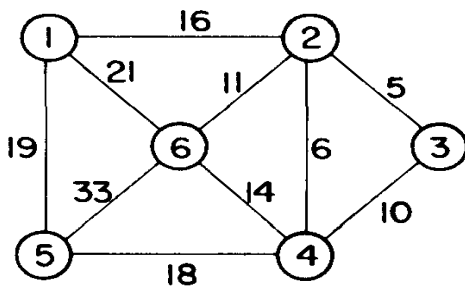
(OR)

(b) Using Prim's algorithm to find the minimum spanning tree from the source **(10)** 4 3
node A
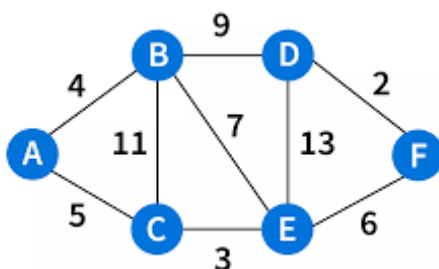
25. (a) **(i)** Sort the sequence 3, 1, 4, 1, 5, 9, 2, 6, 5 using Insertion Sort. **(4)** 5 3

(ii) Simplify the steps for Merge Sort algorithm in C++, to sort an array by **(6)** 5 3
splitting the array into two equal-sized sub-arrays, sorting each sub-
array and merging the sub-arrays into one larger array and Sort the

Sequence 88,11,22,44,66,99,32,67,54,10 using recursive Merge Sort.

(OR)

(b)	Demonstrate the routine and to perform both the searching for the given array of elements {59, 53, 58, 26, 41, 31, 97} and key = 41. How many iterations performed until the element found?	**(10)**	5	3

PART- C (1 x 10 = 10 Marks)
(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	Give the input {4371,1323, 6173, 4199, 4344, 9679, 1989} and hash function h(X)= X (mod 10) show the results for the following: 1) Open addressing hash table using linear probing 2) Open addressing hash table using quadratic probing	**(10)**	5	5

****