Q. Code: 806025

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

B.E./ B. TECH DEGREE EXAMINATIONS, MAY 2024

Third Semester

IT22301 - DATA STRUCTURES AND ALGORITHMS

(Information Technology)

(Regulation 2022)

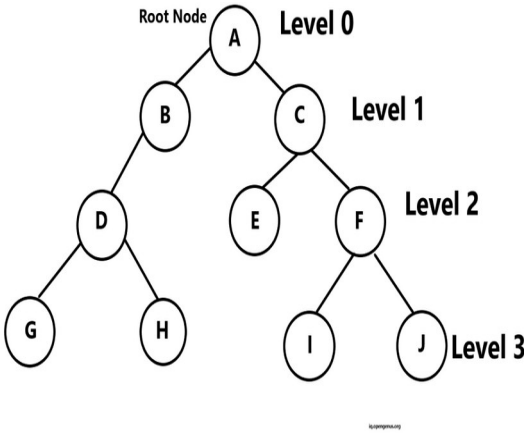
TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO1	Implement ADT linear data structures.	**3**
CO2	Choose appropriate linear data structure for solving the problem.	**5**
CO3	Implement ADT non–linear data structure.	**3**
CO4	Apply appropriate graph algorithms for real time applications.	**3**
CO5	Analyze the various searching and sorting algorithms.	**4**

PART A (20x2=40Marks)

(Answer all Questions)

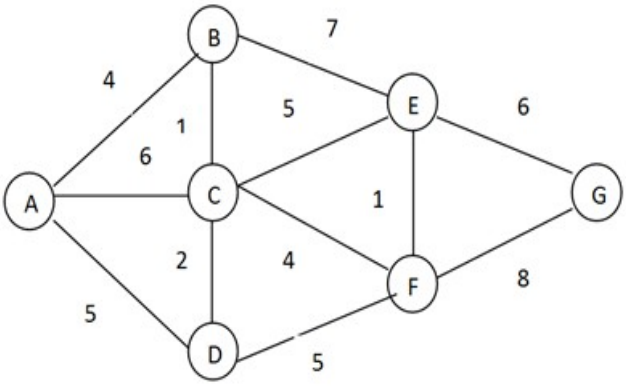
		CO	RBT LEVEL
1.	Summarize the areas in which data structures are applied extensively.	**1**	**2**
2.	Show the disadvantages of linked list over arrays.	**1**	**2**
3.	Give an example for linked list application.	**1**	**2**
4.	Given an infix expression. Convert it into postfix expression a+b*(c^d-e)^(f+g*h)-i	**2**	**3**
5.	Identify any four applications of stack.	**2**	**2**
6.	Analyze how do you test for an empty Queue?	**2**	**4**
7.	Differentiate AVL tree and Binary search tree.	**3**	**3**
8.	Recommend the result of inserting 3,1,4,6,9,2,5,7 into an initially empty binary search tree.	**3**	**3**
9.	Mention the properties of binary heap.	**3**	**3**
10.	Define a Binary heap and list its properties.	**3**	**2**
11.	Define Complete Binary tree and Proper binary tree.	**3**	**2**
12.	Create an undirected graph and its adjacency matrix for the following specification of a graph G. V(G)=1,2,3,4 E(G) ={ (1,2),(1,3),(3,3),3,4),(4,1)}	**4**	**3**
13.	Classify strongly connected and weakly connected graph.	**4**	**3**
14.	Give two applications of graphs.	**4**	**2**
15.	What is meant by internal and external sorting? Give any two examples for each type.	**5**	**2**
16.	Discuss an example about collision in hashing	**5**	**2**

17.	Interpret the fastest searching algorithm and give reason.	**5**		**3**
18.	Compare the advantage and disadvantage of separate chaining and linear probing.	**5**		**3**
19.		**3**		**3**
	Write how the tree is stored in an array and also perform preorder traversal.			
20.	Justify whether Binary search would be effective on a sorted Linked List.	**5**		**4**

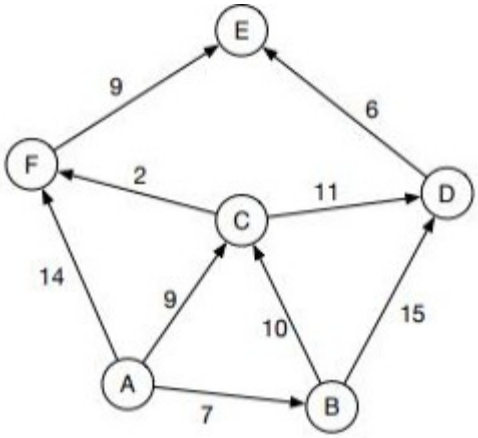
PART B (5x 10=50 Marks)

		Marks	CO	RBT LEVEL
21 (a)	Implement Stack operations using Linked list.	**(10)**	**1**	**3**
	(OR)			
(b)	A circular queue has a size of 5 and has 3 elements 10, 20 and 40 where F=2 and R=4.After inserting 50 and 60, what is the value of F and R. Trying to insert 30 at this stage what happens? Delete 2 elements from the queue and insert 70, 80 & 90.Assess the sequence of steps with necessary diagrams with the value of F & R..	**(10)**	**1**	**3**
22 (a)	Write a Pseudo code to perform addition of two polynomials using Linked Lists.	**(10)**	**2**	**3**
(b)	Analyze and write code for 1. Insertion at the beginning 2. Deletion at end 3. Display the list Operations on a circular doubly linked list.	**(10)**	**2**	**3**
23. a)	**(i)** Create a binary search tree using the following data elements 45, 39, 56, 12, 34, 78, 32, 10, 89, 54, 67, 81 and delete 10 and 56.	**(6)**	**3**	**3**
	(ii) Write a pseudo code for insertion into binary search tree.	**(4)**	**3**	**3**
	(OR)			

(b)	Construct an AVL Tree with following data: 10, 15, 9, 12, 13, 79,45, 36, 22,55,40.	**(10)**	**3**	**3**
24.(a)	Find the minimum Spanning tree for the following using Kruskal algorithm and explain its pseudo code.	**(10)**	**4**	**3**



(OR)

(b)		**(10)**	**4**	**3**

For the above given graph, Find the shortest path from Node A to all other Nodes.

25.(a)	Given input {4371, 1323, 6173, 4199,4344,9679,1989} and a hash function h(x) =x mod 10. Prepare the resulting for the following: i) Open hash table. ii) Open addressing hash table using linear probing. iii) Open addressing hah table using quadratic probing. iv) Open addressing hash table with second hash h2(x) =7- (x mod 7).	**(10)**	**5**	**3**

(OR)

(b)	**(i)** Illustrate the algorithm for Insertion sort and sort the following	**(6)**	**5**	**3**

array:39,9,45,6318,81,108,54,72,36

(ii)	Using binary search, search the number 26 from the list of numbers and give the steps. 10,7,17,26,32,92	**(4)**	**5**	**3**

PART C (1x 10=10Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	i) Evaluate the conversion of an infix expression to postfix form using appropriate data structure A-(B/C+ (D%E*F)/G)*H	**(7)**	**2**	**5**
	ii) Evaluate the following postfix expression 9 3 4 * 8 + 4 / -	**(3)**		

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