QP Code: RM23BTECH023 | Reg. No | | | | | | | | | | | AY 23

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Second Semester Regular) Examinations, May – 2024

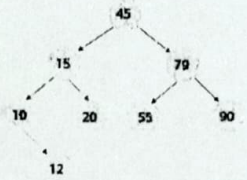
23BBSES12003 – Data Structures & Algorithms

(Common to all Branches)

Time: 3 hrs | Maximum: 60 Marks

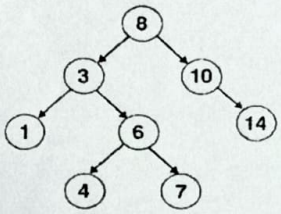
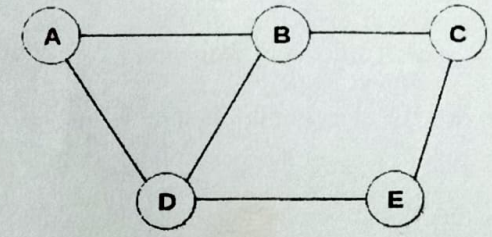
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer *ALL* questions	CO #	Blooms Level
a. A matrix R [10] [10] has elements given input. How to check whether the matrix is sparse or not?	CO2	K2
b. List out the overflow and underflow conditions in an array of elements that follow the First In First Out Concept.	CO1	K1
c. A double linked list has 10 nodes, where the pointer PTR2 points to the 4th node and pointer PTR3 points to the 6th node. Now write the piece of statements which allows you to insert a new node pointed by PTR1.	CO3	K3
d. Given a Binary Tree below:  Find the in-order, post-order sequence of nodes during traversal.	CO4	K2
e. Define Terms: (i) Weighted Graph (ii) Self-Loop	CO1	K3

PART – B **(10 x 5 = 50 Marks)**

Answer *ALL* questions	Marks	CO #	Blooms Level
2. a. Define row major order and column major order. Given a matrix W [10] [10] with elements having a base address of 10000. If the size of each memory is 10 bytes, then find the address of W[5][5] in row major order and also in column major order.	5	CO2	K3
b. Given a stack implemented using an array, write down the algorithms for the operations performed on it, such as: (i) Push (ii) pop	5	CO3	K3
(OR)			
c. Given an infix expression X= Q+W/E-R*T+Y-U Find its equivalent postfix expression using Stack.	5	CO4	K2
d. Briefly elaborate the evaluation process of given postfix expression P = 2, 3, 15, 10, 2, /, -, *, +, 4, + using Stack	5	CO3	K3
3.a. Given a list of elements: 70, 40, 50, 30, 35, 25, 45. Write down the algorithm for applying insertion sort to the elements to sort them in ascending order.	5	CO4	K3
b. Write down the algorithm for implementing binary search on a sorted list of elements present in an array.	5	CO3	K3
(OR)			
c. Write down the algorithms for implementing queue concepts on a single linked list and perform the operations: (i) insertion of a node at the rear-end (ii) deletion of a node from the front-end	5	CO4	K2

d.	Write down the algorithm from implementing the deletion of a node from the end of a double linked list.	5	CO3	K3
4.a.	Construct a binary tree using the traversal sequence of nodes given below: In-order sequence: F D B E I G J A C H Pre-order sequence: F D I J G E B H C A Write down the three recursive traversal algorithms to traverse all the nodes of a binary tree.	5	CO2	K3
b.	Given a sequence of numbers: 40, 30, 50, 80, 90, 20, 10, 60, 70, 100 Construct a Binary Search Tree and then write down the algorithm for applying searching operations to it.	5	CO3	K3
	(OR)			
c.	Write down the non-recursive in-order traversal method for traversing all the nodes of a binary tree.	5	CO4	K2
d.	Briefly explain the sequential representation and linked representation of the given binary tree below. 	5	CO1	K3
5.a.	Construct an AVL Tree on the given a sequence of elements: 90, 80, 70, 60, 50, 10, 20, 30, 40, 55	5	CO5	K3
b.	Construct a Max-Heap Tree on the given sequence of elements: 71, 61, 91, 31, 41, 61, 81, 51	5	CO3	K3
	(OR)			
c.	Given a graph below: Represent the graph using an adjacency matrix and an incidence matrix. 	5	CO2	K3
d.	Write down the algorithm to traverse all the nodes of a graph using a queue.	5	CO2	K3
6.a.	Given a list of 6 elements: 30, 32, 45, 65, 57, 99 Explain the three different hash functions and find the hash addresses using all the hash functions.	5	CO4	K3
b.	Write down the algorithm for applying bubble sort to a list of numbers given input in an array.	5	CO5	K2
	(OR)			
c.	Write down the algorithm for evaluating postfix expression using stack.	5	CO4	K3
d.	Write down the algorithms to perform the operations on a double linked list: (i) count the total no. of nodes (ii) find the sum of all the node values.	5	CO6	K2

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