VIT
Vellore Institute of Technology
CHENNAI

Reg. Number: [redacted]

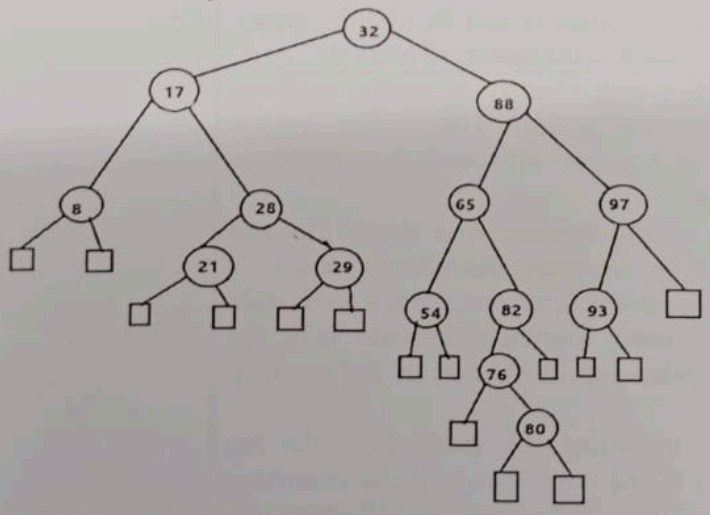
Continuous Assessment Test (CAT) – II - OCT 2024

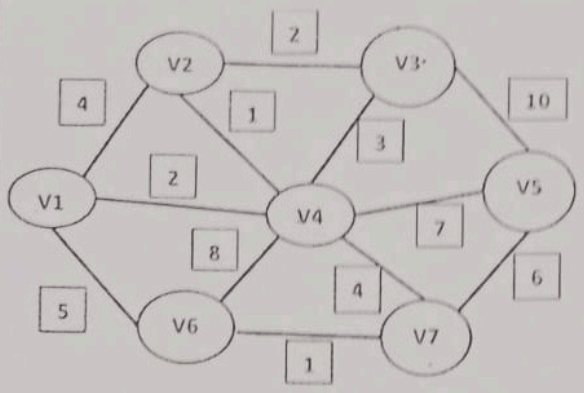
Programme	:	B. Tech – SENSE	Semester	:	FALL 24-25
Course Code & Course Title	:	BCSE202L & Data Structures and Algorithms	Class Number	:	CH2024250101401, CH2024250101402
Faculty	:	Dr. S. Anubha Pearline & Dr. S. Aravindkumar	Slot	:	C1+TC1
Duration	:	90 Minutes	Max. Mark	:	50

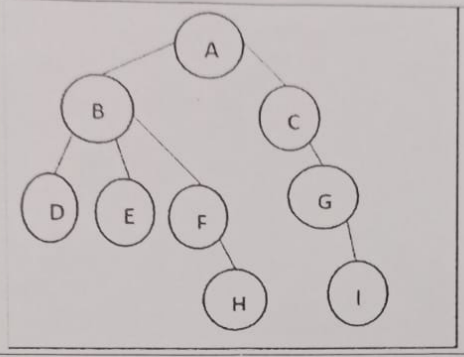
General Instruction:

- Write only your registration number on the question paper in the box provided and do not write other information.

Answer all questions

Q. No	Sub Sec.	Description	Marks
		Section-A (2 x 10 = 20 Marks)	
1		Examine the following diagram representing a tree containing the elements: 32, 17, 88, 8, 28, 65, 97, 21, 29, 54, 82, 76, 93, and 80. i) Determine whether this tree is a Binary Search Tree (BST) or not? Write a pseudocode to support your conclusion ii) If the tree contains the node with the value 88, remove it. Illustrate the step-by-step process for this removal, including the pseudocode for the deletion operation. 	10
2		A dog is exploring its surroundings, starting from vertex V1 and aiming to visit all other vertices in the given diagram. Each vertex represents a location the dog can visit, and the edges between the vertices denote the distances or weights between these locations. Your task is to apply an edge-based approach to identify the minimum distance that covers all locations in the given graph. Write	10

		a pseudocode and illustrate the step-by-step process.  	
		Section-B (2x15=30 Marks)	
3		You are developing a system to collect temperature sensor data using a ring buffer with a fixed capacity of 5 readings. Currently, the buffer contains the elements 11, 30, and 41 (with F= 0 and R=2). i) Insert the values 50 and 60 into the queue. Show the updated values of the front (F) and rear (R) pointers after each insertion. Provide a detailed explanation of how the insertion process works and include the pseudocode for inserting elements into the ring buffer. (6 Marks) ii) After inserting 50 and 60, attempt to insert the value 33 into the queue. Illustrate the situation along with pseudocode. (3 Marks) iii) Delete two elements from the queue. Provide the pseudocode for the deletion process and show the step-by-step state of the queue after each deletion. After deleting two elements, insert the values 71 and 98 into the queue, and describe the final state of the queue. (6 Marks)	15
4		Lolly has been tasked with identifying nearby locations using a GPS navigation system. The system models locations as nodes in a graph, with roads between them represented as edges. As an algorithmic expert familiar with graph traversal techniques, assist her in performing the following tasks: i) Help Lolly find the nearby locations starting from node A using a level-by-level approach. Provide both the pseudocode and step-by-step illustration of the traversal method. ii) Guide Lolly in traversing the graph from the top (starting at node A) to the node that is at the maximum distance (i.e., the farthest node from A). Illustrate the traversal process and provide the corresponding pseudocode.	15



**********All the best **********