PRN No. | | PAPER CODE | U213-293 (RE)

December 2023 (REEXAM)

SY / TY / B.TECH (SEMESTER - I)

COURSE NAME: DATA STRUCTURES   Branch: E&TC   COURSE CODE: ETUA21203

(PATTERN 2020)

[Max. Marks: 60]
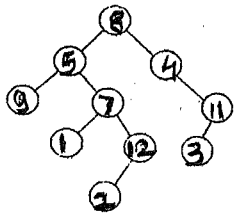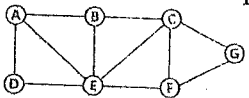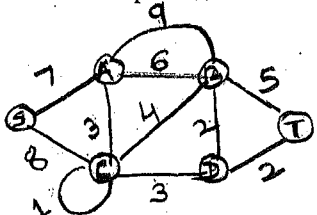
Time: [2 Hrs.]

(*) Instructions to candidates:
1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data wherever required**
4) **All questions are compulsory. Solve any two sub questions each from each Question 1 ,2, 3,4,5, and 6 respectively**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Describe the role of constructors in Java classes. Explain the difference between parameterized and default constructors.	[5]	1	Understand
	b) What is the difference between method overloading and method overriding in Java? Provide examples for each.	[5]		Understand
	c) Create a Java class representing a car. Include member variables and methods that demonstrate encapsulation and abstraction.	[5]		Apply
Q2	a) Compare and contrast the Quick Sort algorithm with the Merge Sort algorithm in terms of time complexity, stability, and memory usage in Java.	[5]	2	Analysis
	b) Describe the conditions under which the bubble sort algorithm in Java terminates, and explain why it is called "bubble sort."	[5]		Understanding
	c) Write a Java method named selection Sort that takes an array of integers and sorts it in ascending order using the selection sort algorithm.	[5]		Apply
Q3.	a) Write a Java method to append a node to the end of a singly linked list.	[5]	3	Apply
	b) Describe how a doubly linked list allows for both forward and backward traversal.	[5]		Understand
	c) Write a Java method to delete a node to the end of a singly linked list	[5]		Apply
Q.4	a) Solve the given infix expressions to find equivalent postfix notations. Show all steps. (A+B/C*(D+E)-F)	[5]	4	Evaluate
	b) Implement a simple stack using a linked list and perform push and pop operations	[5]		Apply

	c) Assess the advantages and disadvantages of implementing a circular queue compared to a regular queue for managing the cinema's booking system. Justify your evaluation by considering factors such as efficiency, memory usage, and ease of implementation.	[5]		Evaluate
Q.5	a) Given an expression tree, break down the steps to evaluate the expression. $a*b/c + e/f*g + k - x*y$	[5]	5	Evaluate
	b) Write an algorithm to perform an in-order traversal of a Binary Search Tree. Apply this algorithm to a tree given below, showing the sequence of visited nodes.	[5]		Apply
	c) Consider the following inorder and preorder traversals of a binary tree: Inorder: D, B, E, A, F, C Preorder: A, B, D, E, C, F Sketch the Binary Tree	[5]		Apply
	a) Given an undirected graph, implement depth-first search traversal algorithms. Provide the order in which the vertices are visited for a specific graph	[5]	6	Apply
	b) Find minimum spanning tree for the given graph using kruskal algorithm stepwise.	[5]		Apply
	c) Explain the concept of a connected graph, a path, and a spanning tree. Provide an example for each, illustrating how they are applied in graph theory.	[5]		Understand