

Course: B. Tech Computer Science and Engineering
(Artificial Intelligence & Machine Learning)
Subject: Data Structures, Subject Code:ETCS106
Semester: II

Time: 03 Hours

Max Marks: 70

Instructions to the Students:

1. This Question paper consists of two Sections. All sections are compulsory.
2. Section A comprises 10 questions of short answer type. All questions are compulsory. Each question carries 02 marks.
3. Section B comprises 8 long answer type questions out of which students must attempt any 5. Each question carries 10 marks.
4. Do not write anything on the question paper.

Q. No.	SECTION –A (SHORT ANSWER TYPE QUESTIONS)	Marks			
1.	a. Differentiate linear and non-linear data structure.	(2)			
	b. What are the merits and demerits of array implementation of lists?	(2)			
2.	c. Define ADT (Abstract Data Type). Mention the features of ADT	(2)			
	d. How doubly linked list can be represented as circular linked list?	(2)			
	e. The polynomial equation can be represented with linked list as follows: <table border="1" style="margin: 10px auto;"><tr><td>Coefficient</td><td>Next node</td><td>Exponent link</td></tr></table>	Coefficient	Next node	Exponent link	(2)
Coefficient	Next node	Exponent link			
	Write down the structure definition in C for the given Node of the list.				
3.	f. What are the postfix and prefix forms of the infix expression? $A + B * (C - D) / (P - R)$	(2)			
	g. List out the steps involved in deleting a node from a binary search tree.	(2)			
	h. What is a balance factor in AVL trees?	(2)			
	i. What is meant by strongly connected and weakly connected graph?	(2)			
	j. What do you mean by internal and external sorting?	(2)			

SECTION –B (LONG ANSWER TYPE QUESTIONS)

2. Write the short Note on the followings:
(a) Asymptotic Notations

(b) Complexity Analysis of Linear Search and Binary Search

3. Consider the following arithmetic infix expression Q: (10)

$$Q: (A + (B * C - (D / E \uparrow F) * G) * H)$$

Simulate the algorithm to transform the infix expression Q into its equivalent Postfix expression (P) using STACK (Show the values of symbol scanned, STACK and Expression P at each and every step.)

4. Explain the working of the circular Queue. What are the conditions for Queue to be EMPTY and FULL. What are the advantages and disadvantages of the Circular Queue? (10)

5. Explain the concept of doubly linked list and also explain the operation performed on the doubly linked list along with the complexity of each operation of doubly linked list. (10)

6. Write the functions in C to perform the following operations:

(a) Deletion from a linked list (5)

(b) PUSH operation using Linked list (5)

7. (a) Create a binary search tree for the following numbers start from an empty binary search tree 45, 26, 10, 60, 70, 30, 40 Delete keys 10, 60 and 45 one after the other and show the trees at each stage. (5)

(b) Construct an expression tree for the expression $(a + b * c) + ((d * e + f) * g)$. (5)

Give the outputs when you apply Inorder, Preorder and Postorder traversals.

8. (a) Explain the various representation of graph with example in detail? (5)

(b) Explain Breadth First Search algorithm with example? (5)

9. Explain Merge Sort with an example. Also write the recursive routine for the Merge sort. (10)

==END OF PAPER==