

END SEMESTER EXAMINATION 2023

Name of the Program: ECE

Semester: IV

Name of the Course: Data Structures

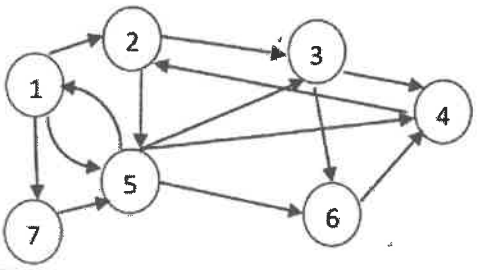
Course Code: TCS-410

Time: 3 Hour

Maximum Marks: 100

Note:

- (i) All Questions are compulsory.
- (ii) Answer any two sub questions among a, b and c in each main question.
- (iii) Total marks in each main question are twenty.
- (iv) Each question carries 10 marks.

Q1	(10*2=20marks)	
(a)	What do you mean by space complexity and time complexity of an algorithm? Write an algorithm/pseudo code for linear search and mention the best case and worst case time complexity of Linear Search algorithm?	CO1
(b)	What are the merits and demerits of array? Given two arrays of integers in ascending order, develop an algorithm to merge these arrays to form a third array.	
(c)	Write an algorithm/pseudocode to delete a given element k from an array A of n elements? Assume that the element k is always present in A.	
Q2	(10*2=20marks)	
(a)	Write an algorithm/pseudocode to convert a given infix expression to postfix expression? Trace the steps involved in converting the given infix expression $((A + B)^C) - ((D * C)/F)$ to postfix expression.	CO2
(b)	Define recursion. What are different types of recursion? Explain.	
(c)	Write an algorithm/pseudocode to delete a node at the end of a doubly linked list.	
Q3	(10*2=20 marks)	
(a)	Design an algorithm/ pseudocode for selection sort. Illustrate the working of selection sort on the following array with 7 elements : 30,45,25,32,55,60,49	CO3
(b)	Why Binary Search algorithm is more efficient than linear search? Depict your answer with suitable example? Mention the time complexity level of two algorithms.	
(c)	Why is quick sort named as quick? Write a program in C Language for the same.	
Q4	(10*2=20 marks)	
(a)	What is a Binary Search Tree (BST)? Show the structure of the binary search tree after adding each of the following values in that order: 10, 25, 2, 4, 7, 13, 11, 22. What is the height of the created binary search tree?	CO4
(b)	Write the output of DFS and BFS traversals on the following graph considering starting vertex as 1. 	
(c)	Write down the inorder, preorder and postorder traversal of the following binary tree	

Q5	(10*2=20 marks)	
(a)	<p>Describe the Dijkstra algorithm to find the shortest path. Find the shortest path in the following graph with vertex "A" as source vertex.</p>	CO5
(b)	Explain the different file organization concepts using proper examples.	
(c)	What is hashing? Explain the four different hashing functions with an example for each.	