

FACULTY OF ENGINEERING
B.E. CSE (AI & ML) III - Semester (AICTE) (Main & Backlog) (New) Examination,
February/ March 2023

Subject: Data Structures and Algorithms

Time: 3 Hours

Max. Marks: 70

- Note:** (i) First question is compulsory and answer any four questions from the remaining six questions. Each questions carries 14 Marks.
(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.
(iii) Missing data, if any, may be suitably assumed.

1. a) Define an Algorithm. What are the characteristics of an algorithm?
b) What is the infix form of the postfix expression: $A+B*(C+D)/F+D*C$?
c) Differentiate between Singly Linked List and Doubly Linked List.
d) Define an AVL tree. What is a balance factor?
e) Define a graph. Write down the ADT of the graph.
f) What are asymptotic notations?
g) Define a Stack. Write the ADT of a Stack.
2. a) Write about the Performance analysis of an algorithm.
b) What is a Sparse Matrix? Explain the Sparse matrix representation.
3. a) Write the algorithm/ implementation of Stacks represented as Arrays. (Operations on Stacks).
b) Write the algorithm/ implementation of Queues represented as Arrays. (Operations on Queues).
4. a) Define a Singly Linked list. Write down its algorithms for traversing , searching, insertion and deletion.
b) Consider the hash function $H(i)=(2i+5)\%11$. Insert keys 3, 8, 102, 23, 4, 10, 9, 12, 44, 15 and construct the 11 item hash table by using open addressing.
5. a) What are the different ways to represent a Binary tree?
b) Construct an AVL tree using the following values: 3, 2, 15, 10, 28, 18, 4, 14, 30, 9, 21 and 26.
6. a) Explain Kruskal's algorithm to find minimum spanning tree.
b) Illustrate merge sort with example. Write its algorithm and its complexity.
7. a) Define Space and Time complexity. What are the metrics to calculate them?
b) Write a C program to perform Pattern Matching.