



R20 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY  
(Autonomous, Accredited by NAAC with 'A' Grade)

Subject code: 3P3EE

B.Tech III Semester Regular/Supplementary Examinations, March/April 2023

**DATA STRUCTURES**  
(Common to CSE & CSE(AI&ML))

Maximum Marks: 70

Date: 10.04.2023 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 Define data abstraction.
- 2 Define data structure and give an example.
- 3 Discuss on linked representation of sparse matrix.
- 4 What are stack operations?
- 5 Define properties of binary tree.
- 6 What are the applications of priority queues?
- 7 Write the linear search with an example.
- 8 Write the model for external sorting.
- 9 What is graph ADT.
- 10 Define Red Black trees and give an example.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 (a) Write a recursive algorithm to find the factorial of a number. 5M  
(b) Discuss on Time and Space complexity. 5M  
OR
- 12 Explain asymptotic notations. 10M
- 13 (a) Write a function to implement delete operation in a single linked list. 5M  
(b) Write a function to insert an element into a double linked list. 5M  
OR
- 14 (a) Explain how stack is used in postfix expression evaluation. 5M  
(b) Write functions to implement insert and delete operations in a circular queue. 5M
- 15 (a) Explain binary tree representations. 5M  
(b) What are binary tree traversals and explain with an example. 5M  
OR
- 16 Construct a max heap for the following numbers 10M  
45, 67, 23, 34, 12, 89, 66, 90

- 17 (a) Write a function to perform binary search. 5M  
(b) Explain collision handling techniques in hashing. 5M  
OR
- 18 (a) Write a function to sort numbers using merge sort technique. 5M  
(b) Sort the following numbers using quick sort technique 5M  
65, 45, 34, 88, 90, 76, 30, 12
- 19 (a) Explain different representations of graphs. 5M  
(b) Write DFS algorithm and apply on any graph with at least 6 vertices. 5M  
OR
- 20 (a) Explain delete operations in binary search tree. 5M  
(b) Define AVL tree and explain rotations in AVL trees. 5M