

PMCA/M21
DATA STRUCTURES
Paper–CS-DE-13

24164

Time allowed : 3 Hours

Maximum Marks : 80

Note : Attempt **five** questions in all, selecting **one** question from each unit.
Question No. **1** is compulsory. All questions carry equal marks.

Compulsory Question

1. Attempt all questions : 8×2 = 16
- (i) Name the various types of classifications of data structures.
 - (ii) Enlist the various operations that can be performed on strings.
 - (iii) How two-way list is different from one-way list?
 - (iv) Suppose we have to perform undo-redo operation. Which data structures must be used and why?
 - (v) Comment on the complexity of quicksort.
 - (vi) What is a Binary Tree?
 - (vii) Enlist the various ways in which a graph can be traversed.
 - (viii) Name a sorting technique that is based on positional number system and justify your answer.

UNIT-I

2. (i) Write an algorithm to check whether the input matrix is a sparse matrix or not. Assume that if zeros are more than 30%, then it is a sparse matrix. 8
- (ii) Write an algorithm to find how many students have scored first division in an exam, assuming you are given with an array comprising of percentage of marks of students in a class. 8
3. (i) Comment on the algorithm complexity and time-space tradeoff. 8
- (ii) Write an algorithm to match a pattern from a given text and display its location if successful matching, otherwise display no match. 8

UNIT-II

4. What is a Linked List? Explain various types of linked lists in brief. Write algorithms for inserting and deleting an element in a linked list at the beginning of the list. 16

5. What are the various types of queues? Explain insertion operation in each type of queue by writing algorithms and suitable examples. 16

UNIT-III

6. What is Quicksort? Write and explain the algorithm to sort the given data using quick sort. Provide suitable examples. Also comment on the complexity of quicksort. 16
7. (i) What is a threaded Binary Tree? Explain in detail. 8
(ii) Write an algorithm to traverse a binary tree using pre-order traversal and explain using suitable example. 8

UNIT-IV

8. What is a Graph? How graphs are stored in computer memory? Write and explain the Warshall's algorithm in graph. 16
9. Write and explain algorithm for performing the sorting of given data using merge sort. Provide suitable example. Also comment on the complexity of merge sort. 16