2025

COMPUTER SCIENCE — MINOR

Paper : MN-3

(Data Structures)

Full Marks : 75

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer ***any five*** questions : 2×5

(a) Differentiate linear and non-linear data structure.

(b) Write down two disadvantages of array.

(c) Define recursion with example.

(d) Write down two applications of linked list with suitable examples.

(e) Define an array of five elements and assign (10, 20, 30, 40, 50) values to it.

(f) What is priority queue? Give an example.

(g) State any two properties of a binary search tree.

(h) List any two advantages of doubly linked list over a singly linked list.

Section - A

Answer ***any three*** questions. 5×3

2. What are the differences between stack and queue? Give diagram for both.

3. Describe the applications of data structure in real life.

4. Convert infix expression into its equivalent postfix expression using stack

A * (B + D) / E – F * (G + H / K).

5. Discuss a method to represent a 2D sparse matrix that saves space.

6. Differentiate between malloc () and calloc ().

Section - B

Answer ***any five*** questions.

7. (a) Write an algorithm to search an element 'X' from 'N' numbers.

(b) Convert the expression into its corresponding prefix expression using stack and evaluate :

30 + ((8 – 4) + 20) / 4 + 5 * 3. 5+5

8. (a) Represent queue with the help of stack with suitable example.

(b) Explain in detail, how to represent 2D sparse matrix. 5+5

9. (a) Write an algorithm to insert an element in a circular queue.

(b) Perform insertion sort technique on the following set of data in ascending order.

76, 80, 10, 20, 15, 5, 60, 30, 40. 5+5

10. (a) Use hashing technique to store the following set of data and resolve collision if it occurs. Hash function to be used is key %10.

90, 12, 23, 38, 56, 69, 77, 83, 86

(b) Write a program snippet to delete a node from a single linked list. Give comments for the program. 5+5

11. (a) Considering linear search and binary search techniques, which technique would you prefer for searching an item and why?

(b) Write the recursive version of the Quick Sort algorithm to sort a given set of elements. Give necessary documentation for the algorithm. 3+7

12. (a) Write the algorithm for the following :

(i) inorder traversal,

(ii) Postorder traversal,

(iii) Preorder traversal of the BST.

(b) What do you mean by a threaded binary tree? Give example. 6+4

13. (a) Write a program in C to reverse the order of elements in a stack using an additional stack. Give necessary documentation for the program.

(b) Implement stack operation using linked list. Provide necessary documentation for the program. 5+5

14. (a) Draw a BST with the following node values :

60, 40, 20, 100, 50, 10, 200, 250, 235, 115, 25

(b) Write the postorder traversal for the above BST.

(c) Delete 200 from the BST and construct the final BST. Show all the steps.

(d) Differentiate between linear and non-linear data structure. 4+2+2+2
