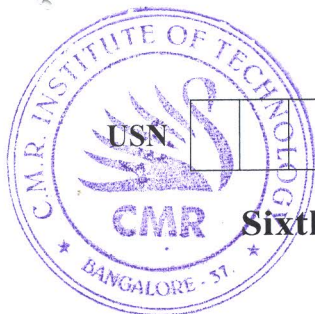18EC643

**Sixth Semester B.E. Degree Examination, Dec.2023/Jan.2024**
## Data Structures using C++

Time: 3 hrs.  Max. Marks: 100

**Note:** *Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

1  a. Mention and explain the features of C++.  (05 Marks)
   b. Classify different data types in C++.  (05 Marks)
   c. Explain operator overloading and write a C++ program to overload + operator.  (10 Marks)

**OR**

2  a. Define variable and explain the syntax to declare the variable.  (05 Marks)
   b. With example explain different types of expression.  (05 Marks)
   c. Define inheritance and explain the multiple inheritance with example.  (10 Marks)

### Module-2

3  a. Define array and write a C++ program to store and retrieve them from array.  (07 Marks)
   b. Explain the following special matrix :
      i)   Square matrix
      ii)  Diagonal matrix
      iii) Tridiagonal matrix
      iv)  Lower triangular matrix
      v)   Upper triangular matrix  (05 Marks)
   c. Write a C++ function to create Linked Lists.  (08 Marks)

**OR**

4  a. Write a C++ program to for :
      i)   Matrix addition
      ii)  Matrix multiplication
      iii) Transpose of matrix.  (07 Marks)
   b. Explain sparse matrix.  (05 Marks)
   c. Write a C++ program to insert a element into Linked List.  (08 Marks)

### Module-3

5  a. Define stack and write Abstract Data Type of Stack (ADT).  (05 Marks)
   b. Explain the infix, postfix and prefix expression with example.  (05 Marks)
   c. Explain tower of Hanoi and write a recursive function for tower of Hanoi.  (10 Marks)

**OR**

6  a. Write a C++ function to push and pop a element into and form the stack.  (05 Marks)
   b. Explain the parenthesis matching with the help of stack.  (05 Marks)
   c. Write a C++ program to convert from infix to postfix expression.  (10 Marks)

## Module-4

**7** a. What is Queue? Explain queue data structure. (05 Marks)
   b. Write a C++ function to insert and delete a element from queue. (05 Marks)
   c. Explain the railroad car arrangement with respect to queue. (10 Marks)

**OR**

**8** a. Write ADT for queue. (05 Marks)
   b. Explain priorities queue. (05 Marks)
   c. Explain the hashing. (10 Marks)

## Module-5

**9** a. Define the following tree terminologies :
   i)   Root node
   ii)  Parent node
   iii) Child node
   iv)  Lowers
   v)   Level of a tree. (05 Marks)

   b. Write ADT for binary tree. (05 Marks)
   c. Write a C++ function to create a binary free and insert a element into binary tree. (10 Marks)

**OR**

**10** a. Explain binary tree, fall binary tree, complete binary tree and array representation of binary tree. (05 Marks)
   b. Explain tree traversal methods. (10 Marks)
   c. Write short notes on heap sort. (05 Marks)

* * * * *