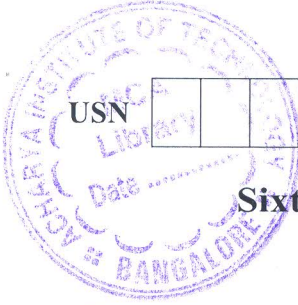


# CBCS SCHEME



USN

18EC643

Sixth Semester B.E. Degree Examination, Jan./Feb. 2023

## 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. Discuss the features of C++. (06 Marks)
- b. What is constructor? Discuss the different types of constructors with example. (08 Marks)
- c. Define recursion. Write the recursion function in C++ to find the factorial of a number. (06 Marks)

OR

- 2 a. What is inheritance? Explain the different types of inheritance with an example. (10 Marks)
- b. Discuss the template function in C++. Write template function to swap two parameters with arguments being two integers or two float values. (10 Marks)

### Module-2

- 3 a. Define sparse matrix and also explain the representation of sparse matrix using single linear. (08 Marks)
- b. Write the abstract class linear list. (06 Marks)
- c. Explain vector representation with an example. (06 Marks)

OR

- 4 a. How dynamic memory allocation is performed in C++? Explain with suitable example. (08 Marks)
- b. Write a C++ program to add two matrices. (06 Marks)
- c. Write struct definition for chain node. (06 Marks)

### Module-3

- 5 a. Write C++ abstract class for stack. (06 Marks)
- b. Write the abstract data type stack. (06 Marks)
- c. Write a program to explain the concept of towers of Hanoi problem using recursive method. (08 Marks)

OR

- 6 a. Explain how parenthesis matching is carried out using stack. Write C++ function for the same. (10 Marks)
- b. Explain the evaluation of postfix expression using stack with example. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

**Module-4**

- 7 a. Write the abstract data type for queue. (04 Marks)  
b. Write C++ template to double the length of the array queue. (08 Marks)  
c. Write ADT specification and abstract class for dictionary. (08 Marks)

**OR**

- 8 a. Discuss problem description and solution strategy for rail road car arrangement. (10 Marks)  
b. Write C++ template for push and POP methods of linked queue. (10 Marks)

**Module-5**

- 9 a. Define a binary tree. State and prove any four properties of binary tree.  
b. Write functions for  
i) Pre-order traversal of binary tree (10 Marks)  
ii) Determining height of the binary tree. (10 Marks)

**OR**

- 10 a. Write a function to insert an element into a binary search tree. (08 Marks)  
b. Write ADT specification of binary tree. (06 Marks)  
c. Write a short note on heap sort. (06 Marks)

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