

# CBCS SCHEME



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17EC661

## Sixth Semester B.E. Degree Examination, Feb./Mar. 2022 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

- What are template functions? Write a simple program to demonstrate template function to compute sum of two numbers. (04 Marks)
  - Explain the memory structure for  $3 \times 5$  array. Give C++ template functions to allocate and free the memory for two-dimensional array using dynamic memory allocation operators. (10 Marks)
  - Explain the different modes of returning a value from a function in C++. (06 Marks)

OR

- Explain the various ways to map the list [5, 2, 4, 8, 1] into one dimensional array with neat diagrams. (06 Marks)
  - Write and explain the header class for chain to implement a linear list as singly linked list. (10 Marks)
  - Explain the various types of recursion with an example. (04 Marks)

### Module-2

- Explain with neat diagram and an example, the row and column-major mappings to arrange 2-dimensional array elements as one-dimensional array. (10 Marks)
  - What are irregular arrays? Demonstrate with an example, how to create and use two dimensional array as irregular-array. (10 Marks)

OR

- Explain different forms of special matrices with an example for each. (10 Marks)
  - Demonstrate with an example, the sparse matrix and its linear list representation. (06 Marks)
  - Illustrate the tower of Hanoi problem with C++ function. (04 Marks)

### Module-3

- Explain PUSH and POP operations on linked representation of a queue with neat sketch. (10 Marks)
  - Illustrate with neat diagram, the Railroad car arrangement application of queue. (10 Marks)

OR

- What is a dictionary? Implement "find" operation in linear list representation of queue with C++ code. (10 Marks)
  - What is collision and overflow? Explain the concept of hashing with chains using neat diagram. (10 Marks)

### Module-4

- Explain with neat diagram, the array-based representation of binary trees. Give advantages and disadvantages. (10 Marks)
  - Demonstrate various traversing methods of binary tree with C++ method for each. (10 Marks)



OR

- 8 a. Write an ADT and an abstract header class for binary tree. (10 Marks)
- b. Write inorder, preorder and postorder traversal output for following tree [Fig.Q8(b)]:

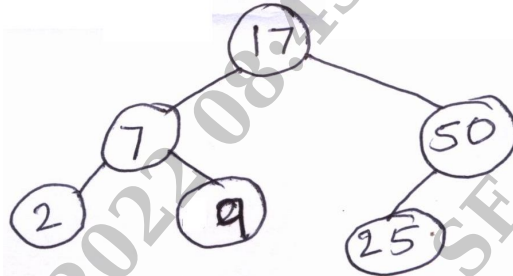


Fig.Q8(b)

(06 Marks)

- c. Write a C++ function to find height of a binary tree, as a member of template class linkedBinaryTree. (04 Marks)

**Module-5**

- 9 a. Demonstrate the insertion process on max heap with neat diagram. (10 Marks)
- b. Assume that  $n = 10$ , and priority of the elements in a [1:10] is [20, 12, 35, 15, 10, 80, 30, 17, 2, 1]. Illustrate the process of initializing a max heap with neat diagram. (10 Marks)

OR

- 10 a. Illustrate the function for searching a key in a binary search tree with C++ code. (10 Marks)
- b. Demonstrate the process of deleting a pair from a binary search tree using neat diagram, for following tree. Assume the pair to be deleted is 40. [Fig.Q10(b)].

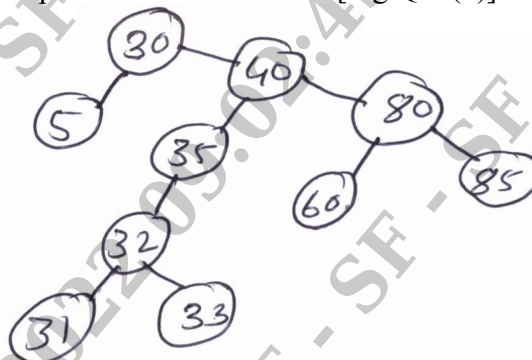


Fig.Q10(b)

(04 Marks)

- c. Write a note on heap sorting. (06 Marks)

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