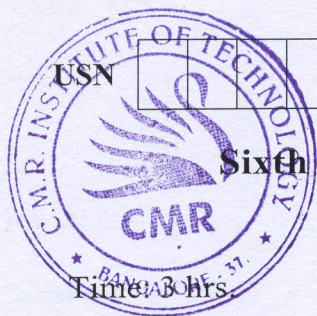


# CBCS SCHEME



21CS651

## Sixth Semester B.E. Degree Examination, June/July 2024 Introduction to Data Structures

Max. Marks: 100

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

### Module-1

- 1 a. Define an array. How to declare and initialize one dimensional, two dimensional and multi-dimensional array? (10 Marks)
- b. Write a C program to multiply 2 matrix A and B and display the resultant matrix C. (10 Marks)

OR

- 2 a. Explain the nested structure with example. Give differences between Union and Structure. (10 Marks)
- b. List out the dynamic memory allocation function with its syntax. Write a C program to swap two numbers. (10 Marks)

### Module-2

- 3 a. Define stack. Write a C program to implement the different operations of stack. (10 Marks)
- b. List out the applications of stack. Convert the following infix expression into its equivalent postfix expression.  
 $((A + B) - C * (D / E)) + F$  (05 Marks)
- c. Deduce the contents of empty stack after the execution of following operations in sequence.  
push(6), push(8), push(-1), pop(), push(7), pop(), pop() (05 Marks)

OR

- 4 a. What is Queue? Explain primitive operations and types of Queue using logical representation. (10 Marks)
- b. Write a C function to insert, delete and display an element in a Linear Queue. (10 Marks)

### Module-3

- 5 a. Define self-referential structure. Give its C declaration. Explain the different types of linked list with logical representation. (10 Marks)
- b. Write a C function for the following operation on singly linked list:  
i) Insert node    ii) Delete node    iii) Display node (10 Marks)

OR

- 6 a. What are the drawbacks of singly linked list? How to overcome it? List out the applications of linked list. (07 Marks)
- b. Write a C function for the following operations on circular linked list:  
i) Insert node at front    ii) Delete node at rear (08 Marks)
- c. Write a C function to count numbers of elements present in singly linked list. (05 Marks)

**Module-4**

- 7 a. Explain the binary tree concepts with examples:  
i) Strictly binary tree                      ii) Complete Binary tree  
iii) Almost Complete Binary tree      iv) Binary search tree                      (10 Marks)
- b. Construct a Binary Search Tree and find the 3 order traversal of tree.  
15, 20, 8, 27, 11, 2, 12, 6, 3, 10, 7, 22, 30                      (10 Marks)

**OR**

- 8 a. Write a C function to find the maximum item in Binary search tree.                      (05 Marks)
- b. Define Expression Tree. Construct the expression tree  
 $((6 + (3 - 2) * 5) \wedge (2 + 3))$                       (07 Marks)
- c. Write iterative functions for preorder, postorder and inorder traversals.                      (08 Marks)

**Module-5**

- 9 a. Write a C program to array numbers in ascending order using Bubble Sort.                      (10 Marks)
- b. Design an algorithm for insertion sort. Trace the sorting elements using insertion sort.  
20, 10, 30, 15, 25, 5                      (10 Marks)

**OR**

- 10 a. Write a C code to search an item using linear search.                      (10 Marks)
- b. Define searching. List out the advantages and disadvantages of Binary Search. Discuss the difference between Binary search and Linear search.                      (10 Marks)

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