

**2023**  
**B.A./B.Sc.**  
**Second Semester**  
CORE – 3  
**COMPUTER SCIENCE**  
*Course Code: CSC 2.11*  
(Data Structures)

*Total Mark: 70*  
*Time: 3 hours*

*Pass Mark: 28*

*Answer five questions, taking one from each unit.*

**UNIT-I**

1. (a) Write program that creates a 3-dimensional array and displays the values of the array. 3  
(b) State the differences between array and linked list. 7  
(c) Explain the various operations on strings. 4
2. (a) Explain data structures. 2  
(b) Write down a brief classification of data structures. 3  
(c) Write a program that represents a sparse matrix in triplet form. 5  
(d) ARR is a 2-dimensional array with 10 rows and 5 columns. Each element occupies memory locations. If ARR [1][1] begins at address 300, find the location of ARR [4][3]. The arrangement of the elements is row-major. 4

**UNIT-II**

3. (a) State any four advantages and any four disadvantages of stacks. 8  
(b) Convert the infix expression into postfix expression:  
(A+B)\*(C\*D-E)\*F/G. 4  
(c) If the sequence of operations: push(1), push(2), pop, push(1), push(2), pop, pop, pop, push(2), pop are performed on a stack. What will be the sequence of popped out values? 2

4. (a) Write a subroutine to perform push operation in a stack. 4  
 (b) Evaluate the postfix expression: 344, 8, \*, 10, 8, 2, /, -, +. 3  
 (c) Explain recursion using stack with example. 7

### UNIT-III

5. (a) State differences between static and dynamic memory allocation. 7  
 (b) Discuss skip list. 7
6. (a) Write a subroutine to create a doubly linked list. 6  
 (b) What do you mean by self-organizing list? Explain the various methods in self-organizing list. 2+6=8

### UNIT-IV

7. (a) Construct a binary search tree with the following elements: 4  
 11, 6, 8, 19, 4, 10, 5, 17, 43, 49, 31.  
 (b) Construct a binary tree from the traversal results: 4  
 In-order traversal: 4, 2, 1, 7, 5, 8, 3, 6  
 Pre-order traversal: 1, 2, 4, 3, 5, 7, 8, 6  
 (c) Explain three cases while inserting a node in threaded binary tree. 6
8. (a) Write down steps to construct an AVL tree. 4  
 (b) Explain perfect binary tree and full binary tree. 4  
 (c) Explain deletion of node with 2 children in binary search tree. 6

### UNIT-V

9. (a) State differences between linear and binary search operations. 5  
 (b) Write algorithm for selection sort. 5  
 (c) Explain logarithmic time and linear time complexity. 4
10. (a) Write algorithm for insertion sort. 5  
 (b) Sort the numbers in ascending order using bubble sort: 6  
 29, 25, 20, 19, 11, 24, 27, 31  
 (c) Write the best case time complexity of insertion sort, selection sort, and merge sort. 3