

**VIT**

Vellore Institute of Technology

Slot : F2+TF2

School of Computer Science Engineering and Information Systems**Fall Semester 2024-2025****Continuous Assessment Test – I****Programme Name & Branch : B.Tech IT****Course Code & Name: BITE201L****Class Number (s): VL2024250102874, VL2024250102868, VL2024250102884****Faculty Name (s) : Dr. Ephzibah E.P, Dr. Lawanya Shri M, Dr. Kishore Raja P C****Exam Duration: 90 Min.****Maximum Marks: 50**

Answer all the questions

- 1 Write an algorithm or a program for infix to postfix conversion using stack data structure. Convert the following infix to its corresponding postfix form. Use a tabular representation to depict the contents of the stack for every scanned token
 $(a + b) * (c - d) / e$ 10
- 2
 - a) Linked lists are often criticized for being memory-intensive data structures. Justify the statement "Linked lists take more memory space than arrays" 5
 - b) Write the algorithm for Towers of Hanoi. Explain the significance of recursive functions in solving the game. 5
- 3 Create a linked list to store the information of students in a class. Each node in the linked list should contain the following fields:
 - name: a string representing the student's name
 - age: an integer representing the student's age
 - grade: a string representing the student's grade (e.g., "A", "B", "C", etc.)Write a program to create the linked list and populate it with 'n' number of students' information. The program should also calculate and store the number of vowels and consonants in each student's name using another linked list. 10
- 4 Implement a circular singly linked list in a programming language of your choice. The linked list should have the following methods:
 - insertAtBeginning(data): Inserts a new node with the given data at the beginning of the linked list.
 - insertAtEnd(data): Inserts a new node with the given data at the end of the linked list.
 - deleteAtBeginning(): Deletes the node at the beginning of the linked list.
 - deleteAtEnd(): Deletes the node at the end of the linked list.
 - printList(): Prints the data of all nodes in the linked list. 10
- 5 Implement a sparse matrix representation using a linked list. A sparse matrix is a matrix where most of the elements are zero. The linked list should store only the non-zero elements of the matrix.
 - addElement(row, column, value): Adds a new non-zero element to the matrix at the specified row and column with the given value.
 - deleteElement(row, column): Deletes the non-zero element at the specified row and column from the matrix. 10