DATA STRUCTURES (3130702)

INFORMATION TECHNOLOGY DEPARTMENT – GEC, BHAVNAGAR

PREREQUISITE – Practical 1

Learning Outcomes:

1. Usage of C programming constructs like loop, condition and variables.
2. To understand the usage of array, string, user defined function, structure, pointer and dynamic memory allocation.

PROGRAMS:

1. Write a program to implement a student structure using dynamic memory allocation and perform following operations - Create a student record
   - Search a student record
   - Update a student record
   - Delete a student record
   - Display student records
   - Sort student records
   - Merge student records (Use sorted and unsorted array)

2. Write a program to implement a 2- dimensional string array using double pointer.
   - Print initial letter of each string
   - Sort the string in ascending order

STUDY OF DATA STRCUTURE-STACK – Practical 2

Learning Outcomes:

1. Create a stack and perform operations on stack
2. Using stack to represent expression in Polish and reverse polish notation 3. Using stack to evaluate expression

PROGRAMS:

1. Write a program to create a stack and perform following operation on stack. Push, pop, peek, change and display
2. Write a program to reverse a string using stack
3. Write a program to check the expression for valid usage of parenthesis
4. Write a program to convert infix expression to postfix expression using stack
5. Write a program to convert infix expression to prefix expression using stack 6. Write a program to evaluate expression using stack

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STUDY OF DATA STRUCTURE- QUEUE – Practical 3

Learning Outcomes:

1. Create and use different types of queue with operations

PROGRAMS

1. Write a program to create queue and perform operation like insert, delete and display
2. Write a program to create circular queue and perform operations like insert, delete and display.
3. Write a program to create double ended queue and perform operations like insert, delete and display.

STUDY OF DATA STRUCTURE- LINKED LIST – Practical 4

Learning Outcomes:

1. Create and use different types of liked list with operations

PROGRAMS:

1. Write a Program to create singly linear linked list, singly circular linked list, doubly linear linked list and doubly circular linked list and perform following operations.
    - Create a linked list
    - Insert a node at beginning
    - Insert a node at end
    - Insert a node before a value
    - Insert a node after a value
    - Delete a node with a value
    - Delete a node after a value
    - Delete a node before a value
    - Delete a node from beginning
    - Delete a node from end
    - Delete a linked list
    - Display a linked list

STUDY OF DATA STUCTURE- TREE – Practical 5

Learning Outcomes:

1. Create and use binary search tree to organize data hierarchically

PROGRAMS:

1. Write a program to create a binary search tree and perform following operations
   - Insert a node in tree
   - Search a node in tree
   - Traversal of tree (Inorder, preorder, postorder)
   - Delete a node in tree
   - Delete tree
   - Calculate height of the tree
   - Calculate total number of nodes, number of internal nodes and number of leaf nodes

2. Write a program to create threaded binary tree
3. Write a program to create a self-balancing binary search AVL tree

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STUDY OF DATA STRUCTURE- GRAPH – Practical 6

Learning outcomes:

1. Represent graph using array and linked list data structure
2. Perform operations on graph data structure

PROGRAMS:

1. Create a graph and perform Breadth First Search
2. Create a graph and perform Depth First Search
3. Create a graph and find Minimum Spanning Tree using Prim's and Krusal's algorithm
4. Create a graph and find Shortest path using Dijkstra's algorithm

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STUDY OF HASHING TECHNIQUES – Practical 7

Learning outcomes:

1. Study and understand different hashing techniques
2. Design of hashing function

PROGRAMS:

1. Write a program to implement following hashing techniques with collision resolution mechanism.
   - Division method

- Multiplication method
- Mid-square method
- Folding method

 Apply collision resolution mechanism like linear probing, quadratic probing, double hashing After certain operation of insertion apply rehashing

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STUDY OF SORTING AND SEARCHING TECHNIQUES – Practical 8

Learning outcomes:

1. Understand and implement various sorting techniques to arrange the data values in order
2. Understand and implement efficient searching technique to retrieve the value from data structure **PROGRAMS:**

1. Write a program to sort a data value using following techniques
   - Bubble sort
   - Selection sort
   - Insertion sort
2. Write a program to search a data value using following techniques
   - Linear search
   - Binary search

 Practical 1 to 8 implements the concepts covering the course curriculum.

NOTE *

A set of practice problems will be declared regularly to enhance problem solving ability and logic building.

Practice problems will be a part of assignment and will be considered in evaluating the lab performance.

Add set of practical problems as practical (Practical no: 9, 10, and 11)

Subject Coordinator

(ANOOP PATEL)