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Course Code: MCA-102

Course Name: Data and File Structures

**List of Programs – Unit I (To be included in Practical File)**

1. Write a program which takes an array of integers and performs searching of an element by implementing linear and binary search techniques.
2. Write program(s) to perform sorting of an array of integers in ascending order by implementing the following algorithms:
  - a) Bubble sort
  - b) Selection sort
  - c) Insertion sort
  - d) Shell sort
  - e) Radix sort
  - f) Merge sort
  - g) Quick sort
3. Write a program which receives a matrix  $a[m][n]$  (represented by a two-dimensional array) of integers from the user and determines whether the given matrix is sparse matrix or not. If it is sparse matrix, represent it through appropriate representation with array to save the memory space.
4. Write a program which receives a matrix  $a[n][n]$  (represented by a two-dimensional array) of integers from the user and perform the following operations on the received matrix:
  - a) Transpose the matrix
  - b) Determine the row-wise sum
  - c) Determine the column-wise sum
  - d) Display the upper triangular matrix
  - e) Display the lower triangular matrix
  - f) Display the diagonal elements only
5. Write a menu-driven program which implements a linear linked list with following operations:
  - a) Insertion of an element at beginning of the list
  - b) Insertion of an element at specific location of the list
  - c) Insertion of an element at end of the list
  - d) Deletion of an element from the beginning of the list
  - e) Deletion of an element from specific location of the list
  - f) Deletion of an element from the end of the list

- g) Display all elements of the list
  - h) Search a specific element in the list
  - i) Remove all duplicate elements
  - j) Delete whole list
6. A polynomial is composed of different terms where each of them holds a coefficient and an exponent. Write a program to represent the following polynomials:  $4x^4 + 4x^3 - 2x^2 + x$  and  $11x^3 + 7x^2 - 4x$  with linked list, and then perform addition of the given polynomials.
7. Write a program to implement a doubly linked list with all insertion and deletion operations. Display the elements of lists in left-to-right and right-to-left manner.
8. Write a menu-driven program which implements a stack with following operations:
- a) Push (Insert an element)
  - b) Pop (Delete an element)
  - c) Display (Print all elements of stack)
9. Write a menu-driven program which implements a linear queue with following operations:
- a) Enqueue (Insert an element)
  - b) Dequeue (Delete an element)
  - c) Display (Print all elements of queue)
10. Write a menu-driven program which implements a circular queue with following operations:
- a) Enqueue (Insert an element)
  - b) Dequeue (Delete an element)
  - c) Display (Print all elements of queue)

**Note:** Output-screens (having student's name displayed on the output screens) should be provided along with the program code. Necessary comments for code should also be provided.