S. V. National Institute of Technology Surat
Computer Engineering Department
Data Structure Lab
Assignment-1

1) Create five arrays of integers for five different cities of India. Each array stores the temperature data of a city for 365 days varying from 20 degrees celsius to 40 degrees celsius. You can generate temperature values randomly using an inbuilt function in C. Write a program to display the average temperature of each city and the overall average temperature combining data from all cities over a period of five years.

2) Write a program to create Fibonacci series of length 10.
   Hint: Fibonacci series: next number is the sum of the previous two numbers, for example, 0, 1, 1, 2, 3, 5, 8, 13, 21, etc.

3) Write the program for given problem statements:
   a) To merge two arrays of the same size sorted in descending order
   b) To print all unique elements in an array.
   c) To separate odd and even integers in separate arrays
   d) To accept two matrices and check whether they are equal.
   e) An array contains both positive and negative numbers in random order. Rearrange the array elements so that all negative numbers appear before all positive numbers.
   f) Two sorted arrays, such that the arrays may have some common elements. Find the sum of the maximum sum path to reach from the beginning of any array to the end of any of the two arrays. We can switch from one array to another array only at common elements.
   g) For given two sorted arrays and a number x, find the pair whose sum is closest to x and the pair has an element from each array.

S. V. National Institute of Technology Surat
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Assignment-2

1) Draw the following patterns in C and print current values of all variables used in the program after displaying each row. Attach screenshots of the output along with 'Watch' values.

(a)
```
1 2 3 4 5
1 2 3 4
1 2 3
1 2
1
```

(b)
```
                1
              1   1
            1   2   1
          1   3   3   1
        1   4   6   4   1
      1   5  10  10   5   1
```

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Assignment-3

1) **Note: Write all the program logic/functions in the user-defined header file "mystring.h". Your user-defined function should work similarly to the in built function of the library header file string.h.**

1. Write a program to find the length of a given string.
2. Write a program to concat two given strings.
3. Write a program to copy one string to another string.
4. Write a program to compare two given strings.
5. Write a program to search for the first occurrence of the character 'c' in the given string.
6. Write a program to find substring is there in given string or not?
7. Write a program to generate the reverse of a string.
8. Write a program to replace all vowels with star (*) and consonants with hash (#) of string.

2) Create an array named **AUTO** which stores random elements ranging from 250-350 which denotes the number of automobiles sold during the last 30 years.

a) Write a program to
   i) Insert one element in the beginning of an array and print the original and modified array.
   ii) Insert one element in the end of an array and print the original and modified array.
   iii) Insert one element at the 'pth ' position of an array and print the original and modified array.

b) Write a program to
   i) Delete an element from the beginning of an array and print the original and modified array.
   ii) Delete the last element of an array and print the original and modified array.
   iii) Delete the element at the 'pth ' position of an array and print the original and modified array.

c) Write a program to update the value at the 'p^{th} ' position with new value.
d) Write a program to print the index during which more than 300 automobiles were sold.
e) Write a program to print each index and corresponding number of automobiles sold.

S. V. National Institute of Technology Surat
Computer Science and Engineering Department
Data Structure Lab
Assignment 4

1) Write a program to
    a) Implement stack using an array, the stack should perform four basic operations such as

        Push(): Add an item in the stack
        Pop(): Remove an item from the stack
        Peek() or Top(): Return top element of the stack
        isEmpty(): Check for empty stack

    a) Implement Queue using an array that performs the following operations

        Enqueue(): Add an element in the Queue
        Dequeue(): Remove an element from the Queue
        Front(): Return the front element of the Queue
        Display(): Print all the elements of the Queue

S. V. National Institute of Technology Surat
Computer Science and Engineering Department
Data Structure Lab
Lab Assignment 5

1) Write a program to convert an expression from
    a) Infix to Postfix using stack.
    b) Infix to prefix using stack.

NOTE: Program must handle all kinds of operators/operations like addition, subtraction, exponential operators, nested parentheses, etc.

S. V. National Institute of Technology Surat
Computer Science and Engineering Department
Data Structure
Lab Assignment 6

1. Implement Circular Queue and perform the following operations:
    a. **Front:** It is used to get the front element from the Queue.
    b. **Rear:** It is used to get the rear element from the Queue.
    c. **enQueue(value):** This function is used to insert the new value in the Queue. The new element is always inserted from the rear end.
    d. **deQueue():** This function deletes an element from the Queue. The deletion in a Queue always takes place from the front end.
2. For a given array of size 'N', create a linked list and display it.
3. Write a menu-driven program to create a linked list and perform the following operations:
    1) Insert in beginning
    2) Insert at last
    3) Insert at any random location
    4) Delete from Beginning
    5) Delete from last
    6) Delete node after specified location
    7) Search for an element
    8) Exit

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Computer Science and Engineering Department
Data Structure Lab
Assignment 7

1) Write a program to count the number of nodes present in the linked list.

2) Write a program to count the number of nodes having a) odd data element b) even data element.

3) Write a program to print the middle data element of a given linked list.

4) Write a program to insert a node at the end of the linked list with value as total of all its previous node values.

5) Implement the following operations w.r.t. doubly linked list:

- Insertion at any position given by the user
- Deletion at any position given by the user
- Display the list
- Search for a specific element
- Find maximum and minimum elements.

S. V. National Institute of Technology Surat
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Data Structure
Assignment 8

1) Write a program to implement Inorder, Preorder and Postorder traversal of a tree.
2) Write a program to apply binary search on an unsorted array