**Practical-10**

**AIM:** To implement Longest Common Subsequence (LCS) in C programming.

**SOFTWARE REQUIRED:** Vs Code

**PSEUDO CODE:**

function LCS(X, Y):

m = length(X)

n = length(Y)

let dp be a 2D array of size (m+1) x (n+1)

for i from 0 to m:

for j from 0 to n:

if i == 0 or j == 0:

dp[i][j] = 0

else if X[i-1] == Y[j-1]:

dp[i][j] = dp[i-1][j-1] + 1

else:

dp[i][j] = max(dp[i-1][j], dp[i][j-1])

// Reconstruction of LCS

let lcs be an empty string

i = m, j = n

while i > 0 and j > 0:

if X[i-1] == Y[j-1]:

lcs = X[i-1] + lcs

i = i - 1

j = j - 1

else if dp[i-1][j] > dp[i][j-1]:

i = i - 1

else:

j = j - 1

return lcs

**CODE:**

#include <stdio.h>

#include <string.h>

int max(int a, int b) {

    return (a > b) ? a : b;

}

void lcs(char X[], char Y[], int m, int n) {

    int L[m + 1][n + 1];

    int i, j;

    for (i = 0; i <= m; i++) {

        for (j = 0; j <= n; j++) {

            if (i == 0 || j == 0)

                L[i][j] = 0;

            else if (X[i - 1] == Y[j - 1])

                L[i][j] = L[i - 1][j - 1] + 1;

            else

                L[i][j] = max(L[i - 1][j], L[i][j - 1]);

        }

    }

    int index = L[m][n];

    char lcs[index + 1];

    lcs[index] = '\0';

    i = m;

    j = n;

    while (i > 0 && j > 0) {

        if (X[i - 1] == Y[j - 1]) {

            lcs[index - 1] = X[i - 1];

            i--;

            j--;

            index--;

        } else if (L[i - 1][j] > L[i][j - 1])

            i--;

        else

            j--;

    }

    printf("Longest Common Subsequence: %s\n", lcs);

}

int main() {

    char X[100], Y[100];

    printf("Name:Ananta Walli");

    printf("\nEnrollment Number:A2305221322");

    printf("\nEnter first string: ");

    gets(X);

    printf("Enter second string: ");

    gets(Y);

    int m = strlen(X);

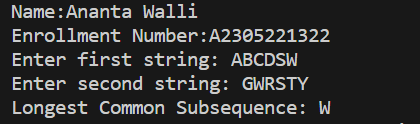
    int n = strlen(Y);

    lcs(X, Y, m, n);

    return 0;

}

**OUTPUT:**



**TIME COMPLEXITY:** If m and n are lengths of input string, the time complexity would be: O(m\*n).

**RESULT:** The above code implements LCS in C programming.