



# SHREE L. R. TIWARI COLLEGE OF ENGINEERING

Approved by AICTE & DTE, Maharashtra State & Affiliated to University of Mumbai, NAAC Accredited, NBA Accredited program,  
ISO 9001:2015 Certified | DTE Code No: 3423, Recognized under Section 2(f) of the UGC Act 1956, Minority Status (Hindi Linguistic)

Name: Gupta Santosh

Roll no.: 33 Div: A

Batch: A1

## **Program:**

```
#include <stdio.h>
```

```
void quicksort(int arr[], int p, int r);  
int partition(int arr[], int p, int r);`1
```

```
int main() {    int n;    printf("Enter the  
number of elements: ");    scanf("%d",  
&n);
```

```
    int arr[n];    printf("\nEnter the elements of  
the array: ");  
    for (int i = 0; i < n; i++) {  
        scanf("%d", &arr[i]);  
    }
```

```
    printf("\nArray before sorting: ");  
    for (int i = 0; i < n; i++) {  
        printf("%d ", arr[i]);  
    }
```

```
    int p = 0, r = n - 1;  
    quicksort(arr, p, r);
```

```
    printf("\nArray after sorting: ");  
    for (int i = 0; i < n; i++) {  
        printf("%d ", arr[i]);  
    }  
    return 0;  
}
```

```
void quicksort(int arr[], int p, int r) {  
    if (p < r) {        int q =  
partition(arr, p, r);  
quicksort(arr, p, q - 1);  
quicksort(arr, q + 1, r);  
    }
```

}



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Name: Ali Fareen Musafir

Roll no.: 03 Div: A

Batch: A1

```
int partition(int arr[], int p, int r) {
    int x = arr[r];    int i = p - 1;    int
    temp;    for (int j = p; j < r; j++) {
        if (arr[j] <= x) {            i++;
        temp = arr[i];            arr[i] =
        arr[j];            arr[j] = temp;
        }
    }
    temp = arr[i + 1];
    arr[i + 1] = arr[r];
    arr[r] = temp;    return
    i + 1;
}
```

## **Output:**

Enter the number of elements: 5

Enter the elements of the array: 5 6 8 12 59

Array before sorting: 5 6 8 12 59

Array after sorting: 5 6 8 12 59



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Name: Gupta Santosh

Roll no.: 33 Div: A

Batch: A1

## **Program:**

```
#include <stdio.h>
```

```
#include <stdlib.h>
```

```
typedef struct {  
    double value, weight, cost;  
} Item;
```

```
int compare(const void *a, const void *b) {  
    double r1 = ((Item *)a)->cost;  
    double r2 = ((Item *)b)->cost;  
    return (r2 > r1) - (r1 > r2);  
}
```

```
double fractionalKnapsack(int W, Item arr[], int n) {  
    for (int i = 0; i < n; i++)  
        arr[i].cost = arr[i].value / arr[i].weight;
```

```
    qsort(arr, n, sizeof(Item), compare);
```

```
    int i = 0;  
    double total = 0.0;
```

```
    while (i < n) {  
        if (arr[i].weight <= W) {  
            W -= arr[i].weight;  
            total += arr[i].value;  
        } else {  
            total += arr[i].value * ((double)W / arr[i].weight);  
            break;  
        }  
        i++;  
    }  
    return total;  
}
```

```
int main() {  
    int n, W;  
    printf("Enter number of items: ");  
    scanf("%d", &n);
```

```
    Item arr[n];
```



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```
printf("Enter weight and value for each item:\n");
for (int i = 0; i < n; i++)
    scanf("%lf %lf", &arr[i].weight, &arr[i].value);

printf("Enter maximum capacity of knapsack: ");
scanf("%d", &W);

double maxVal = fractionalKnapsack(W, arr, n);
printf("Maximum value in knapsack: %.2f\n", maxVal);

return 0;
}
```

## **Output:**

Enter number of items: 3

Enter weight and value for each item:

10 60

20 100

30 120

Enter maximum capacity of knapsack: 50

Maximum value in knapsack: 240.00



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Name: Gupta Santosh

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## **Program:**

```
#include<stdio.h>
#define INFINITY 9999
#define MAX 10

void dijkstra(int G[MAX][MAX],int n,int startnode);

int main()
{
    int G[MAX][MAX],i,j,n,u;
    printf("Enter no. of vertices:");
    scanf("%d",&n);
    printf("\nEnter the adjacency matrix:\n");

    for(i=0;i<n;i++)
        for(j=0;j<n;j++)
            scanf("%d",&G[i][j]);

    printf("\nEnter the starting node:");
    scanf("%d",&u);
    dijkstra(G,n,u);

    return 0;
}

void dijkstra(int G[MAX][MAX],int n,int startnode)
{
    int cost[MAX][MAX],distance[MAX],pred[MAX];
    int visited[MAX],count,mindistance,nextnode,i,j;

    //pred[] stores the predecessor of each node
    //count gives the number of nodes seen so far
    //create the cost matrix
    for(i=0;i<n;i++)
        for(j=0;j<n;j++)
            if(G[i][j]==0)
                cost[i][j]=INFINITY;
            else
                cost[i][j]=G[i][j];
```



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```
//initialize pred[],distance[] and visited[]
for(i=0;i<n;i++)
{
    distance[i]=cost[startnode][i];
    pred[i]=startnode;
    visited[i]=0;
}

distance[startnode]=0;
visited[startnode]=1;
count=1;

while(count<n-1)
{
    mindistance=INFINITY;

    //nextnode gives the node at minimum distance
    for(i=0;i<n;i++)
        if(distance[i]<mindistance&&!visited[i])
        {
            mindistance=distance[i];
            nextnode=i;
        }

    //check if a better path exists through nextnode
    visited[nextnode]=1;
    for(i=0;i<n;i++)
        if(!visited[i])
            if(mindistance+cost[nextnode][i]<distance[i])
            {
                distance[i]=mindistance+cost[nextnode][i];
                pred[i]=nextnode;
            }
    count++;
}

//print the path and distance of each node
for(i=0;i<n;i++)
    if(i!=startnode)
    {
        printf("\nDistance of node%d=%d",i,distance[i]);
        printf("\nPath=%d",i);
    }
```



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Batch: A1

```
j=i;
do
{
    j=pred[j];
    printf("<-%d",j);
}while(j!=startnode);
}
}
```

## **Output:**

Enter no. of vertices:4

Enter the adjacency matrix:

0 5 0 10

5 0 3 0

0 3 0 1

10 0 1 0

Enter the starting node:0

Distance of node1=5

Path=1<-0

Distance of node2=8

Path=2<-1<-0

Distance of node3=9

Path=3<-2<-1<-0



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Name: Gupta Santosh

Roll no.: 33 Div: A

Batch: A1

## **Program:**

```
#include <stdio.h>
```

```
#include <string.h>
```

```
void LCS_Length(char X[], char Y[], int m, int n, int c[][n+1], char b[][n+1]) {  
    for (int i = 0; i <= m; i++)  
        c[i][0] = 0;  
    for (int j = 0; j <= n; j++)  
        c[0][j] = 0;  
  
    for (int i = 1; i <= m; i++) {  
        for (int j = 1; j <= n; j++) {  
            if (X[i - 1] == Y[j - 1]) {  
                c[i][j] = c[i - 1][j - 1] + 1;  
                b[i][j] = '\\';  
            } else if (c[i - 1][j] >= c[i][j - 1]) {  
                c[i][j] = c[i - 1][j];  
                b[i][j] = '^';  
            } else {  
                c[i][j] = c[i][j - 1];  
                b[i][j] = '<';  
            }  
        }  
    }  
}
```

```
void Print_LCS(char b[][100], char X[], int i, int j) {  
    if (i == 0 || j == 0)  
        return;  
    if (b[i][j] == '\\') {  
        Print_LCS(b, X, i - 1, j - 1);  
        printf("%c", X[i - 1]);  
    } else if (b[i][j] == '^') {  
        Print_LCS(b, X, i - 1, j);  
    } else {  
        Print_LCS(b, X, i, j - 1);  
    }  
}
```

```
int main() {  
    char X[100], Y[100];
```





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```
printf("Enter the first string: ");
scanf("%s", X);

printf("Enter the second string: ");
scanf("%s", Y);

int m = strlen(X), n = strlen(Y);
int c[m+1][n+1];
char b[m+1][n+1];

LCS_Length(X, Y, m, n, c, b);

printf("The Longest Common Subsequence (LCS) is: ");
Print_LCS(b, X, m, n);
printf("\n");

return 0;
}
```

## **Output:**

Enter the first string: ABCBDAB

Enter the second string: BDCAB

The Longest Common Subsequence (LCS) is: BCAB



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## **Program:**

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
int a[30],count=0;
int place(int pos)
{
    int i;
    for(i=1;i<pos;i++)
    {
        if((a[i]==a[pos])||((abs(a[i]-
a[pos])==abs(ipos))))
        return 0; }
    return 1; }
    void print_sol(int n) {
    int i,j;
    count++; printf("\n\nSolution
    #d:\n",count);
    for(i=1;i<=n;i++) {
    for(j=1;j<=n;j++) {
    if(a[i]==j) printf("Q\t"); else
    printf("*\t");
    }
    printf("\n");
    }
    }
    void queen(int n) {
    int k=1; a[k]=0;
    while(k!=0) { a[k]=a[k]+1;
    while((a[k]<=n)&&!place(k
    )) a[k]++; if(a[k]<=n) {
    if(k==n) print_sol(n); else {
    k++; a[k]=0; }
    }
    else k--; }
    } void main() {
    int i,n;
    clrscr();
    printf("Enter the number of
    Queens\n");
    scanf("%d",&n);
    queen(n);
```



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```
printf("\nTotal solutions=%d",count);  
getch();  
}
```

## Output:

Enter the number of Queens 4

Solution #1:

```
*   Q   *   *  
*   *   *   Q  
Q   *   *   *  
*   *   Q   *
```

Solution #2:

```
*   *   Q   *  
Q   *   *   *  
*   *   *   Q  
*   Q   *   *
```

Total solutions=2



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Name: Gupta Santosh

Roll no.: 33 Div: A

Batch: A1

**Program:**

```
#include <stdio.h>
```

```
#include <string.h>
```

```
int main() {
```

```
    char txt[] =
```

```
"tutorialsPointisthebestplatformforprogrammers";
```

```
    char pat[] = "a";
```

```
    int M = strlen(pat);
```

```
    int N = strlen(txt);
```

```
    for (int i = 0; i <= N - M; i++) {
```

```
        int j;
```

```
        for (j = 0; j < M; j++) {
```

```
            if (txt[i + j] != pat[j]) {
```

```
                break;
```

```
            }
```

```
        }
```

```
        if (j == M) {
```

```
            printf("Pattern matches at index %d\n", i);
```

```
        }
```

```
    }
```

```
    return 0;
```

```
}
```



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## **Output:**

Pattern matches at 6

Pattern matches at 25

Pattern matches at 39



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Name: Gupta Santosh

Roll no.: 33 Div: A

Batch: A1

## **Program:**

```
#include <stdio.h>
```

```
#include <conio.h>
```

```
#include <string.h>
```

```
#define tonum(c) (c >= 'A' && c <= 'Z' ? c - 'A' : c - 'a' + 26)
```

```
int mod(int a, int p, int m) {
```

```
    int sqr;
```

```
    if (p == 0)
```

```
        return 1;
```

```
    sqr = mod(a, p / 2, m) % m;
```

```
    sqr = (sqr * sqr) % m;
```

```
    if (p & 1)
```

```
        return ((a % m) * sqr) % m;
```

```
    else
```

```
        return sqr;
```

```
}
```

```
int RabinKarpMatch(char *T, char *P, int d, int q) {
```

```
    int i, j, p, t, n, m, h, found;
```

```
    n = strlen(T);
```

```
    m = strlen(P);
```

```
    h = mod(d, m - 1, q);
```

```
    p = t = 0;
```

```
    // Preprocessing the pattern and the first window of the text
```

```
    for (i = 0; i < m; i++) {
```

```
        p = (d * p + tonum(P[i])) % q;
```

```
        t = (d * t + tonum(T[i])) % q;
```

```
    }
```

```
    // Searching the pattern in the text
```

```
    for (i = 0; i <= n - m; i++) {
```

```
        if (p == t) {
```

```
            found = 1;
```

```
            // Check if the pattern matches character by character
```

```
            for (j = 0; j < m; j++) {
```



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```
        if (P[j] != T[i + j]) {
            found = 0;
            break;
        }
    }

    if (found)
        return i;
    } else {
        // Update t for the next window
        t = (d * (t - ((tonum(T[i]) * h) % q)) + tonum(T[i + m])) % q;
    }
}

return -1;
}

void main() {
    char str[100], p[100];
    int ans, q;

    clrscr();

    printf("\n Enter String: ");
    gets(str);

    printf("\n Enter Pattern you want to search in the string: ");
    gets(p);

    printf("\n Enter value of q: ");
    scanf("%d", &q);

    ans = RabinKarpMatch(str, p, 10, q);

    if (ans == -1)
        printf("\n Pattern is not found.");
    else
        printf("\n Pattern is found at displacement: %d", ans);

    getch();
}
```



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## **Output:**

Enter String: Rabin karp algorithm for pattern matching

Enter Pattern you want to search into string: pattern

Enter value of q: 11

Pattern is found at displacement: 25





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T = Text

1 0 1 1 1 0 1 1 1 0

S=0

1 1 1

P = Pattern

1 0 1 1 1 0 1 1 1 0

S=1

1 1 1

1 0 1 1 1 0 1 1 1 0

S=2

1 1 1

So, S=2 is a Valid Shift

1 0 1 1 1 0 1 1 1 0

S=3

1 1 1

1 0 1 1 1 0 1 1 1 0

S=4

1 1 1

1 0 1 1 1 0 1 1 1 0

S=5

1 1 1

1 0 1 1 1 0 1 1 1 0

S=6

1 1 1



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