```cpp
#include<iostream>
#define MAXN 20

using namespace std;

void OptimalBST(int Keys[],int p[],int q[],int c[][MAXN],int w[][MAXN],int r[][MAXN],int n)
{
    int l,i,j,k,min,minK,sum;

    for(l=1;l<=n+1;l++)
    {
        for(i=0;i<=(n+1)-l;i++)
        {
            j = i + l - 1;
            if(i==j)
            {
                w[i][j] = q[i];
            }
            else
            {
                w[i][j] = w[i][j-1] + q[j] + p[j];
            }
        }
    }

    for(l=1;l<=n+1;l++)
    {
        for(i=0;i<=(n+1)-l;i++)
        {
            j = i + l - 1;
            if(i==j)
            {
                c[i][j] = r[i][j] = 0;
            }
            else
            {
                min = 99999;
                minK = -1;
                for(k=i+1;k<=j;k++)
                {
                    sum = c[i][k-1] + c[k][j] + w[i][j];
                    if(sum<min)
                    {
                        min = sum;
                        minK = k;
                    }
                }
                c[i][j] = min;
                r[i][j] = minK;
            }
        }
    }
}

int main()
{
    int i,j;
```

```

/*  int Keys[MAXN] = {0, 15, 32, 39, 41, 59};
    int p[MAXN] = {0, 5, 2, 6, 3, 5};
    int q[MAXN] = {4, 8, 11, 2, 9, 3};
    int n = 5;
/*
/*  int Keys[MAXN] = {0, 10, 20, 30, 40};
    int p[MAXN] = {0, 3, 3, 1, 1};
    int q[MAXN] = {2, 3, 1, 1, 1};
    int n = 4;
*/

    int Keys[MAXN] = {0, 10, 20, 30, 40};
    int p[MAXN] = {0, 1, 4, 2, 1};
    int q[MAXN] = {4, 2, 4, 1, 1};
    int n = 4;

    int c[MAXN][MAXN];
    int w[MAXN][MAXN];
    int r[MAXN][MAXN];

    float totalProb=0;
    for(i=0;i<=n;i++)
    {
        totalProb += p[i];
        totalProb += q[i];
    }
    OptimalBST(Keys,p,q,c,w,r,n);

    //Printing c,w and r table
    cout<<"\n\nMatrix - w\n";
    for(i=0;i<=n;i++)
    {
        for(j=i;j<=n;j++)
        {
            cout<<"\t"<<w[i][j];
        }
        cout<<"\n";
    }


    cout<<"\n\nMatrix - c\n";
    for(i=0;i<=n;i++)
    {
        for(j=i;j<=n;j++)
        {
            cout<<"\t"<<c[i][j];
        }
        cout<<"\n";
    }

    cout<<"\n\nMatrix - r\n";
    for(i=0;i<=n;i++)
    {
        for(j=i;j<=n;j++)
        {
            cout<<"\t"<<r[i][j];
        }
        cout<<"\n";
    }
```

```cpp

    cout<<"\n\nOptimal Cost: "<<(c[0][n]/totalProb);

}
```