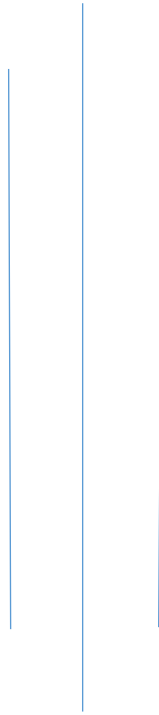


Project report on “Mesh analysis of electric circuit”



Submitted To:

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Introduction:

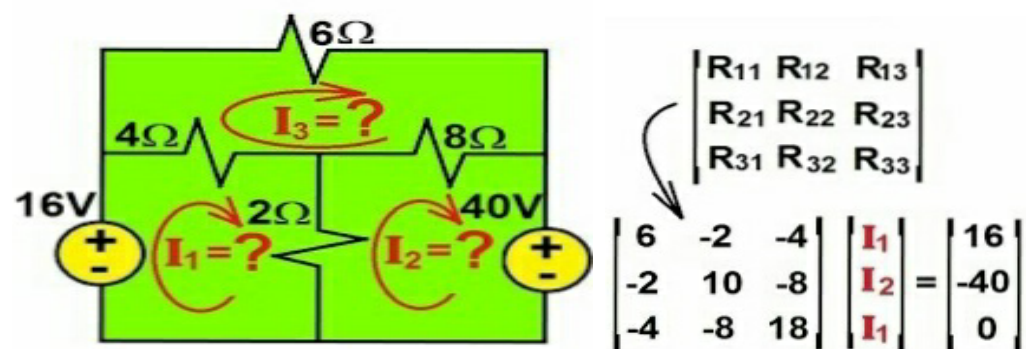
- A program is a set of instructions or commands that is arranged in a sequence to guide a computer to find solution for the given problem .The process of developing and implementing computer programs to solve a problem is known as Computer programming. C is a general purpose programming language that is extremely popular, simple and flexible. Programming in C can help to solve complex problems in simpler and easier way.

Being an electrical engineer, we have to deal with complex electrical circuit in our every further step. To solve such circuit without any help is time consuming and confusing. As we know every second is very important in this modern and technological age, we try our best to save time as far as possible. So for better accuracy and save time we decided to make a program on mesh analysis of any electrical circuit.

In mesh analysis we can find the current flowing in the different branches of the circuit , voltage drop across any resistor and power consumed by it . We have made a program by using different user defined function in which current through any resistor can be calculated easily with accuracy which will also saved our time.

In this program we have solved the mesh analysis by using matrix method. After taking all the input from user we will store it and calculate the determinant and value of current through different resistor will be calculated with their direction.

Let us take an example of an electric circuit:



In the above circuit we have to find the unknown current which can be calculated by using the kirchoff's current and voltages law . But in our further studies we have to deal with the complex electric circuit having more no of meshes which will be difficult to solve by us using equation. So to minimize such difficulty we have designed a program to solve such circuit easily and efficiently and source code of program and output for above circuit are as follows :

(This program is not suitable for supermesh only which is only limitation of this program.)

```

#include <stdio.h>
#include <stdlib.h>
#include <math.h>
#include <conio.h>
#define SIZE 50
float absof(float x)
{
    int n=(int)x;
    if(n>=0)
        return (x);
    else
    {
        x=x*(-1);
        return (x);
    }
}

//THIS IS THE CODE FOR THE CALCULATION OF DETERMININANT
int determinant( int matrix[50][50], int n) {
    int det = 0;
    int submatrix[50][50];
    if (n == 2)
        return ((matrix[0][0] * matrix[1][1]) - (matrix[1][0] *
matrix[0][1]));
    else
    {
        for (int x = 0; x < n; x++)
        {
            int subi = 0;
            for (int i = 1; i < n; i++)
            {
                int subj = 0;
                for (int j = 0; j < n; j++)
                {
                    if (j == x)
                        continue;
                    submatrix[subi][subj] = matrix[i][j];
                    subj++;
                }
            }

```

```

        subi++;
    }
    det = det + (pow(-1, x) * matrix[0][x] *
determinant( submatrix, n - 1 ));
    }
}
return det;
}
//THIS IS THE CODE FOR THE INPUT OF VOLTAGES
void voltage(float v[],int m)
{
    int i;
    float cv[50],ncv[50];
    for(i=0;i<m;++i)
    {
        printf("\nEnter voltage in direction of current in loop no %d
",i+1);
        scanf("%f",&cv[i]);
    }
    for(i=0;i<m;++i)
    {
        printf("\nEnter voltage opposite to direction of current in loop
no %d ",i+1);
        scanf("%f",&ncv[i]);
    }
    for(i=0;i<m;++i)
    {
        v[i]=cv[i]-ncv[i];
    }

    for(i=0;i<m;++i)
    {
        printf("\nVoltages of mesh %d:",i+1);
        printf("%.3f Volt",v[i]);
    }
    printf("\n\n\n");
}

```

```

int main()
{
int temp[100],st[100];
int mesh,i,j,cm;
int m;
float current[100];

printf("HELLO USER !!! You are in the program which can calculate
current flowing in any resistor and simplest loop(mesh)of any
complicated circuit.\nNOTE: Mesh is the simplest loop which doesn't
contain any futher loop inside it.\n");
printf("\n\nEnter the no of meshes:");
scanf("%d",&mesh);
int a[SIZE][SIZE];
// THIS CODE IS THE INPUT FOR RESISTANCE
for(i=0;i<mesh;i++)
{
    for (j=0;j<=i;j++)
    {
        if (i==j)
        {
            printf("Enter total resistance   of loop %d :",i+1);

            scanf("%d",&a[i][j]);
        }
        else
        {
            printf("Enter the common resistance of loop %d and loop
%d :",i+1,j+1);
            scanf("%d",&cm);
            a[i][j]=cm*(-1);
        }
    }
}
for(i=0;i<mesh;i++)
{
    for(j=0;j<mesh;j++)
    {
        if(i<j)
            a[i][j]=a[j][i];
    }
}
}

```

```

        }
    }
    printf("\nResistance:\n");
    for(i=0;i<mesh;i++)
    {
        for(j=0;j<mesh;++j)
        {
            printf("%d ",a[i][j]);
        }
        printf("\n");
    }

```

```

float v[SIZE];
voltage(v,mesh);

```

```

    m=determinant(a,mesh);

```

```

for (i=0;i<mesh;i++)
{
    for(j=0;j<mesh;j++)
    {
        temp[j]=a[j][i];
    }
}

```

a[j][i]=v[j];//THIS IS THE PART WHERE COLUMN OF RESISTANCES IS SWAPED BY VOLTAGES

```

    }
    int x;
    st[i]=determinant(a,mesh);//THIS IS THE PART WHERE CALCULATED DELTA 1,2,3,...GETS STORED

```

```

    for( x=0;x<mesh;x++)
        a[x][i]=temp[x];
}
for(i=0;i<mesh;i++)
{
    current[i]=(float)st[i]/m;
}
for(i=0;i<mesh;i++)

```

```

{
    for(j=0;j<=i;j++)
    {
        if (i==j)
        {
            if(current[i]<0)
                printf("Current flowing in the loop %d =%.3f A, but
opposite in direction of assigned current\n",i+1,current[i]*(-1));
            else
                printf("Current flowing in the loop %d = %.3f A, in
the same direction of assigned current\n",i+1,current[i]);
        }
        else if(a[i][j]==0)
            printf("There is no resistance common loop %d and loop
%d\n ",i+1,j+1);
        else
        {
            if(absof(current[i]-current[j])<0)

            {
                printf("Current flowing in the common resistance %d of loop
%d and %d = %.3f A, in the direction of current assigned in loop
%d\n",a[i][j]*(-1),i+1,j+1,absof(current[i]-current[j])*(-1),j+1);
            }
            else
                printf("\nCurrent flowing in the common resistance of %d
of loop %d and %d = %.3f A, in the direction of current assigned in loop
%d\n",a[i][j]*(-1),i+1,j+1,absof(current[i]-current[j]),i+1);
        }
    }
    printf ("\nThank you");
    return 0;
}

```


Output :

The answers of above circuit by above program is :

```
Select C:\Users\Puskar\Documents\srp.exe
HELLO USER !!! You are in the program which can calculate current flowing in any resistor
and simplest loop(mesh)of any complicated circuit.
NOTE: Mesh is the simplest loop which doesn't contain any further loop inside it.

Enter the no of meshes:3
Enter total resistance of loop 1 :6
Enter the common resistance of loop 2 and loop 1 :2
Enter total resistance of loop 2 :10
Enter the common resistance of loop 3 and loop 1 :4
Enter the common resistance of loop 3 and loop 2 :8
Enter total resistance of loop 3 :18

Resistance:
6 -2 -4
-2 10 -8
-4 -8 18

Enter voltage in direction of current in loop no 1
16

Enter voltage in direction of current in loop no 2 0
Enter voltage in direction of current in loop no 3 0

Enter voltage opposite to direction of current in loop no 1 0
Enter voltage opposite to direction of current in loop no 2 40
Enter voltage opposite to direction of current in loop no 3 0
```

```
C:\Users\Puskar\Documents\srp.exe
Voltages of mesh 1:16.000 Volt
Voltages of mesh 2:-40.000 Volt
Voltages of mesh 3:0.000 Volt

Current flowing in the loop 1 =2.571 A, but opposite in direction of assigned current
Current flowing in the common resistance of 2 of loop 2 and 1 = 5.143 A, in the direction
of current assigned in loop 2
Current flowing in the loop 2 =7.714 A, but opposite in direction of assigned current
Current flowing in the common resistance of 4 of loop 3 and 1 = 1.429 A, in the direction
of current assigned in loop 3
Current flowing in the common resistance of 8 of loop 3 and 2 = 3.714 A, in the direction
of current assigned in loop 3
Current flowing in the loop 3 =4.000 A, but opposite in direction of assigned current

Thank you
Process returned 0 (0x0) execution time : 41.022 s
Press any key to continue.
```

THANK YOU

The End.