EXP.NO :2(b)
DATE:

FORMATION OF BUS IMPEDANCE MATRICES

AIM: To determine the impedances matrices for the given power system network

SOFTWARE REQUIRED: MATLAB/MIPOWER

THEORY:

FORMATION OF Z-BUS MATRIX

In bus impedance matrix the elements on the main diagonal are called driving point impedance and the off-diagonal elements are called the transfer impedance of the buses or nodes. The bus impedance matrix are very useful in fault analysis.

The bus impedance matrix can be determined by two methods. In one method we can form the bus admittance matrix and than taking its inverse to get the bus impedance matrix. In another method the bus impedance matrix can be directly formed from the reactance diagram and this method requires the knowledge of the modifications of existing bus impedance matrix due to addition of new bus or addition of a new line (or impedance) between existing buses

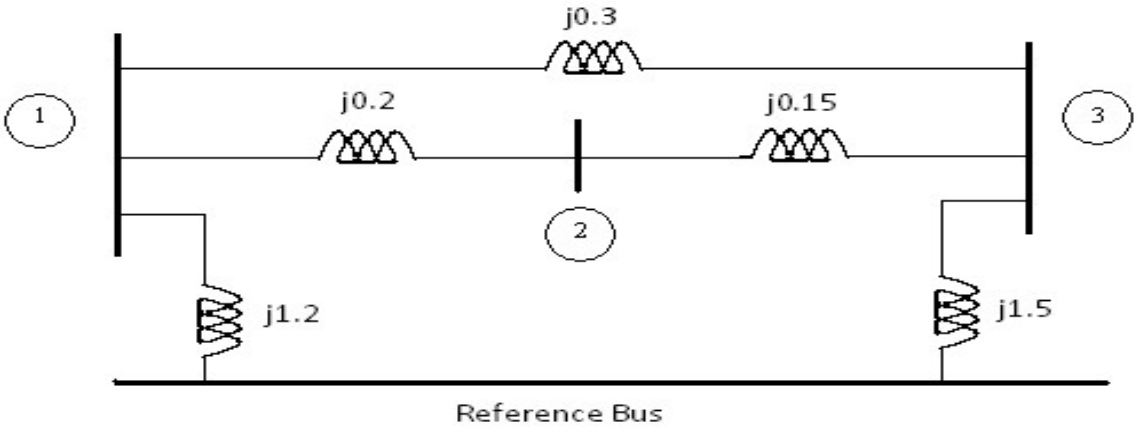
PROCEDURE :

1. Enter the command window of the MATLAB.
2. Create a new M – file by selecting File - New – M – File
3. Type and save the program.
4. Execute the program by either pressing Tools – Run.
5. View the results.

EXERCISES :

(i) Determine the and Z bus matrix for the power system network shown in fig.

(ii) Check the results obtained in using MATLAB.



PROGRAM :

```
%Formation of Impedance Bus Matrix by Bus Building Algorithm
nb=input('enter the no of buses');
nl=input('enter the no of lines');
disp('');
zn=zeros(nb,nb);
ord=0;
for i=1:nl
    z0=zn;
    disp('enter 1 for line between new bus and reference bus:');
    disp('enter 2 for line between exsisting bus and new bus:');
    disp('enter 3 for line between exsisting bus and reference bus:');
    disp('enter 4 for line between two exsisting buses :');
    ch=input('enter the choice');
    zb=input('enter the branch impedance:');
%calc
  switch ch
      case 1
          ord=ord+1;
          zn(ord,ord)=zb
      case 2
          j=input('enter the exsisting bus no:');
```

```
        k=input('enter the new bus no:');
        for x=1:ord
            zn(x,(ord+1))=z0(x,j);
            zn((ord+1),x)=zn(x,(ord+1));
        end
        ord=ord+1;
        zn(ord,ord)=zb+zn(j,j)
    case 3
        j=input('enter the exsisting bus no:');
        t=zn(j,j)+zb;
        zt1=zeros(ord,1);
        zt2=zeros(1,ord);
        for i=1:ord
 zt1(i)=zn(i,j);

zt2(i)=zn(j,i);
 end
zn=z0-((zt1*zt2)/t)
 case 4
        i=input('enter the first exsisting bus no:');
        j=input('enter the second exsisting bus no:');
        t=zb+zn(i,i)+zn(j,j)-2*zn(i,j);
        zt1=zeros(ord,1);
        zt2=zeros(1,ord);
        for k=1:ord
            zt1(k)=zn(k,i)-zn(k,j);
            zt2(k)=zn(i,k)-zn(j,k);
        end
zn=z0-((zt1*zt2)/t)
 %output
 zn
 end
end
```

Procedure to enter data for performing studies using Mipower:

1. Draw single line diagram and enter data simultaneously in database manager.
2. Open power system network editor. Select menu option Database-configure. Configure database dialog box is popped up. Click browse button.
3. The elements can be selected from the power system tool bar.
4. The element ID can be selected by double click the element in the file. Enter the details of the elements in detailed form.
5. Save and close the library screen.
6. To solve bus admittance matrix choose menu option solve-Ybus and Zbus.
7. Enter the number of buses and number of lines.
8. Enter details of buses and line values.
8. Click execute and Zbus will be executed.
9. Click on report to view the report.

Result: The results obtained for Zbus using Mipower software was verified.

RESULT :

Thus the impedance matrix for the given power system network was determined.