Practical - 5

Gauss Jacobi Method:-

```
n = 3;
a = {{5, 2, 1}, {3, 7, 4}, {1, 1, 9}};
MatrixForm [a]
x = {0, 0, 0}
y = {0, 0, 0}
b = {10, 21, 12}
For [k = 1, k ≤ 25, k++,
 For[i = 1, i ≤ n, i++,
  y[[i]] =
           (b[[i]] - Sum[a[[i, j]] * x[[j]], {j, 1, i - 1}] -
      Sum[a[[i, j]] * x[[j]], {j, i + 1, n}]) / a[[i, i]]];
 For[m = 1, m ≤ n, m++, x[[m]] = N[y[[m]]]]]
        For[p = 1, p ≤ n, p++, Print["x[", p, "]=", x[[p]]]]
```

$$\begin{pmatrix} 5 & 2 & 1 \\ 3 & 7 & 4 \\ 1 & 1 & 9 \end{pmatrix}$$

```
{0, 0, 0}

{0, 0, 0}

{10, 21, 12}

x[1]=1.

x[2]=2.

x[3]=1.
```

```
n = 3;
a = {{6, -2, -1}, {1, 5, 1}, {2, 1, 4}};
MatrixForm [a]
x = {0, 0, 0}
y = {0, 0, 0}
b = {4, 3, 27}
For [k = 1, k ≤ 25, k++,
 For[i = 1, i ≤ n, i++,
  y[[i]] =
           (b[[i]] - Sum[a[[i, j]] * x[[j]], {j, 1, i - 1}] -
      Sum[a[[i, j]] * x[[j]], {j, i + 1, n}]) / a[[i, i]]];
 For[m = 1, m ≤ n, m++, x[[m]] = N[y[[m]]]]]
        For[p = 1, p ≤ n, p++, Print["x[", p, "]=", x[[p]]]]
```

$$\begin{pmatrix} 6 & -2 & -1 \\ 1 & 5 & 1 \\ 2 & 1 & 4 \end{pmatrix}$$

```
{0, 0, 0}

{0, 0, 0}

{4, 3, 27}

x[1]=1.40157

x[2]=-0.937008

x[3]=6.28346
```

```
n = 3;
a = {{10, -5, -2}, {4, -10, 32}, {1, -6, 10}};
MatrixForm [a]
x = {0, 0, 0}
y = {0, 0, 0}
b = {3, -3, -3}
For [k = 1, k ≤ 25, k++,
 For[i = 1, i ≤ n, i++,
  y[[i]] =
           (b[[i]] - Sum[a[[i, j]] * x[[j]], {j, 1, i - 1}] -
      Sum[a[[i, j]] * x[[j]], {j, i + 1, n}]) / a[[i, i]]];
 For[m = 1, m ≤ n, m++, x[[m]] = N[y[[m]]]]]
        For[p = 1, p ≤ n, p++, Print["x[", p, "]=", x[[p]]]]
```

$$\begin{pmatrix} 10 & -5 & -2 \\ 4 & -10 & 32 \\ 1 & -6 & 10 \end{pmatrix}$$

```
{0, 0, 0}

{0, 0, 0}

{3, -3, -3}

x[1]=-1887.15

x[2]=-79.0264

x[3]=-2239.69
```

Gauss Seidal Method:-

```
n = 3;
a = {{5, 2, 1}, {3, 7, 4}, {1, 1, 9}};
MatrixForm [a]
x = {0, 0, 0}
y = {0, 0, 0}
b = {10, 21, 12}
For[k = 1, k ≤ 25, k++,
 For[i = 1, i ≤ n, i++,
  y[[i]] = (b[[i]] - Sum[a[[i, j]] * y[[j]], {j, 1, i - 1}] - Sum[a[[i, j]] * x[[j]],

        {j, i + 1, n}]) / a[[i, i]]];
 For[m = 1, m ≤ n, m++, x[[m]] = N[y[[m]]]]
For[p = 1, p ≤ n, p++, Print["x[", p, "]=", x[[p]]]]
```

$$\begin{pmatrix} 5 & 2 & 1 \\ 3 & 7 & 4 \\ 1 & 1 & 9 \end{pmatrix}$$

```
{0, 0, 0}

{0, 0, 0}

{10, 21, 12}

x[1]=1.

x[2]=2.

x[3]=1.
```

```
n = 3;
a = {{6, -2, -1}, {1, 5, 1}, {2, 1, 4}};
MatrixForm [a]
x = {0, 0, 0}
y = {0, 0, 0}
b = {4, 3, 27}
For[k = 1, k ≤ 8, k++,
 For[i = 1, i ≤ n, i++,
  y[[i]] = (b[[i]] - Sum[a[[i, j]] * y[[j]], {j, 1, i - 1}] - Sum[a[[i, j]] * x[[j]],

        {j, i + 1, n}]) / a[[i, i]]];
 For[m = 1, m ≤ n, m++, x[[m]] = N[y[[m]]]]
For[p = 1, p ≤ n, p++, Print["x[", p, "]=", x[[p]]]]
```

$$\begin{pmatrix} 6 & -2 & -1 \\ 1 & 5 & 1 \\ 2 & 1 & 4 \end{pmatrix}$$

```
{0, 0, 0}

{0, 0, 0}

{4, 3, 27}

x[1]=1.40163

x[2]=-0.937038

x[3]=6.28344
```

```
n = 3;
a = {{10, -5, -2}, {4, -10, 32}, {1, -6, 10}};
MatrixForm [a]
x = {0, 0, 0}
y = {0, 0, 0}
b = {3, -3, -3}
For[k = 1, k ≤ 8, k++,
 For[i = 1, i ≤ n, i++,
  y[[i]] = (b[[i]] - Sum[a[[i, j]] * y[[j]], {j, 1, i - 1}] - Sum[a[[i, j]] * x[[j]],

        {j, i + 1, n}]) / a[[i, i]]];
 For[m = 1, m ≤ n, m++, x[[m]] = N[y[[m]]]]
For[p = 1, p ≤ n, p++, Print["x[", p, "]=", x[[p]]]]
```

$$\begin{pmatrix} 10 & -5 & -2 \\ 4 & -10 & 32 \\ 1 & -6 & 10 \end{pmatrix}$$

```
{0, 0, 0}

{0, 0, 0}

{3, -3, -3}
```

```
x[1]=-8.95741

x[2]=-31.694

x[3]=-18.4207
```