Question 1:-

1)Thomas Algorithm

l=[0 1 1 1]

d=[-2 -4 -4 -2]

u=[1 1 1 0]

b=[3 1 -2 2]

Solution=[-1.8444 -0.6889 0.0889 -0.9556]

2)Gaussian Elimination with partial pivoting.

A=[9.3746, 3.0416, -2.4371
3.0416, 6.1832, 1.2163
-2.4371, 1.2163, 8.4429]

b=[9.2333 8.2409 3.9339]

x=[0.893 0.7728 0.6125]

3)Inverse using Gauss-Jordan:-

A=[10 7 8 7
7 5 6 5

8 6 10 9

7 5 9 10]

A^-1=[25.0000 -41.0000 10.0000 -6.0000
-41.0000 68.0000 -17.0000 10.0000
10.0000 -17.0000 5.0000 -3.0000
-6.0000 10.0000 -3.0000 2.0000]

4)LU Decomposition:-

3

4 1 0

1 4 1

0 1 4

Chloesky:-

L= 2.0000 0 0

0.5000 1.9365 0

0 0.5164 1.9322

U=2.0000 0.5000 0

0 1.9365 0.5164

0 0 1.9322

ii)3

9.3746 3.0416 -2.4371

3.0416 6.1832 1.2163

-2.4371 1.2163 8.4429

Doolittle:-

$$L = \begin{bmatrix} 1.0000 & 0 & 0 \\ 0.3245 & 1.0000 & 0 \\ -0.2600 & 0.3862 & 1.0000 \end{bmatrix}$$

$$U = \begin{bmatrix} 9.3746 & 3.0416 & -2.4371 \\ 0 & 5.1963 & 2.0070 \\ 0 & 0 & 7.0341 \end{bmatrix}$$

Crout:-

$$L = \begin{bmatrix} 9.3746 & 0 & 0 \\ 3.0416 & 5.1963 & 0 \\ -2.4371 & 2.0070 & 7.0341 \end{bmatrix}$$

$$U = \begin{bmatrix} 1.0000 & 0.3245 & -0.2600 \\ 0 & 1.0000 & 0.3862 \\ 0 & 0 & 1.0000 \end{bmatrix}$$

Question 2:-

1)n=4
A=[2 -1 0 0
-1 4 -1 0
0 -1 4 -1
0 0 -1 2]
e%=0.001
Power Method=3.618033

QR Decomposition method=5.302776 3.618034 1.697224 1.381966

2)n=3
A=[7 -2 1
-2 10 -2
1 -2 7]
e%=0.01

Power Method=6.000000

QR Decomposition method=12.000000 6.000000
6.000000

3)n=3
A=3 4 1
  3 5 1
  2 2 1
e%=0.01
Power Method=8.156855
QR Decomposition method=8.156856 0.656363 0.186781