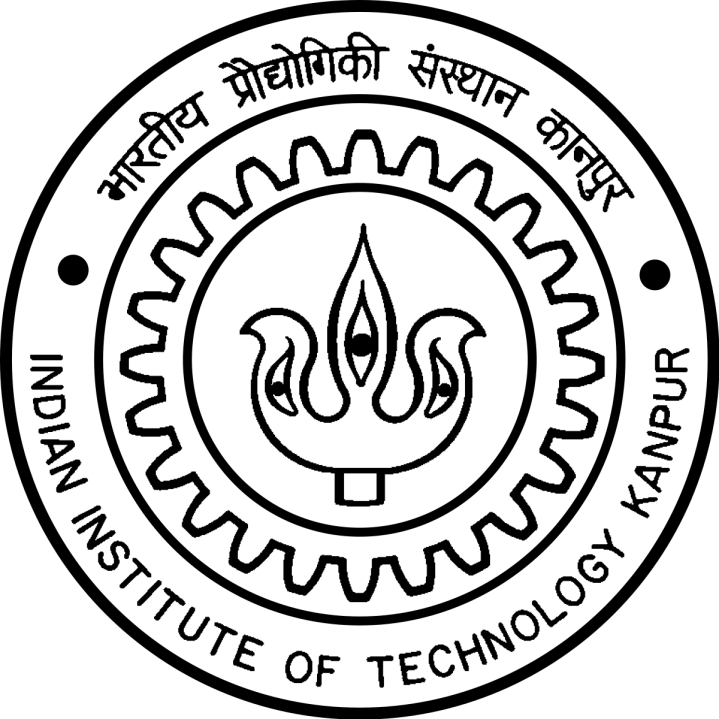
**ESO-208A**

**Computational Methods in Engineering**



Programming Assignment – 2

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**PROGRAM -1**

**Matrices From PS-3**

**Problem. 4**

Input

n = 3

Matrix A= 9.3746 3.0416 -2.4371

3.0416 6.1832 1.2163

-2.4371 1.2163 8.4429

b = [9.2333 8.2049 3.9339]

Output

1. Solution using gauss elimination with partial pivoting :

X = [0.896424 0.765130 0.614475]

1. Cholesky method with full pivoting

Column and row changes

1. swap row 3 with 2
2. swap column 3 with 2

L matrix :

L = 3.061797 0.000000 0.000000

-0.795971 2.794518 0.000000

0.993404 0.718199 2.163455

1. Crout’s method with full pivoting

Column and row changes

1. swap row 3 with 2
2. swap column 3 with 2

L matrix :

L = 9.374600 0.000000 0.000000

-2.437100 7.809331 0.000000

3.041600 2.007020 4.680540

U Matrix :

U = 1.000000 -0.259968 0.324451

0.000000 1.000000 0.257003

0.000000 0.000000 1.000000

1. Doolittles’s method with full pivoting

Column and row changes

1. swap row 3 with 2
2. swap column 3 with 2

L matrix :

L = 1.000000 0.000000 0.000000

-0.259968 1.000000 0.000000

0.324451 0.257003 1.000000

U Matrix :

U = 9.374600 -2.437100 3.041600

0.000000 7.809331 2.007020

0.000000 0.000000 4.680540

5.) Gauss Jordan

Inverse of A

0.148033 -0.083594 0.054773

-0.083594 0.213651 -0.054909

0.054773 -0.054909 0.142164

**Problem. 5**

Input

n = 3

Matrix A= 9 3 -2

3 6 1

-2 1 9

Output

1. Cholesky method with full pivoting

Column and row changes

1. swap row 3 with 2

2) swap column 3 with 2

L matrix :

L = 3.000000 0.000000 0.000000

-0.666667 2.924988 0.000000

1.000000 0.569803 2.162250

**Problem. 6**

Input

n = 4

l = [0 1 1 1]

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

u= [1 1 1 0]

b= [3 1 2 -2]

Output

Thomas Algorithm

Solution Vector

X = [-1.933333 -0.866667 -0.533333 0.733333]

**Problem. 10**

Input

n = 4

Matrix A= 10 7 8 7

7 5 6 5

8 6 10 9

7 5 9 10

Output

Cholesky method with full pivoting

Column and row changes

1. swap row 3 with 2
2. swap column 3 with 2
3. swap row 4 with 3
4. swap column 4 with 3

L matrix :

L = 3.162278 0.000000 0.000000 0.000000

2.529822 1.897367 0.000000 0.000000

2.213594 1.791957 1.374369 0.000000

2.213594 0.210819 -0.202113 0.121268

**PROGRAM -2**

**Matrices From PS-4**

**Problem. 6**

Input

n = 4

Matrix A= 2 -1 0 0

-1 4 -1 0

0 -1 4 -1

0 0 -1 2

Maximum error % =0.001

Output

1. Power Method

Largest Eigen Value = 5.302749

1. QR decomposition using Gram-Schmidt Process

Eigen Values = [5.302776, 3.618034, 1.697204, 1.381987]

**Problem. 7**

Input

n = 3

Matrix A= 7 -2 1

-2 10 -2

1 -2 7

Maximum error % =0.001

Output

1. Power Method

Largest Eigen Value = 11.999971

1. QR decomposition using Gram-Schmidt Process

Eigen Values = [11.99999, 6.000007, 6.000000]

**Problem. 8**

Input

n = 3

Matrix A= 3 4 1

3 5 1

2 2 1

Maximum error % =0.001

Output

1. Power Method

Largest Eigen Value = 8.156855

1. QR decomposition using Gram-Schmidt Process

Eigen Values = [8.156856, 0.6563630, 0.1867809]