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63/2 (SEM-3) MAT 304

2021

(held in 2022)

MATHEMATICS

(Theory Paper)

Paper Code : MAT-304

(Numerical Analysis)

Full Marks – 80

Time – Three hours

The figures in the margin indicate full marks
for the questions.

1. Answer any *two* of the following questions :

10×2=20

(a) Apply LU decomposition method to solve the
equations :

$$3x + 2y + 7z = 4 ;$$

$$2x + 3y + z = 5 ;$$

$$3x + 4y + z = 7.$$

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(b) Apply Crout's method to solve the equations :

$$5x_1 + 4x_2 + x_3 = 3.4 ;$$

$$10x_1 + 9x_2 + 4x_3 = 8.8 ;$$

$$10x_1 + 13x_2 + 15x_3 = 19.2.$$

(c) Apply Cholesky's method to solve the equations :

$$4x_1 + 10x_2 + 8x_3 = 44 ;$$

$$10x_1 + 26x_2 + 26x_3 = 128 ;$$

$$8x_1 + 26x_2 + 61x_3 = 214.$$

2. Answer any *two* of the following : $10 \times 2 = 20$

(a) Solve, by Jacobi's iteration method, the equations :

$$20x + y - 2z = 17 ;$$

$$3x + 20y - z = -18 ;$$

$$2x - 3y + 20z = 25.$$

(b) Solve, by Relaxation method, the equations :

$$9x - 2y + z = 50 ;$$

$$x + 5y - 3z = 18 ;$$

$$-2x + 2y + 7z = 19.$$

(c) Write in brief about Escalator method.

3. Answer any *two* of the following : $10 \times 2 = 20$

(a) Determine the largest eigen value and the corresponding eigen vector of the matrix

$$\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}.$$

(b) Using Jacobi's method, find all the eigen values and the eigen vectors of the matrix

$$A = \begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix}.$$

(c) Write in brief about Power Method.

4. Answer any *two* of the following : 10×2=20

(a) Using Given's method, reduce the following matrix to the tri-diagonal form :

$$A = \begin{bmatrix} 2 & 1 & 3 \\ 1 & 4 & 2 \\ 3 & 2 & 3 \end{bmatrix}$$

(b) Write about QR decomposition with Gram-Schmidt with an example.

(c) Write in brief about Given's method.