EC 1st

SNPSU

SAPTHAGIRI NPS UNIVERSITY

BE 1st Semester 2024-25

First Internal Assessment Test

Course Code: 24BEELY102

Course: Linear Algebra and Calculus

Semester: I

SRN:

Duration: 1.5 hours

Max Marks: 50

PART –A

Answer any Ten of the following **2x10=20**

1. Define Equivalent matrices.
2. If $y = tan^{-1}x$, find the second order derivative.
3. Solve the following system of linear equations using Gauss elimination method

   $x - y = 2;\ \ 2x + y = 5$
4. Use Rayleigh power method to find the new vector $X^{(1)}$ for $A = \begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$
5. Using Gauss-Seidel iteration method find 1st iteration

   $5x - y = 9;\ x - 5y + 2 = -4;\ \ y - 5z = 6$
6. Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$
7. Write the n^{th} order derivative of $e^{ax}sin(bx + c)$
8. Write the formula for the angle between radius vector and tangent vector.
9. Write the working procedure to find the rank of a matrix.
10. Write the condition for the polar curves cut orthogonally.
11. Write the n^{th} derivative of $log(ax + b)$
12. Find the n^{th} order derivative of $y = a^{3x}$

PART –B

Answer any Four of the following **5 x 4 =20**

1. Find the rank of the matrix by row elementary transformation.

$$\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$$

2. Solve the following system of equations by Gauss Elimination Method

$x + y + z = 9; x - 2y + 3z = 8; 2x + y - z = 3$

3. Solve the following system of equations by Gauss Jordan Method

$2x + 5y + 7z = 52; 2x + y + z = 0; x + y + z = 9$

4. Find the angle between the radius vector and tangent to the curve

$r^m = a^m(\cos m\theta + \sin m\theta)$

5. Show that the following pairs of curves intersect each other orthogonally

$r = a(1 + \cos\theta) and\ r = b(1 - \cos\theta)$

PART – C

Answer any One of the following **10 x 1=10**

1. Solve the following system of equations by Gauss seidel Method

$20x + y - 2z = 17; 3x + 20y - z = -18; 2x - 3y + 20z = 25$

2. If $y^{1/m} + y^{-1/m} = 2x$ then prove that

$(x^2 - 1)y_{n+2} + (2n + 1)xy_{n+1} + (n^2 - m^2)y_n = 0$