

## BACHELOR OF ARTS EXAMINATION, 2025

## [ GENERAL ELECTIVE ]

1st Year, 2nd Semester

DEPARTMENT OF ECONOMICS

Subject Code : CBCS/UG/GE/2.1 (OLD)

MATHEMATICS – II

Time : Two Hours

Full Marks : 30

Use a separate Answer-Script for each part

Part - IAnswer any *three* questions :

1. Define rank of a matrix.

5

$$\text{Let } A = \begin{pmatrix} 0 & 0 & 2 & 2 & 0 \\ 1 & 3 & 2 & 4 & 1 \\ 2 & 6 & 2 & 6 & 2 \\ 3 & 9 & 1 & 10 & 6 \end{pmatrix}$$

Reduce the normal form of A and hence find the rank of A.

2. Find the eigen values and the corresponding eigen vectors of

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$$A = \begin{bmatrix} 1 & -1 & 0 \\ 1 & 2 & -1 \\ 3 & 2 & -2 \end{bmatrix}$$

3. Determine the conditions for which the system of equations :

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$$x + y + z = 1$$

$$x + 2y - z = m$$

$$5x + 7y - lz = m^2$$

4. If A and P be both  $n \times n$  matrices and P be a non singular matrix, then prove that A and  $P^{-1}AP$  have the same eigen values 5

5. Solve (if possible) the system of equations 5

$$x + 2y - z = 10$$

$$-x + y + 2z = 2$$

$$2x + y - 3z = 2$$

### Part - II

1. Solve **any one** from the following : 4

(i)  $(x^4y^2 - y) dx + (x^2y^4 - x) dy = 0$

(ii)  $(x^4 + y^4) dx - xy^3 dy = 0$

2. Solve the following differential equation (any one) : 6

(i)  $\frac{d^2y}{dx^2} - \frac{2dy}{dx} + y = x^2e^{3x}$

(ii)  $\frac{d^2y}{dx^2} + \frac{2dy}{dx} + y = x \cos x$

3. Solve the following difference equation : 5

(i)  $U_{n+2} - 7U_{n+1} + 10U_n = 12.4u^n$

Or

(ii)  $U_{n+2} - 4u_n = 9n^2$

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