

B.Sc. (CBCS Pattern) Semester-V
USMT11 : Mathematics DSE-III - Matrices and Theory of Equations

P. Pages : 2

Time : Three Hours



GUG/S/25/13117

Max. Marks : 60

- Notes : 1. Solve all the **five** questions.
2. All questions carry equal marks.

UNIT – I

1. a) **6**
If $A = \begin{bmatrix} 1 & 2 & -1 \\ 3 & 4 & 0 \\ -2 & 6 & 1 \end{bmatrix}$ then find Adj A.

- b) Find the rank of the matrix A **6**
 $A = \begin{bmatrix} 1 & 1 & -1 & 1 \\ 1 & -1 & 2 & -1 \\ 3 & 1 & 0 & 1 \end{bmatrix}$

OR

- c) If the non singular symmetric matrices A and B commute, then show that $A^{-1}B^{-1}$ is symmetric and commute. **6**
d) **6**
Reduce the matrix $A = \begin{bmatrix} 3 & 5 & 7 \\ 2 & 3 & 4 \\ 1 & 2 & 3 \end{bmatrix}$ to the normal form and then find its rank.

UNIT – II

2. a) Show that the equations $2x + 6y = -11$, $6x + 20y - 6z = -3$, $6y - 18z = -1$ are not consistent. **6**
b) Solve the linear equations $2x + 3y - z = 0$, $x - y + 2z = 5$, $3x + y - z = 1$. by matrix method. **6**

OR

- c) Solve $2x + y + z = 4$, $3x - 2y + z = 2$, $x - y + 2z = 2$. by Cramer's rule. **6**
d) Find the eigen values and the corresponding eigen vectors of the matrix **6**
 $A = \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$

UNIT – III

3. a) Prove that in an equations with real coefficients complex roots Occurs in pair **6**

- b) Solve $x^4 - 2x^3 - 22x^2 + 62x - 15 = 0$ given that $2 + \sqrt{3}$ is a root. 6

OR

- c) The roots of the equation $8x^3 + 18x^2 - 27x - 27 = 0$ are in geometric progression. Find Him. 6

- d) Solve $x^3 - 11x^2 + 34x - 24 = 0$; two roots of which are in the ratio 3:2 6

UNIT – IV

4. a) Solve $6x^6 - 25x^5 + 31x^4 - 31x^2 + 25x - 6 = 0$ 6

- b) Solve the cubic equation $x^3 - 15x = 126$ by Cardon's method. 6

OR

- c) Solve biquadratic equation $x^4 - 10x^3 + 35x^2 - 50x + 24 = 0$ by Ferrari's method. 6

- d) Solve $x^4 - 3x^2 - 42x - 40 = 0$ by Descartes method. 6

5. Attempt any six.

- a) Find tranjugate of a matrix $A = \begin{bmatrix} 1+i & 2 \\ 3i & -7+2i \end{bmatrix}$ 2

- b) Define Singular and non-singular matrix. 2

- c) State the condition of consistency of system of equations $AX = B$. 2

- d) Find the eigen values of $A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$ 2

- e) Show that $x^7 - 3x^4 + 2x^3 - 1 = 0$ has at least four imaginary roots. 2

- f) Find one of the root of $x^3 - 12x^2 + 39x - 28 = 0$ roots being in arithmetical progression. 2

- g) Define reciprocal equation. 2

- h) Write general and standard term of cubic equation. 2
