

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

P. Pages : 2

Time : Three Hours



GUG/S/23/13117

Max. Marks : 60

- Notes :
1. Solve all **five** question.
  2. Que. No. 1 to 4 has an alternative. Solve each question in full or its alternative In full.
  3. All question carry equal marks.

**UNIT – I**

1. a) 
$$\text{If } A = \begin{bmatrix} 1 & 2 & -1 \\ 3 & 4 & 0 \\ -2 & 6 & 1 \end{bmatrix} \text{ then find the adjoint of matrix A.}$$
 **6**
- b) 
$$\text{If } A = \begin{bmatrix} 2 & 1 \\ -3 & 5 \end{bmatrix} \text{ then show that A is non singular and find adjoint and inverse of A.}$$
 **6**

**OR**

- c) 
$$\text{Find rank of matrix } A = \begin{bmatrix} 2 & 0 & 1 \\ 1 & -2 & 2 \\ 3 & 2 & 0 \end{bmatrix}$$
 **6**
- d) 
$$\text{Reduce the matrix } A = \begin{bmatrix} 2 & 1 & -3 & -6 \\ 3 & -3 & 1 & 2 \\ 1 & 1 & 1 & 2 \end{bmatrix} \text{ in the normal form.}$$
 **6**

**UNIT – II**

2. a) Find all non-trivial solution of  $x - 2y + z = 0$  ,  $x - 2y - z = 0$  ,  $2x - 4y - 5z = 0$  **6**
- b) Solve the linear equations  $2x + 3y - z = 0$  ,  $x - y + 2z = 5$  ,  $3x + y - z = 1$  by matrix method. **6**

**OR**

- c) Show that  $\lambda$  is eigen value of non-singular matrix A, then  $\lambda^{-1}$  is the eigen value of  $A^{-1}$ . **6**
- d) 
$$\text{Find the eigen values of the matrix } A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$$
 **6**

**UNIT – III**

3. a) Prove that in an equation with real coefficients complex roots occur in pairs. 6
- b) Find the roots of equation  $8x^3 + 18x^2 - 27x - 27 = 0$  are in geometric progression. 6

**OR**

- c) If a, b, c are the roots of equation  $x^3 + px^2 + qx + r = 0$ , find the values of  $\frac{1}{a^2} + \frac{1}{b^2} + \frac{1}{c^2}$  6
- d) Find the equation whose roots are the roots of  $4x^5 - 2x^3 + 7x - 3 = 0$  each increased by 2. 6

**UNIT – IV**

4. a) Find the equation whose roots are the negative reciprocals of the roots of  $x^4 + 7x^3 + 8x^2 - 9x + 10 = 0$  6
- b) Solve the Cubic equation by Cardon's method  $x^3 + 6x^2 + 9x + 4 = 0$  6

**OR**

- c) Solve the equation  $x^4 - 10x^3 + 35x^2 - 50x + 24 = 0$  by Ferrari's method. 6
- d) Solve the biquadratic equation  $x^4 - 2x^3 - 5x^2 + 10x - 3 = 0$  6

5. Solve **any six**.

- a) Define Skew-Hermitian matrix. 2
- b) If  $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$  then find adj A. 2
- c) Define consistent system of linear equations. 2
- d) Show the vectors (1, 0, 0), (0, 1, 0), (0, 0, 1) are linearly independent. 2
- e) If  $1 + i$  are roots of  $x^4 - 2x^3 + 3x^2 - 2x + 2 = 0$  then find the remaining roots. 2
- f) Find the nature of roots of equation  $x^2 + 3x + 2 = 0$ . 2
- g) Find reciprocal equation of equation  $f(x) = x^n + P_1x^{n-1} + P_2x^{n-2} + \dots + P_{n-1}x + P_n = 0$  2
- h) Reduce the Cubic equation  $x^3 + ax^2 + bx + c = 0$  in the standard form. 2

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