ANURAG GROUP OF INSTITUTIONS
Autonomous

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I.B.Tech I Semester

MATHEMATICS-I

ASSIGNMENT-I

1. Define following
   a). Hermitian matrix b). Skew Hermitian matrix c). Unitary matrix d). Orthogonal matrix.

2. Define rank of a matrix. Find the rank of matrice $\begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 4 & 8 & 7 & 5 \end{bmatrix}$

3. Find the rank of following matrices by reducing it to Normal form

a). $\begin{bmatrix} 0 & 1 & 2 & -2 \\ 4 & 0 & 2 & 6 \\ 2 & 1 & 3 & 1 \end{bmatrix}$ b). $\begin{bmatrix} 2 & -2 & 0 & 6 \\ 4 & 2 & 0 & 2 \\ 1 & -1 & 0 & 3 \\ 1 & -2 & 1 & 2 \end{bmatrix}$

4. Investigate for what values of λ *and* μ the simultaneous equations $2x+3y+5z=9$,

   $7x+3y-2z=8, 2x+3y+\lambda z=\mu$ have

(i) no solution (ii) a unique solution iii) an infinite number of solutions

5. Show that the only real number λ for which the system $x+2y+3z=\lambda x,\ 3x+y+2z=\lambda y,\ 2x+3y+z=\lambda z$ has non zero solution is 6 and solve them when $\lambda=6$.

6. Solve the following equations using Gauss Elimination method

$2x_1+x_2+x_3=10,\ 3x_1+2x_2+3x_3=18,\ x_1+4x_2+9x_3=16$

7. Solve the following equations using Gauss Jordan method

$10x_1+x_2+x_3=12,\ x_1+10x_2-x_3=10,\ 2x_1-2x_2+10x_3=9.$

8. a). Define Eigen values and Eigen vector of a matrix.

Find Eigen values and Eigen vectors of the following matrices

(i) $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$ (ii). $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ (iii) $\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ (iv) $\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$

(v) $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

9. State Cayley Hamilton theorem.
Verify Cayley Hamilton theorem for the following matrices find its inverse.

(i) $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ (ii) $\begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix}$ (iii) $\begin{bmatrix} 2 & -1 & 2 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ also find A^4.

10. Diagonalize the matrix $A = \begin{bmatrix} -3 & -7 & -5 \\ 2 & 4 & 3 \\ 1 & 2 & 2 \end{bmatrix}$ if possible.