

Mathematics-1

CHAPTER - Matrices

Q1. Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$.

Q2. Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$.

Q3. Using Cayley Hamilton Theorem, Find the inverse of

(i) $\begin{bmatrix} 2 & 3 \\ 3 & 5 \end{bmatrix}$

(ii) $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$

Q4. Find a matrix P which transforms the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ into a diagonal form.

Q5. Diagonalise the matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$.

Q6. For what values of λ and μ do the system of equations $x+2y+3z=6$, $x+3y+5z=9$ and $2x+5y+\lambda z=\mu$ have

(i) No solution (ii) a unique solution (iii) more than one solution?

Q7. Investigate the value of λ and μ so that equations $2x+3y+5z=9$, $7x+3y-2z=8$, $2x+3y+\lambda z=\mu$ have (i) no solution (ii) a unique solution and (iii) an infinite number of solution.

Q8. Find the rank of the following matrices:

(i) $\begin{bmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{bmatrix}$

(ii) $\begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \\ 16 & 4 & 12 & 15 \end{bmatrix}$

(iii) $\begin{bmatrix} 8 & 1 & 3 & 6 \\ 0 & 3 & 2 & 2 \\ -8 & -1 & -3 & 4 \end{bmatrix}$

Q9. Are the following vectors linearly dependent? If so, find a relation between them.

(i) $x_1 = (2, -1, 4)$, $x_2 = (0, 1, 2)$, $x_3 = (6, -1, 16)$, $x_4 = (4, 0, 12)$

(ii) $x_1 = (1, 1, 1)$, $x_2 = (1, -1, 1)$, $x_3 = (3, -1, 3)$

Q10. Use Gauss Jordan method to find the inverse of the following:

(i) $\begin{bmatrix} 8 & 4 & 3 \\ 2 & 1 & 1 \\ 1 & 2 & 1 \end{bmatrix}$

(ii) $\begin{bmatrix} 2 & 1 & -1 \\ 0 & 2 & 1 \\ 5 & 2 & -3 \end{bmatrix}$.