All Branches Hinglish

Subject: Engineering Mathematics

DPP-09

Chapter: Linear Algebra

Topic : Properties of Eigen Values And Vectors

1. The eigen values of the matrix $\begin{bmatrix} 2 & -1 & 0 & 0 \\ 0 & 3 & 0 & 0 \\ 0 & 0 & -2 & 0 \\ 0 & 0 & -1 & 4 \end{bmatrix}$ are

(a) 2, –2, 1, –1 (b) 2, 3, –2, 4

(c) 2, 3, 1, 4 (d) None

2. The necessary condition to diagonalize a matrix is that

(a) its all eigen values should be distinct
(b) its eigen vectors should be independent
(c) its eigen values should be real
(d) the matrix is non-singular

3. Obtain the eigen values of the matrix

$$A = \begin{bmatrix} 1 & 2 & 34 & 49 \\ 0 & 2 & 43 & 94 \\ 0 & 0 & -2 & 104 \\ 0 & 0 & 0 & -1 \end{bmatrix}$$

(a) 1, 2, –2, –1 (b) –1, –2, –1, –2

(c) 1, 2, 2, 1 (d) None

4. For the matrix

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

one of the eigen value is equal to –2. Which of the following is an eigen vector?

(a) $\begin{bmatrix} 3 \\ -2 \\ 1 \end{bmatrix}$ (b) $\begin{bmatrix} 3 \\ 2 \\ -1 \end{bmatrix}$

(c) $\begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix}$ (d) $\begin{bmatrix} 2 \\ 5 \\ 0 \end{bmatrix}$

5. The minimum and the maximum eigen values of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ are –2 and 6, respectively. What is the other eigen value?

(a) 5 (b) 3

(c) 1 (d) –1

6. Given that

$A = \begin{bmatrix} -5 & -3 \\ 2 & 0 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ the value A^3 is

(a) 15A + 12I (b) 19A + 30I

(c) 17A + 15I (d) 17A + 21I

7. Suppose that the eigen values of matrix A are 1, 2, 4. The determinant of $(A^{-1})^T$ is _____.

8. Let $A = \begin{bmatrix} 1 & 0 & -1 \\ -1 & 2 & 0 \\ 0 & 0 & -2 \end{bmatrix}$ and $B = A^3 - A^2 - 4A + 5I$, where I is the 3 × 3 identity matrix. The determinant of B is_____(up to 1 decimal place)

Answer Key

1. **(b)**
2. **(d)**
3. **(1, 2, –2, –1)**
4. **(d)**
5. **(b)**
6. **(b)**
7. **(0.125)**
8. **(1)**