Subject: Engineering Mathematics
Chapter: Linear Algebra
Topic : Eigen Values & vectors

DPP-08

1. One of the eigen vectors of the matrix $A = \begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$ is

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

   (c) $\begin{bmatrix} 4 \\ 1 \end{bmatrix}$ (d) $\begin{bmatrix} 1 \\ -1 \end{bmatrix}$

2. The matrix $\begin{bmatrix} 1 & 2 & 4 \\ 3 & 0 & 6 \\ 1 & 1 & p \end{bmatrix}$ has one eigen value equal to 3.

   The sum of the other two eigen value

   (a) p (b) $p-1$

   (c) $p-2$ (d) $p-3$

3. The eigen vector of the matrix $\begin{bmatrix} 1 & 2 \\ 0 & 2 \end{bmatrix}$ are written in the

   form $\begin{bmatrix} 1 \\ a \end{bmatrix}$ and $\begin{bmatrix} 1 \\ b \end{bmatrix}$. What is a+b?

   (a) 0   (b) $\dfrac{1}{2}$

   (c) 1   (d) 2

4. If a square matrix A is real and symmetric, then the eigen values

   (a) are always real

   (b) are always real and positive

   (c) are always real and nonnegative

   (d) occur in complex conjugate pairs

5. The number of linearly independent eigen vectors of $\begin{bmatrix} 2 & 1 \\ 0 & 2 \end{bmatrix}$ is

   (a) 0   (b) 1

   (c) 2   (d) infinite

6. The eigen value of a skew-symmetric matrix are
   (a) always zero

   (b) always pure imaginary

   (c) either zero or pure imaginary

   (d) always real

7. The Eigen values of following matrix are
   $$\begin{bmatrix} -1 & 3 & 5 \\ -3 & -1 & 6 \\ 0 & 0 & 3 \end{bmatrix}$$

   (a) $3, 3+5j, 6-j$ (b) $-6+5j, 3+j, 3-j$

   (c) $3+j, 3-j, 5+j$ (d) $3, -1+3j, -1-3j$

8. All the four entries of the 2×2 matrix $P = \begin{bmatrix} p_{11} & p_{12} \\ p_{21} & p_{22} \end{bmatrix}$

   are nonzero, and one of its eigenvalue is zero. Which of the following statements is true?

   (a) $p_{11}p_{12} - p_{12}p_{21} = 1$

   (b) $p_{11}p_{22} - p_{12}p_{21} = -1$

   (c) $p_{11}p_{22} - p_{12}p_{21} = 0$

   (d) $p_{11}p_{22} + p_{12}p_{21} = 0$

Answer Key

1. (a)
2. (c)
3. (b)
4. (a)

5. (b)
6. (c)
7. (d)
8. (c)