12.894

EE25BTECH11049 - Sai Krishna Bakki

Question:
The eigenvalues of the matrix

$$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$$

are
Solution:
Given

$$\mathbf{A} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \tag{1}$$

To find eigenvalues of the matrix $\mathbf{A}$

$$\mathbf{A}\mathbf{x} = \lambda\mathbf{x} \tag{2}$$
$$(\mathbf{A} - \lambda\mathbf{I})\,\mathbf{x} = 0 \tag{3}$$
$$\left|\mathbf{A} - \lambda\mathbf{I}\right| = 0 \tag{4}$$
$$\begin{vmatrix} 0-\lambda & -1 \\ 1 & 0-\lambda \end{vmatrix} = 0 \tag{5}$$
$$\lambda^2 = -1 \tag{6}$$
$$\lambda = -\sqrt{-1},\ \sqrt{-1} \tag{7}$$

$\therefore$ The eigenvalues of the matrix are $\lambda = -\sqrt{-1},\ \sqrt{-1}$.