12.270

EE25BTECH11049 - Sai Krishna Bakki

Question:

If

$$\mathbf{A} = \begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 4 & 6 \\ 5 & 9 \end{pmatrix},$$

$(\mathbf{AB})^T$ is equal to

Solution:

Given

$$\mathbf{A} = \begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 4 & 6 \\ 5 & 9 \end{pmatrix} \tag{1}$$

$$\mathbf{A}^T = \begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}, \mathbf{B}^T = \begin{pmatrix} 4 & 5 \\ 6 & 9 \end{pmatrix} \tag{2}$$

$(\mathbf{AB})^T$ can also be written as $\mathbf{B}^T\mathbf{A}^T$

$$(\mathbf{AB})^T = \mathbf{B}^T\mathbf{A}^T \tag{3}$$

$$\implies \begin{pmatrix} 4 & 5 \\ 6 & 9 \end{pmatrix}\begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix} \tag{4}$$

$$\implies \begin{pmatrix} 8+20 & 4+15 \\ 12+36 & 6+27 \end{pmatrix} \tag{5}$$

$$\implies \begin{pmatrix} 28 & 19 \\ 48 & 33 \end{pmatrix} \tag{6}$$

$\therefore$ $(\mathbf{AB})^T$ is equal to $\begin{pmatrix} 28 & 19 \\ 48 & 33 \end{pmatrix}$.