Assignment 6

Y.KAVYA

and latex-tikz codes from

1 QUESTION No.2.48

If the matrix A is both symmetric and skew symmet-
ric,then
A) A is diagonal matrix
B) A is zero matrix
C) A is square matrix
D) None of these

2 SOLUTION

If a matrix A is symmetric,then

$$\mathbf{A}^T = \mathbf{A} \qquad (2.0.1)$$

If a matrix A is skew symmetric,then

$$\mathbf{A}^T = -\mathbf{A} \qquad (2.0.2)$$

and the diagonal elements are also zero.
Given that the matrix A is both symmetric and skew
symmetric ,then we have

$$\implies \mathbf{A} = \mathbf{A}^T = -\mathbf{A} \qquad (2.0.3)$$

But the above expression is only possible if A is a
zero matrix.

$$If A = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}, Now\,we\,find\,\mathbf{A}^T and-\mathbf{A} \qquad (2.0.4)$$

$$\implies \mathbf{A}^T = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} \qquad (2.0.5)$$

$$\implies \mathbf{A}^T = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}^T \qquad (2.0.6)$$

$$\implies \mathbf{A}^T = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} \qquad (2.0.7)$$

$$\implies -\mathbf{A} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} \qquad (2.0.8)$$

Thus ,the zero matrices are the only matrix, which
is both symmetric and skew symmetric matrix.