If $A = \begin{bmatrix} \cos2\theta & -\sin 2\theta \\ \sin2\theta & \cos2\theta \end{bmatrix}$ and $A + A^T = I$ where I is 2×2 unit matrix and A^T is the transpose of A, then the value of θ is equal to

Solution :

We have $A = \begin{bmatrix} \cos2\theta & -\sin 2\theta \\ \sin2\theta & \cos2\theta \end{bmatrix}$

$\Rightarrow A^T = \begin{bmatrix} \cos2\theta & \sin 2\theta \\ -\sin2\theta & \cos2\theta \end{bmatrix}$

$\Rightarrow A + A^T = \begin{bmatrix} 2\cos2\theta & 0 \\ 0 & 2\cos2\theta \end{bmatrix} = I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$\Rightarrow 2\cos2\theta = 1$

$\Rightarrow \cos2\theta = \dfrac{1}{2} = \cos\dfrac{\pi}{3}$

$\Rightarrow 2\theta = 2n\pi + \dfrac{\pi}{3}$

$\therefore \theta = \dfrac{\pi}{6}$

A	$\dfrac{\pi}{6}$
B	$\dfrac{\pi}{2}$
C	$\dfrac{\pi}{3}$
D	$\dfrac{3\pi}{2}$

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