C. $1-\alpha^2-\beta\gamma=0$

D. $1+\alpha^2-\beta\gamma=0$

Answer

Answer: C

$$A=\begin{bmatrix}\alpha & \beta\\ \gamma & -\alpha\end{bmatrix}$$

$$\begin{aligned}\therefore A^2=A\cdot A&=\begin{bmatrix}\alpha & \beta\\ \gamma & -\alpha\end{bmatrix}\begin{bmatrix}\alpha & \beta\\ \gamma & -\alpha\end{bmatrix}\\ &=\begin{bmatrix}\alpha^2+\beta\gamma & \alpha\beta-\alpha\beta\\ \alpha\gamma-\alpha\gamma & \beta\gamma+\alpha^2\end{bmatrix}\\ &=\begin{bmatrix}\alpha^2+\beta\gamma & 0\\ 0 & \beta\gamma+\alpha^2\end{bmatrix}\end{aligned}$$

$$\text{Now, } A^2=I\Rightarrow\begin{bmatrix}\alpha^2+\beta\gamma & 0\\ 0 & \beta\gamma+\alpha^2\end{bmatrix}=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$$

On comparing the corresponding elements, we have:

$$\begin{aligned}&\alpha^2+\beta\gamma=1\\ &\Rightarrow\alpha^2+\beta\gamma-1=0\\ &\Rightarrow 1-\alpha^2-\beta\gamma=0\end{aligned}$$

Question 14:

If the matrix *A* is both symmetric and skew symmetric, then

A. *A* is a diagonal matrix

B. *A* is a zero matrix

C. *A* is a square matrix

D. None of these

Answer

Answer: B

If *A* is both symmetric and skew-symmetric matrix, then we should have

$$\begin{aligned}&A'=A\text{ and }A'=-A\\ &\Rightarrow A=-A\\ &\Rightarrow A+A=O\\ &\Rightarrow 2A=O\\ &\Rightarrow A=O\end{aligned}$$

Therefore, *A* is a zero matrix.

Question 15:

If *A* is square matrix such that $A^2=A$, then $(I+A)^3-7A$ is equal to

A. *A* **B.** *I* – *A* **C.** *I* **D.** 3*A*

Answer

Answer: C

$$\begin{aligned}(I+A)^3-7A&=I^3+A^3+3I^2A+3A^2I-7A\\ &=I+A^3+3A+3A^2-7A\\ &=I+A^2\cdot A+3A+3A-7A \qquad [A^2=A]\\ &=I+A\cdot A-A\\ &=I+A^2-A\\ &=I+A-A\\ &=I\end{aligned}$$

$$\therefore (I+A)^3-7A=I$$

*********** END **********