

Matrices and Determinants - Class XII

Related Questions with Solutions

Questions

Question: 01

The values of θ in $\left(0, \frac{\pi}{2}\right)$ satisfying $\begin{vmatrix} 1 + \sin^2 \theta & \cos^2 \theta & 4 \sin 4\theta \\ \sin^2 \theta & 1 + \cos^2 \theta & 4 \sin 4\theta \\ \sin^2 \theta & \cos^2 \theta & 1 + 4 \sin 4\theta \end{vmatrix} = 0$ are

- A. $\frac{7\pi}{24}$
- B. $\frac{5\pi}{24}$
- C. $\frac{11\pi}{24}$
- D. $\frac{\pi}{24}$

Solutions

Solution: 01

$$\begin{vmatrix} 2 & \cos^2 \theta & 4 \sin 4\theta \\ 2 & 1 + \cos^2 \theta & 4 \sin 4\theta \\ 1 & \cos^2 \theta & 1 + 4 \sin 4\theta \end{vmatrix} = 0 \quad (\text{Applying } C_1 \rightarrow C_1 + C_2)$$

$$\Rightarrow \begin{vmatrix} 2 & \cos^2 \theta & 4 \sin 4\theta \\ 0 & 1 & 0 \\ 1 & \cos^2 \theta & 1 + 4 \sin 4\theta \end{vmatrix} = 0 \quad (\text{Applying } R_2 \rightarrow R_2 - R_1)$$

$$\Rightarrow 2 + 4 \sin 4\theta = 0 \Rightarrow \sin 4\theta = -\frac{1}{2} = \sin\left(-\frac{\pi}{6}\right)$$

$$\Rightarrow 4\theta = n\pi + (-1)^n \left(-\frac{\pi}{6}\right)$$

$$n = 1 \Rightarrow \theta = \frac{7\pi}{24}$$

$$n = 2 \Rightarrow \theta = \frac{11\pi}{24}$$

Correct Options

Answer:01

Correct Options: A, C