

Determinants - Class XII

Related Questions with Solutions

Questions

Question: 01

The value of θ lying between 0 and $\frac{\pi}{2}$ and satisfying the equation

$$\begin{vmatrix} 1 + \sin^2 \theta & \cos^2 \theta & 4 \sin 4\theta \\ \sin^2 \theta & 1 + \cos^2 \theta & 4 \sin 4\theta \\ \sin^2 \theta & \cos^2 \theta & 1 + 4 \sin 4\theta \end{vmatrix} = 0 \text{ are}$$

- A. $\frac{5\pi}{24}, \frac{3\pi}{24}$
B. $\frac{7\pi}{24}, \frac{5\pi}{24}$
C. $\frac{7\pi}{24}, \frac{11\pi}{24}$
D. $\frac{7\pi}{24}, \frac{11\pi}{24}$

Solutions

Solution: 01

$$\begin{aligned} R_2 &\rightarrow R_2 - R_1, R_3 \rightarrow R_3 - R_1 \\ \Delta &= \begin{vmatrix} 1 + \sin^2 \theta & \cos^2 \theta & 4 \sin 4\theta \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{vmatrix} = 0 \end{aligned}$$

$$\begin{aligned} C_1 &\rightarrow C_1 + C_2 + C_3 \\ \Rightarrow &\begin{vmatrix} 2 + 4 \sin 4\theta & \cos^2 \theta & 4 \sin 4\theta \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} = 0 \end{aligned}$$

$$\begin{aligned} \Rightarrow &4 \sin 4\theta = -2 \\ \Rightarrow &\sin 4\theta = -\frac{1}{2} = \sin\left(\frac{7\pi}{6}\right), \sin\left(\frac{11\pi}{6}\right) \end{aligned}$$

$$\Rightarrow \theta = \frac{7\pi}{24}, \frac{11\pi}{24}$$

Correct Options

Answer:01

Correct Options: C