

Related Questions with Solutions

Questions

**Question: 01**

The value of  $\theta$  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.  $\frac{\pi}{24}, \frac{11\pi}{24}$

Solutions

**Solution: 01**

$$R_2 \rightarrow R_2 - R_1, R_3 \rightarrow R_3 - R_1$$

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

$$C_1 \rightarrow C_1 + C_2 + C_3$$

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

$$\Rightarrow 4 \sin 4\theta = -2$$

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

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

Correct Options

Answer:01

Correct Options: C