Questions

Quetion: 01

The solutions of the equation $\begin{vmatrix} 1 + \sin^2 x & \sin^2 x & \sin^2 x \\ \cos^2 x & 1 + \cos^2 x & \cos^2 x \\ 4\sin 2x & 4\sin 2x & 1 + 4\sin 2x \end{vmatrix} = 0, (0 < x < \pi)$, are

A. $\frac{\pi}{12}, \frac{\pi}{6}$

B. $\frac{\pi}{6}, \frac{5\pi}{6}$

C. $\frac{5\pi}{12}, \frac{7\pi}{12}$

D. $\frac{7\pi}{12}, \frac{11\pi}{12}$

Solutions

Solution: 01

Explanation

By using $C_1 \rightarrow C_1 - C_2$ and $C_3 \rightarrow C_3 - C_2$ we get

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

Expanding by R_1 we get

$1(1 + \cos^2 x + 4\sin 2x) - \sin^2 x(-1) = 0$

$\Rightarrow 2 + 4\sin 2x = 0$

$\Rightarrow \sin 2x = \frac{-1}{2}$

$\Rightarrow 2x = n\pi + (-1)^n \left(\frac{-\pi}{6}\right), n \in Z$

$\therefore 2x = \frac{7\pi}{6}, \frac{11\pi}{6}$

$\Rightarrow x = \frac{7\pi}{12}, \frac{11\pi}{2}$