## **Determinants - Class XII**

## **Related Questions with Solutions**

$\begin{array}{c c} \hline \textbf{Quetion: 01} \\ \hline \text{The value of } \theta \text{ lying between } 0 \text{ and } \frac{\pi}{2} \text{ and satisfying the equation} \\ \hline 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 \\ \hline \text{sin}^2 \theta & \cos^2 \theta & 1 + 4 \sin 4\theta \\ \hline \text{a.} \frac{5\pi}{24}, \frac{3\pi}{24} \\ \text{B.} \frac{7\pi}{24}, \frac{5\pi}{24} \\ \text{C.} \frac{7\pi}{24}, \frac{11\pi}{24} \\ \hline \textbf{D.} \frac{\pi}{24}, \frac{11\pi}{24} \\ \hline \textbf{Solutions} \\ \hline \textbf{O} \\ \Delta = \begin{vmatrix} -1 & 1 & 0 \\ -1 & 0 & 1 \\ -1 & 0 & 1 \end{vmatrix} = 0 \\ \text{C1} \rightarrow \text{C1} + \text{C2} + \text{C3} \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} = 0 \\ \hline \text{c1} \Rightarrow 4 \sin 4\theta \cos^2 \theta & 4 \sin 4\theta \\ \Rightarrow \begin{vmatrix} 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) \\ \hline \text{and } 1\pi \\ \hline \textbf{C1} \\ \Rightarrow \begin{bmatrix} 7\pi & 11\pi \\ 7\pi & 11\pi \\ \end{bmatrix} $	Questions
$\begin{vmatrix} 1 + \sin^{2}\theta & \cos^{2}\theta & 4\sin 4\dot{\theta} \\ \sin^{2}\theta & 1 + \cos^{2}\theta & 4\sin 4\theta \\ \sin^{2}\theta & \cos^{2}\theta & 1 + 4\sin 4\theta \end{vmatrix} = 0 \text{ are } \\ A. \frac{5\pi}{24}, \frac{3\pi}{24} \\ B. \frac{5\pi}{24}, \frac{5\pi}{24} \\ C. \frac{7\pi}{24}, \frac{11\pi}{24} \\ D. \frac{\pi}{24}, \frac{11\pi}{24} \\ D. \frac{\pi}{24}, \frac{11\pi}{24} \\ \hline \hline \\ Solutions \\ \hline \\ Solutions \\ \hline \\ C_{1} \rightarrow C_{1} + C_{2} + C_{3} \\ = \begin{vmatrix} 1 + \sin^{2}\theta & \cos^{2}\theta & 4\sin 4\theta \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{vmatrix} = 0 \\ C_{1} \rightarrow C_{1} + C_{2} + C_{3} \\ = \begin{vmatrix} 2 + 4\sin 4\theta & \cos^{2}\theta & 4\sin 4\theta \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} = 0 \\ \Rightarrow 4\sin 4\theta = -2 \\ \Rightarrow \sin 4\theta = -\frac{1}{2} = \sin\left(\frac{7\pi}{6}\right), \sin(11\pi/6) \end{aligned}$	Quetion: 01
$\begin{vmatrix} 1 + \sin^{2}\theta & \cos^{2}\theta & 4\sin 4\dot{\theta} \\ \sin^{2}\theta & 1 + \cos^{2}\theta & 4\sin 4\theta \\ \sin^{2}\theta & \cos^{2}\theta & 1 + 4\sin 4\theta \end{vmatrix} = 0 \text{ are } \\ A. \frac{5\pi}{24}, \frac{3\pi}{24} \\ B. \frac{5\pi}{24}, \frac{5\pi}{24} \\ C. \frac{7\pi}{24}, \frac{11\pi}{24} \\ D. \frac{\pi}{24}, \frac{11\pi}{24} \\ D. \frac{\pi}{24}, \frac{11\pi}{24} \\ \hline \hline \\ Solutions \\ \hline \\ Solutions \\ \hline \\ C_{1} \rightarrow C_{1} + C_{2} + C_{3} \\ = \begin{vmatrix} 1 + \sin^{2}\theta & \cos^{2}\theta & 4\sin 4\theta \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{vmatrix} = 0 \\ C_{1} \rightarrow C_{1} + C_{2} + C_{3} \\ = \begin{vmatrix} 2 + 4\sin 4\theta & \cos^{2}\theta & 4\sin 4\theta \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} = 0 \\ \Rightarrow 4\sin 4\theta = -2 \\ \Rightarrow \sin 4\theta = -\frac{1}{2} = \sin\left(\frac{7\pi}{6}\right), \sin(11\pi/6) \end{aligned}$	The value of $\theta$ lying between 0 and $\frac{\pi}{2}$ and satisfying the equation
$\begin{aligned} \frac{\text{Solution: 01}}{\text{R}_2 \to \text{R}_2 - \text{R}_1, \text{R}_3 \to \text{R}_3 - \text{R}_1} \\ \Delta &= \begin{vmatrix} 1 + \sin^2 \theta & \cos^2 \theta & 4 \sin 4\theta \\ 1 + \sin^2 \theta & \cos^2 \theta & 4 \sin 4\theta \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{vmatrix} = 0 \\ \text{C}_1 \to \text{C}_1 + \text{C}_2 + \text{C}_3 \\ &\Rightarrow \begin{vmatrix} 2 + 4 \sin 4\theta & \cos^2 \theta & 4 \sin 4\theta \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} = 0 \\ \Rightarrow 4 \sin 4\theta = -2 \\ \Rightarrow & \sin 4\theta = -\frac{1}{2} = \sin\left(\frac{7\pi}{6}\right), \sin\left(11\pi/6\right) \end{aligned}$	$\begin{vmatrix} \sin^2 \theta & 1 + \cos^2 \theta & 4 \sin 4\theta \\ \sin^2 \theta & \cos^2 \theta & 1 + 4 \sin 4\theta \end{vmatrix} = 0 \text{ are}$ A. $\frac{5\pi}{24}, \frac{3\pi}{24}$ B. $\frac{7\pi}{24}, \frac{5\pi}{24}$ III $\pi$
$\begin{aligned} \overline{\mathbf{R}_{2} \to \mathbf{R}_{2} - \mathbf{R}_{1}, \mathbf{R}_{3} \to \mathbf{R}_{3} - \mathbf{R}_{1}} \\ \Delta &= \begin{vmatrix} 1 + \sin^{2}\theta & \cos^{2}\theta & 4\sin 4\theta \\ -1 & 0 & 1 \end{vmatrix} = 0 \\ \overline{\mathbf{C}_{1} \to \mathbf{C}_{1} + \mathbf{C}_{2} + \mathbf{C}_{3}} \\ \Rightarrow \begin{vmatrix} 2 + 4\sin 4\theta & \cos^{2}\theta & 4\sin 4\theta \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} = 0 \\ \Rightarrow 4\sin 4\theta = -2 \\ \Rightarrow & \sin 4\theta = -\frac{1}{2} = \sin\left(\frac{7\pi}{6}\right), \sin\left(11\pi/6\right) \end{aligned}$	Solutions
	$\begin{aligned} \overline{\mathbf{R}_{2} \to \mathbf{R}_{2} - \mathbf{R}_{1}, \mathbf{R}_{3} \to \mathbf{R}_{3} - \mathbf{R}_{1}} \\ \Delta &= \begin{vmatrix} 1 + \sin^{2}\theta & \cos^{2}\theta & 4\sin 4\theta \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{vmatrix} = 0 \\ C_{1} \to C_{1} + C_{2} + C_{3} \\ &= \begin{vmatrix} 2 + 4\sin 4\theta & \cos^{2}\theta & 4\sin 4\theta \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} = 0 \\ \Rightarrow &4\sin 4\theta = -2 \\ \Rightarrow & \sin 4\theta = -\frac{1}{2} = \sin\left(\frac{7\pi}{6}\right), \sin\left(11\pi/6\right) \\ \Rightarrow & \theta = \frac{7\pi}{24}, \frac{11\pi}{24} \end{aligned}$
Correct Options	Correct Options

Answer:01 Correct Options: C