Trigonometry Functions - Class XI

Past Year JEE Questions

Questions

Quetion: 01

If for x $\in \left(0, \frac{\pi}{2}\right)$, $\log_{10}\sin x + \log_{10}\cos x = -1$ and $\log_{10}(\sin x + \cos x) = \frac{1}{2}(\log_{10} n - 1)$, n > 0, then the value of n is equal to :

A. 16

B. 9

C. 12

D. 20

Solutions

Solution: 01

Explanation

$\log_{10}(\sin x) + \log_{10}(\cos x) = -1$

$\sin x \cos x = \frac{1}{10}$ .... (1)

and $\log_{10}(\sin x + \cos x) = \frac{1}{2}(\log_{10} n - 1)$

$\Rightarrow \sin x + \cos x = \left(\frac{n}{10}\right)^{\frac{1}{2}}$

$\Rightarrow \sin^2 x + \cos^2 x + 2 \sin x \cos x = \frac{n}{10}$ (squaring)

$\Rightarrow 1 + 2\left(\frac{1}{10}\right) = \frac{n}{10}$ (using equation (1))

$\Rightarrow \frac{n}{10} = \frac{12}{10}$

$\Rightarrow n = 12$