

The numerical value of $\tan \left\{ 2 \tan^{-1} \left(\frac{1}{5} \right) - \frac{\pi}{4} \right\}$ is equal to _____ (1984 - 2 Marks)

Sol-

$$\tan \left[2 \tan^{-1} \left(\frac{1}{5} \right) - \frac{\pi}{4} \right]$$

$$= \tan \left[\tan^{-1} \left(\frac{2/5}{1 - (1/5)^2} \right) - \frac{\pi}{4} \right] \quad \left(\frac{1}{5} < 1 \right)$$

$$= \tan \left(\tan^{-1} \left(\frac{2/5}{24/25} \right) - \frac{\pi}{4} \right) =$$

$$= \tan \left[\tan^{-1} \left(\frac{5}{12} \right) - \frac{\pi}{4} \right]$$

$$= \frac{\tan \left[\tan^{-1} \left(\frac{5}{12} \right) \right] - \tan \left(\frac{\pi}{4} \right)}{1 + \tan \left(\tan^{-1} \left(\frac{5}{12} \right) \right) \tan \left(\frac{\pi}{4} \right)} = \frac{5/12 - 1}{1 + 5/12} = \frac{-7}{17} \underline{\underline{\text{Ans}}}$$