Trigonometry Functions - Class XI

Past Year JEE Questions

Questions

Quetion: 01

If $0 < x < \pi$ and $\cos x + \sin x = \frac{1}{2}$, then $\tan x$ is

A. $\frac{(1-\sqrt{7})}{4}$

B. $\frac{(4-\sqrt{7})}{3}$

C. $-\frac{(4+\sqrt{7})}{3}$

D. $\frac{(1+\sqrt{7})}{4}$

Solutions

Solution: 01

Explanation

$\cos x + \sin x = \frac{1}{2}$

$\Rightarrow (\cos x + \sin x)^2 = \frac{1}{4}$

$\Rightarrow \cos^2 x + \sin^2 x + 2\cos x \sin x = \frac{1}{4}$

$[\because \cos^2 x + \sin^2 x = 1 \ \ and \ \ 2\cos x \sin x = \sin 2x]$

$\Rightarrow 1 + \sin 2x = \frac{1}{4}$

$\Rightarrow \sin 2x = -\frac{3}{4}$, so x is obtuse and

$\frac{2\tan x}{1+\tan^2 x} = -\frac{3}{4}$

$\Rightarrow 3\tan^2 x + 8\tan x + 3 = 0$

$\therefore \tan x = \frac{-8 \pm \sqrt{64-36}}{6}$

$= \frac{-4 \pm \sqrt{7}}{3}$

as $\tan x < 0$

$\therefore \tan x = \frac{-4-\sqrt{7}}{3}$