JEE PYQ'S

If x, y, z are in A.P. and $\tan^{-1}x$, $\tan^{-1}y$ and $\tan^{-1}z$ are also in A.P., then **[JEE M 2013]**

(a) $x=y=z$ (b) $2x=3y=6z$

(c) $6x=3y=2z$ (d) $6x=4y=3z$

Sol- x, y & z are in A.P $\Rightarrow 2y = x+z$

$\tan^{-1}x$, $\tan^{-1}y$, $\tan^{-1}z \longrightarrow$ A.P

$\Rightarrow 2\tan^{-1}y = \tan^{-1}x + \tan^{-1}z$

$\Rightarrow \tan^{-1}\left(\frac{2y}{1-y^2}\right) = \tan^{-1}\left(\frac{x+z}{1-xz}\right)$

$\Rightarrow \frac{2y}{(1-y^2)} = \frac{x+z}{(1-xz)}$

$\Rightarrow 1-y^2 = 1-xz \quad (\because 2y = x+z)$

$\Rightarrow y^2 = xz$

So, x, y, z are in G.P

x, y, z are in A.P and G.P both, which is only possible when $x=y=z$

Ans- (a) $x=y=z$