

10. $Y = A\sin(\omega t + \phi_0)$ is the time –displacement equation of a SHM. At $t=0$ the displacement of the particle is $Y = \frac{A}{2}$ and it is moving along negative x -direction. Then the initial phase angle ϕ_0 will be:

1) $\frac{\pi}{3}$

2) $\frac{2\pi}{3}$

3) $\frac{\pi}{6}$

4) $\frac{5\pi}{6}$

(JEE MAINS - 2021)

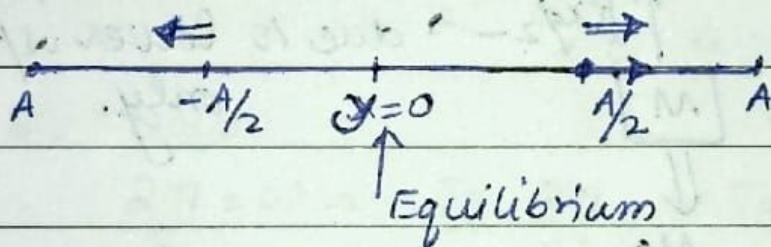
SOLUTION :

GIVEN $y = A \sin(\omega t + \phi)$.

At $t=0$, we have $y = \frac{A}{2}$ AND

the particle is moving along -ve X-direction.

∴ Let us draw the figure



so, we can clearly see that at $y = -\frac{A}{2}$,

the particle is moving in -ve X-direction,
But for $y = \frac{A}{2}$, we have particle moving
in +ve X-direction.

So, at $t=0$ we have $y = -\frac{A}{2}$

so, $y = A \sin(\omega t + \phi)$

$$-\frac{A}{2} = A \sin \phi \Rightarrow \sin \phi = -\frac{1}{2} \Rightarrow \phi = \frac{5\pi}{6}$$

so, $\phi =$

so, correct option is 4) $\frac{5\pi}{6}$