GATE 2022 -AE 63

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Question: The time delay between the peaks of the voltage signals $v_1(t) = \cos(6t + 60°)$ and $v_2(t) = -\sin(6t)$ is _____s

(A) $\frac{300\pi}{360}$
(B) $\frac{10\pi}{360}$
(C) $\frac{50\pi}{360}$
(D) $\frac{200\pi}{360}$

(GATE BM 2022 QUESTION 18)

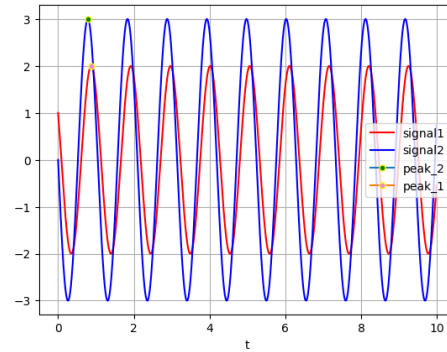**Solution**:
From the values given in the Table I:

Fig. 1. Figure of input voltage signals

Parameter	Description	Value
$v_1(t)$	Input voltage signal 1	$\cos(6t + 60°)$
$v_2(t)$	Input voltage signal 2	$-\sin(6t)$
$\Delta\phi$	Phase difference between two input signals	?
Δt	Time difference between maxima of two input signals	?
ω	angular frequency of input voltages	6

TABLE I

INPUT VALUES

$$v_1(t) = \cos(6t + 60°) \tag{1}$$
$$v_2(t) = -\sin(6t) \tag{2}$$
$$v_2(t) = \cos(6t + 90°) \tag{3}$$
$$\tag{4}$$

From (2) and (4), phase difference between two voltage signals is 30°. From formula,

$$\Delta\phi = \frac{\Delta t}{\frac{2\pi}{\omega}}360 \tag{5}$$

$$\therefore \Delta t = \frac{10\pi}{360}s \tag{6}$$

Hence, option B is correct.