

GATE 2022 -AE 63

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Question: The time delay between the peaks of the voltage signals $v_1(t) = \cos(6t + 60^\circ)$ 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:

Parameter	Description	Value
$v_1(t)$	Input voltage signal 1	$\cos(6t + 60^\circ)$
$v_2(t)$	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	✓

TABLE I
INPUT VALUES

$$v_1(t) = \cos(6t + 60^\circ) \quad (1)$$

$$v_2(t) = -\sin(6t) \quad (2)$$

$$\Rightarrow v_2(t) = \cos(6t + 90^\circ) \quad (3)$$

From (2) and (3), phase difference between two voltage signals is 30° . From formula,

$$\Delta\phi = \frac{\Delta t}{\frac{2\pi}{\omega}} 360 \quad (4)$$

$$\therefore \Delta t = \frac{10\pi}{360} s \quad (5)$$

Hence, option B is correct.

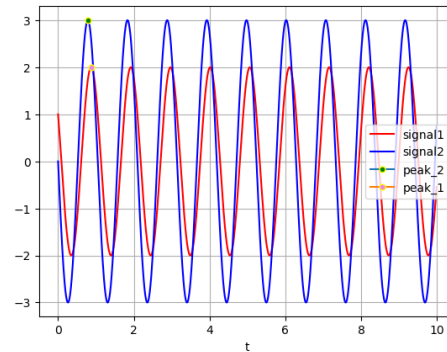


Fig. 1. Figure of input voltage signals