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Q.1. If the power that is used at home has frequency of 60 Hz, then find the period associated with the sine wave?

Solution: Given, $f = 60\,Hz$

We know, $T = \frac{1}{f} = \frac{1}{60} = 0.0116\ s$

∴ The time period associated with sine wave is 0.0116s

Q.2. Convert a period of 100 ms into microsecond.

Solution: Given, 100 ms

We know, $1\ ms = 1000\ \mu s$

So, $100\ ms = 100 \times 1000\ \mu s = 100000\ \mu s$

∴ A period of 100ms equals 100000 microsecond.

Q.3. If the period of a signal is 100 ms, what is its value in Kilohertz?

Solution: Given, $T = 100\ ms = 0.1\ s$

We know, $f = \frac{1}{T} = \frac{1}{0.1} = 10\,Hz$

$1\ Hz = 10^{-3}\ KHz$

$\therefore 10\ Hz = 10^{-2}\ KHz$

∴ The period signal of 100 ms equals $10^{-2}\ KHz$

Q.4. A sine wave is offset 1/6 cycle with respect to time 0. What is its phase in degrees and radians?

Solution: Given, offset of 1/6 cycle.

We know, $1\ cycle = 360°$

$\therefore 1/6\ cycle = \frac{1}{6} \times 360° = 60°$

Also, $1° = \frac{2\pi}{360}\ rad$

So, $60^\circ = 60 \times \frac{2\pi}{360}$ rad $= \pi/3$ rad.

∴ A sine wave of offset 1/6 cycle w.r.t. time 0 has phase of 60° in terms of degrees and has phase of $\pi/3$ rad in terms of radian.

Q.5. If the propagation speed of light in vacuum is 3×10^8 m/s, and the frequency is 4×10^{14} Hz, then compute the wavelength.

Solution: Given, $v = 3 \times 10^8$ m/s

$f = 4 \times 10^{14}$ Hz

We know,

$$\lambda = \frac{v}{f} = \frac{3 \times 10^8}{4 \times 10^{14}} = \frac{3}{4} \times 10^{-6} \text{ m}$$

$$= 0.75 \times 10^{-6} \text{ m}$$

$$= 7.5 \times 10^{-7} \text{ m}$$

∴ The wavelength is 7.5×10^{-7} m