Answer on Question # 42896, Physics, Other

Task:

32. For a damped harmonic oscillator of mass 200 gm, the values of spring constant and damping constant are, respectively, 90 N/m and 0.04 kg/s. The time taken for its amplitude of vibration to drop to half of its initial values ($\log_e 2=0.693$):

(a)7.0 s

(b)14.2 s

(c)15.9 s

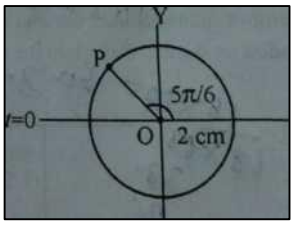
(d)26.6 s

Solution:

$$\ln\frac{A_1}{A_2}=\frac{A_0e^{-\beta t}}{A_0e^{-\beta(t+\Delta t)}}=\ln 2=0.693=\beta\Delta t=\frac{\lambda}{T}\Delta t\Rightarrow\Delta t=\frac{\ln 2\cdot T}{\lambda}=\frac{\ln 2\cdot 2\pi\sqrt{\frac{m}{k}}}{\lambda}\approx 7.0s$$

Answer: (a)7.0 s

33. For the following reference circle, the equation for simple harmonic motion (S.H.M.) is:



(a)$x=-2\sin(2\pi t+\pi/4)$

(b) $x=-2\sin(3t+\pi/3)$

(c) $x=-2\cos(\pi/6-t)$

(d) $x=-2\cos\pi t$

Answer: (b) $x=-2\sin(3t+\pi/3)$