Midterm Exam-(Summer-2020)

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Physics - II (201)

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Answer to the Question no - (I)

Given,

$$y = 10 \sin\left(10t - \frac{\pi}{6}\right)$$

we know $y = a \sin \frac{2\pi}{\lambda}(vt - x)$

-1- The frequency

$$\frac{2\pi}{\lambda} vt = 10t$$

$$\Rightarrow \frac{v}{\lambda} = \frac{10}{2\pi}$$

$$\Rightarrow f = 1.59 \text{ Hz}$$

∴ Time period

$$T = \frac{1}{f} = \frac{1}{1.59}$$

$$= 0.635$$

(III) the maximum velocity

$$V_{max} = \omega A$$

$$= 10 \cdot 10$$

$$= 10 ms^{-1}$$

$$2\pi V f = 10 f$$

$$\Rightarrow 2\pi f = 10$$

$$\therefore \omega = 10$$

(V) The maximum acceleration

$$a_{max} = \omega^2 A$$

$$= (10)^2 A$$

$$= 1000 ms^{-1}$$

(IV) The maximum displacement.

$$X = \frac{\pi}{6} = \frac{3.1416}{6}$$

$$= 0.5236$$

Answer to the question no-6

(a) $\frac{C_g}{C_d} = \frac{\mu_a}{\mu_g}$

Given

$\mu_g = 1.5$

$C_g = \frac{3 \times 10^8 \times 1}{1.5}$

$= 2 \times 10^8$

(b) I wave length $= 0.5m$

$\therefore$ In 1020 m total waves $= 2040$

Given.

$N = 2040$

$t = 180s$

$\therefore f = \frac{2040}{180}$

$= 11.33$

$\therefore t = \frac{1}{11.33}$

$= 0.0885.$

Answer to the question no — (2)

$\therefore \lambda = \frac{xd}{D}$

$= \frac{0.5 \times 10^{3} \times 3}{3.4 \times 10^{-3}}$

$= 0.485$

Given

$d = 0.5\text{mm}$

$= 0.5 \times 0^{-3}\ m$

$D = 3.4 \times 10^{-3} m$

Answer to the question no-(3)

(a) $\theta_c = \frac{1}{\sin \mu_w}$

$= \frac{1}{0.023}$

$= 43.47$

Given:

$\mu_w = 1.33$

(b) At different angle to the surface will be chance because we know that $\theta_c = \sin^{-1} \frac{1}{\mu}$

Answer to the question no (4) (i)

if $t = 0$

$y_1 = 0$

$y_2 = b_2 \sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2} b_2$

the displacement $= y_2 - y_1$

$= \frac{\sqrt{3}}{2} b_2$

6(d)(ii)

$$y_1 = b_1 \sin \omega t$$

$$y_2 = b_2 \cdot \sin\left(\omega t + \frac{\pi}{3}\right)$$

here

amplitude and phase is not same

$$\therefore A = (b_1 + b_2)$$

$$\therefore V_{max} = \omega A$$

$$= \omega (b_1 + b_2)$$

(iii) the maximum acceleration

$$a_{max} = \omega^2 a$$

$$= \omega^2 (b_1 + b_2)$$