Metropolitan University
PHY 111: Physics I
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ASSIGNMENT-CHAPTER 18

CSE 54

(1-a) we know that,

$$f = \frac{v}{\lambda}$$

$$= \frac{243\ m/s}{0.0327\ m}$$

$$= 7431.19\ Hz$$

given,

$v = 243\ m/s$

$\lambda = 3.27\ cm$

$= 0.0327\ m$

∴ The frequency is $7.43 \times 10^3\ Hz$

(1-b) we know that,

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

$$= \frac{1}{7.43 \times 10^3\ Hz}$$

$$= 1.35 \times 10^{-4}\ s$$

given,

$f = 7.43 \times 10^3\ Hz$

∴ The period of the wave is $1.35 \times 10^{-4}\ s$.

(2-a) In 30s the boat performs 12 oscillation.

The frequency of wave is $f = \frac{12}{30s}$

$= 0.4\ Hz.$

(2-b) ~~Wave v~~ Wave crest reaches shore 15m away in 5.0s.

speed of the wave is $v = \frac{15m}{5s}$

$= 3\ m/s.$

(2-c) we know that,

$$\lambda = \frac{v}{f}$$

$$= \frac{3\ m/s}{0.40\ Hz}$$

$$= 7.5\ m.$$

given,

$v = 3\ m/s$

$f = 0.40\ Hz$

∴ The wavelength of the waves is 7.5 m.

(3-a) The time for a particular point to move from maximum displacement to zero displacement is 178 ms.

∴ The period $T = 4 \times 178\ ms$

$= 712\ ms$

$= 0.712\ s.$

(3-b) We know that,

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

$$= \frac{1}{0.712 s}$$

~~= 1.40 m~~

$$= 1.40 \text{ Hz}$$

Given,

$T = 718 \text{ ms}$

$= 0.712 \text{ s}$

∴ The frequency is 1.40 Hz

(3-c) We know that,

$$v = f\lambda$$

$$= 1.40 \text{ Hz} \times 1.38 \text{ m}$$

$$= 1.932 \text{ m/s}$$

Given,

$f = 1.40 \text{ Hz}$

$\lambda = 1.38 \text{ m}$

∴ The speed of wave is 1.932 m/s.

(7-a) The ideal equation of traveling wave is

$$y(x,t) = y_m \sin(kx - \omega t)$$

given equation is

$$y = (6.0\,cm)\sin[(2.0\pi\,rad/m)x + (9.0\pi\,rad/s)t]$$

if we compare ~~booth~~ both equation we get the amplitude $y_m = 6.0\,cm$

$$= 0.06\,m.$$

(7-b) we know that,

$$k = \frac{2\pi}{\lambda}$$

$$\lambda = \frac{2\pi\,rad}{2.0\pi\,rad/m}$$

$$= 1.0\,m$$

Given,

$k = 2.0\pi\,rad/m$

(17-b) We know that,

$$f = \frac{\omega}{2\pi}$$

$$= \frac{4.0\pi \text{ rad/s}}{2\pi \text{ rad}}$$

$$= 2.0 \text{ Hz}$$

Given,

$\omega = 4.0\pi$ rad/s

(17-d) We know that,

$$v = f\lambda$$

$$= 1.0 \times 2.0$$

$$= 2.0 \text{ m/s}$$

given,

$\lambda = 1.0$ m

$f = 2.0$ Hz

17-e The second term is positive so the wave is moving in the -x direction.

17-f