Question 6

A sinusoidal wave is described by the equation
$$y(x, t) = 2.0 \sin[5*x + 15*t]$$
in SI units. How far does this wave move in 15 seconds?
(a)   15 m.
(b)   45 m.
(c)   5 m.
(d)   55 m.
(e)   90 m.

17-5   The Speed of a Traveling Wave

Question 7

For a certain wave, the maximum transverse velocity is 6 m/s, and the maximum transverse acceleration is 12 m/s**2. Find the amplitude of this wave.
(a)   5 m.
(b)   3 m.
(c)   9 m.
(d)   1 m.
(e)   7 m.

Question 8

A sinusoidal wave traveling in the positive x direction has an amplitude of 10 cm, a wavelength of 20 cm, and a frequency of 5.0 Hz. A particle at $x = 0$ and $t = 0$ has a displacement of 10 cm. Write the equation of the displacement of the particles as a function of x and t.
(a)   y = (0.1 m)*sin[pi*(10x-10t-3/2)]
(b)   y = (0.1 m)*sin[pi*(10x+10t-3/2)]
(c)   y = (0.1 m)*sin(10x-10t+pi/2)
(d)   y = (0.2 m)*sin(pi*(10x+10t-3/2)]
(e)   y = (0.2 m)*sin[pi*(10x-10t+3/2)]

Question 9

A harmonic wave is described by y = 0.2*sin(25x-10t) (SI units). How far does a wave crest move in 20 sec?
(a)   20 m
(b)   5 m
(c)   8 m
(d)   50 m
(e)   0 m

Question 10

A transverse wave of 0.5-m wavelength is moving in a stretched string with a speed of 5 m/s. If the maximum transverse acceleration of the particles in the string is 80 m/s**2, find the amplitude of the wave.
(a)   4 cm
(b)   6 cm
(c)   8 cm
(d)   5 cm
(e)   2 cm

Question 11

A transverse sinusoidal wave traveling in the negative x direction has an amplitude of 10.0 cm, a wavelength of 20.0 cm, and a frequency of 8.00 Hz. Write the expression for y as a function of x(in meters) and t(in seconds)if y(0,0) = 10.0 cm.

(a)   y = (0.1 m) sin[20.0*x-8.00*t-(2*pi)]
(b)   y = (0.1 m) sin[20.0*x+8.00*t+(2*pi)]
(c)   y = (0.1 m) sin[31.4*x+50.3*t+(pi/2)]
(d)   y = (0.1 m) sin[31.4*x+50.3*t+pi]
(e)   y = (0.1 m) sin[31.4*x-50.3*t-(pi/2)]

Question 12

Ocean waves, with a wavelength of 12 m, are coming in at a rate of 20 crests per minute. What is their speed?

(a)   30 m/s
(b)   8.0 m/s
(c)   16 m/s
(d)   24 m/s
(e)   4.0 m/s

Question 13

The equation of a transverse wave traveling along a stretched string is given by:

$$y(x,t) = (2.0 \text{ mm}) \sin(20x-600t)$$

where x is in meter and t in sec. What is the transverse speed at x = 1 m and t = 0.5 seconds?

(a)   1.1 m/s
(b)   - 0.43 m/s
(c)   zero
(d)   0.52 m/s
(e)   - 0.21 m/s

Question 14

A sinusoidal wave is described as:

$$y = (0.1 \text{ m}) * \sin[10*pi*(x/5 +t-3/2)],$$

where x is in meters and t is in seconds. What are the values of its frequency(f), and its velocity(v)?

(a)   f=2 Hz, v = 1 m/s moving in -x-direction.
(b)   f=2 Hz, v = 1 m/s moving in +x-direction.
(c)   f=2 Hz, v = 5 m/s moving in -x-direction.
(d)   f=5 Hz, v = 5 m/s moving in -x-direction.
(e)   f=5 Hz, v = 5 m/s moving in +x-direction.

Question 15

A stretched string has a mass per unit length of 0.500 kg/m and is under a tension of 10.0 N. A sinusoidal wave on this string has an amplitude of 0.120 mm, a frequency of 100 Hz, and is traveling in the negative x direction. What is the equation of the wave ?

(a)   y = (0.120 mm) sin(444*x - 628*t)
(b)   y = (0.120 mm) sin(444*x + 628*t)
(c)   y = (0.120 mm) sin(140*x + 628*t)
(d)   y = (0.120 mm) sin(140*x - 628*t)
(e)   y = (0.060 mm) sin(140*x + 628*t)

17-05

Question 16
A sinusoidal wave is given by the equation:
     y(x,t) = 7.0 cos(-kx-wt+Phi).
Which of the following statements is true about this wave:
(a)   The wave is a standing wave.
(b)   The wave is moving to the positive x-axis.
(c)   The wave is moving with speed k/w.
(d)   The wave is moving to the negative x-axis.
(e)   The wave is moving with speed kw.

17-05
0.53-36%

Question 17
In a vibrating string waves travel a distance of 45 cm in 3.0 s. If the distance between two successive crests is 3.0 cm, what is the frequency of the vibrator causing the waves?
(a)   5.0 Hz.
(b)   20.0 Hz.
(c)   11.5 Hz.
(d)   15.0 Hz.
(e)   7.5 Hz.

17-05
0.44-31%

Question 18
A water wave is described by the equation:
     y(x,t) = 0.40 cos[0.10(x + 3t)]
where x and y are in meters and t is in seconds. The maximum transverse speed of the water molecules is
(a)   0.12 m/s.
(b)   4.11 m/s.
(c)   0.04 m/s.
(d)   0.22 m/s.
(e)   1.20 m/s.

17-05
0.43-28%
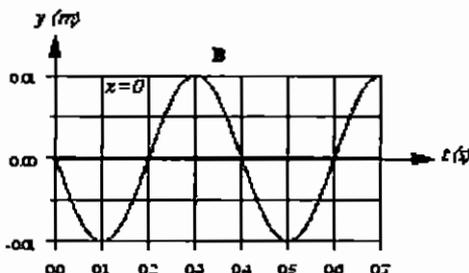
Question 19
A sinusoidal traveling wave is generated on a string. The speed of the wave is 0.050 m/s, and it is traveling to the right along the x-axis. Figure 1 shows the displacement of the particle of the string, at x=0, as a function of time. What is the equation of the wave? [y is given in meters]

Figure 1

(a)   y(x,t) = 0.01*sin[2*Pi(50x - 2.5t)]
(b)   y(x,t) = 0.02*sin[2*Pi(50x - 8.0t)]
(c)   y(x,t) = 0.01*sin[2*Pi(50x + 2.5t)]
(d)   y(x,t) = 0.01*sin[2*Pi(50x + 8.0t)]
(e)   y(x,t) = 0.01*sin[2*Pi(50x - 8.0t)]