Chapter 17

1- The equation for a standing wave is given by:
y = 4.00*10**(-3) sin(2.09 x) cos(60.0 t) (SI units).
What is the distance between two consecutive antinodes? [1.50 m]

2- A string under a tension of 15 N, is set into vibration to produce a wave of speed 20 m/s, and a maximum transverse speed of 8 m/s. For this wave, the average power is: [24 W]

3- Standing waves are produced in a string at the two consecutive resonant frequencies 155 and 195 Hz. If the mass of the string is 5.00 g and its length is 0.80 m, then the tension applied to the string should be: [25.6 N]

4- A transverse wave in a 3.0 m long string is given by the harmonic wave equation:

$$y = 0.4*\cos[\pi*(x/4 + 6t)] \text{ (SI units)}$$

If the string is kept under a constant tension of 70 N, find the power transmitted to the wave. [83 W]

5- 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. [y = (0.1 m)*sin[pi*(10x-10t-3/2)]]

6- A harmonic wave is described by y = 0.2*sin(25x-10t) (SI units). How far does a wave crest move in 20 sec? [8 m]

7- The equation of a wave traveling along a string, under a tension of 10 N, is given by:
y = (6.0 cm) sin(0.02*pi*x+40.0*pi*t), where x is in centimeters and t is in seconds. Determine the mass per unit length of the string. [25 g/m]

8- 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.[y = (0.1 m) sin[31.4*x+50.3*t+(pi/2)]]

9- A sinusoidal wave is described as: y = (0.1 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)? [f=5 Hz, v = 5 m/s moving in -x-direction.]

10- A 100-Hz oscillator is used to generate a sinusoidal wave, on a string, of wavelength 10 cm. When the tension in the string is doubled, the oscillator produces a wave with a frequency and wavelength of: [100 Hz and 14 cm]

11- The lowest resonant frequency, in a certain string clamped at both ends, is 50 Hz. When the string is clamped at its midpoint, the lowest resonant frequency is:[100 Hz]