17-11
Question 70 0.26-49%
A wave on a string is reflected from a fixed end. The reflected wave:
(a) is in phase with the original wave at the fixed end.
(b) has a larger amplitude than the original wave.
(c) is 180 degrees out of phase with the original wave at the fixed end.
(d) cannot be transverse.
(e) has a larger speed than the original wave.

17-11
Question 71 0.54-32%
The wave function for a standing wave on a string is
y(x,t) = 2.0*sin(0.25*Pi*x)*cos(120*Pi*t)
where x and y are in centimeters and t is in seconds. What is the distance between two adjacent nodes ?
(a) 4.0 cm
(b) 6.0 cm
(c) 8.0 cm
(d) 2.0 cm
(e) 1.0 cm

17-11
Question 72 0.43-23%
A wave of speed 20 m/s on a string, fixed at both ends, has an equation for a standing wave given by:
y(x,t) = 0.05 sin(kx) cos(30t),
where x and y are in meters and t is in seconds. What is the distance between two consecutive nodes?
(a) 5.0 m.
(b) 0.1 m.
(c) 2.1 m.
(d) 3.2 m.
(e) 1.1 m.

17-11
Question 73 0.44-54%
A 200-cm string is fixed at both ends. The mass per unit length of the string is 0.0150 g/cm. The tension in the string is 600 N. If the string vibrates in three equal segments, what is its fundamental frequency?
(a) 950 Hz
(b) 632 Hz
(c) 475 Hz
(d) 158 Hz
(e) 1330 Hz

17-12 Standing Waves and Resonance

17-12
Question 74 0.46-28%
Consider a string fixed at both ends. It has consecutive standing wave modes with frequencies of 480 Hz and 600 Hz. The tension in the string is kept constant. Find the fundamental frequency.
(a) 480 Hz
(b) 300 Hz
(c) 150 Hz
(d) 120 Hz
(e) 500 Hz

17-12
0.51-46%

Question 75
A stretched string, fixed at both ends, vibrates in its fundamental frequency. To double the fundamental frequency of the same string, one can change the tension in the string by a factor of:
(a) SQRT(2)
(b) 1/(SQRT(2))
(c) 2
(d) 1/2
(e) 4

17-12
0.34-37%

Question 76
A string, 30.0 cm long, with a linear density of 0.65 g/m is set into vibration. It is found that normal modes of vibration are present ONLY at the frequencies of 880 Hz and 1320 Hz as the frequency of the source is varied over the range 500 Hz to 1500 Hz. What is the tension in the string?
(a) 56.4 N
(b) 50.4 N
(c) 45.3 N
(d) 36.5 N
(e) 78.2 N

17-12
0.38-37%

Question 77
A string of length L, mass per unit length mu, and tension F is vibrating at its fundamental frequency. What is the effect on the fundamental frequency if the length of the string is doubled and the tension is quadrupled?
(a) The fundamental frequency is doubled.
(b) The fundamental frequency is quadrupled.
(c) The fundamental frequency is halved
(d) The fundamental frequency does not change.
(e) The fundamental frequency is tripled.

17-12

Question 78
A standing wave is established in a 3.0-m-long string fixed at both ends. The string vibrates in three segments with an amplitude of 1.0 cm. If the wave speed is 100 m/s, what is the frequency?
(a) 25 Hz
(b) 100 Hz
(c) 50 Hz
(d) 10 Hz
(e) 33 Hz

17-12

Question 79
A stretched wire vibrates in its fundamental mode at 300 Hz. What would be the fundamental frequency if the wire were one third the original length, with twice the diameter and with four times the tension?
(a) 900 Hz.
(b) 150 Hz.
(c) 450 Hz.
(d) 300 Hz.
(e) 800 Hz.

17-12

Question 80
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:
(a) 50 Hz.
(b) 150 Hz.
(c) 100 Hz.
(d) 200 Hz.
(e) 250 Hz.

17-12
0.39-42%

Question 81
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:
(a) 17.2 N.
(b) 6.4 N.
(c) 28.5 N.
(d) 19.0 N.
(e) 25.6 N.

17-12

Question 82
A standing wave pattern is established on a string as shown in Figure 1. The wavelength of the component traveling wave is

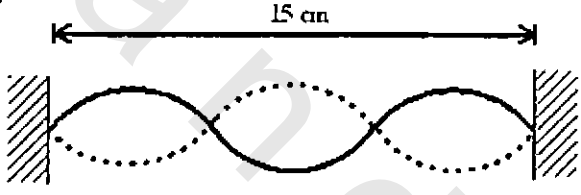

Fig. (1)

(a) 0.4 cm
(b) 15 cm
(c) 0.2 cm
(d) 5.0 cm
(e) 10 cm

17-12

Question 83
A string that is stretched between two supports separated by 1.0 m has resonant frequencies of 500 Hz and 450 Hz, with no intermediate resonant frequencies, what is the wave speed in the string?
(a) 200 m/s
(b) 50 m/s
(c) 350 m/s
(d) 500 m/s
(e) 450 m/s

17-12
0.55-37%

Question 84
A string fixed at both ends vibrates in three loops. The string has a length of 1.0 m, a mass of 8.0 g and is under a tension of 15 N. What is the frequency?
(a) 150 Hz
(b) 130 Hz
(c) 29 Hz
(d) 55 Hz
(e) 36 Hz

17-12
Question 85 0.52-22%
A string having a mass per unit length of 10.0 g/m is under a tension of 160 N. This string resonates in the mode shown in figure 1. If the length of this string is 90.0 cm, find the frequency of oscillation.

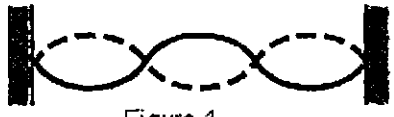

Figure 1

(a) 60.0 Hz
(b) 211 Hz
(c) 120 Hz
(d) zero
(e) 310 Hz

17-12
Question 86 0.38-35%
When a certain string is clamped at both ends, the lowest four resonant frequencies are 50, 100, 150 and 200 Hz. When the string is also clamped at its midpoint (without changing the tension), then the lowest four resonant frequencies are
(a) 50, 100, 150 and 200 Hz.
(b) 35, 50 , 75 and 100 Hz.
(c) 75, 150, 225 and 300 Hz.
(d) 50, 150, 250 and 300 Hz.
(e) 100, 200, 300 and 400 Hz.

17-12
Question 87
A string has linear density = 5.1 g/m and is under a tension of 120 N. If the vibrating length of the string is 60 cm, What is the lowest resonant frequency?
(a) 225 Hz.
(b) 128 Hz.
(c) 312 Hz.
(d) Not enough information.
(e) 158 Hz.

17-12
Question 88 0.53-44%
A 40 cm string of linear mass density 8.0 g/m is fixed at both ends. The string is driven by a variable frequency audio oscillator ranged from 300 Hz to 800 Hz. It was found that the string is set in oscillation only at the frequencies 440 Hz and 660 Hz. What is the tension in the string?
(a) 125 N.
(b) 496 N.
(c) 500 N.
(d) 322 N.
(e) 248 N.

17-12
Question 89 0.24-13%
A certain string, fixed at both ends, vibrates in seven segments at a frequency of 240 Hz. What frequency will cause it to vibrate in four segments?
(a) 411 Hz
(b) 89 Hz
(c) 137 Hz
(d) 274 Hz
(e) 420 Hz