National University of Computer and Emerging Sciences

FAST

LAHOREFALL 2023

Assignment # 2	**Applied Physics**	**Max. Marks: 50**
Section: BCS-1F	**Submission Date:**	**30th Oct, 2023 (Mon)**

Instructions:

1. *Solve the assignment questions in the space provided.*
2. *Assignment should be hand-written. Typed assignment will not be accepted.*
3. *Make diagrams/illustrations wherever possible.*

ROLL NO.: ---------- NAME: ----------

Question #1: A long clothesline is stretched horizontally between two trees. While shaking this clothesline up and down near one end at the rate of 4.0 cycles per second, you observe that the wavelength of the waves you generate is 1.0 m. What is the speed of these waves? If the distant end of the clothesline is 10 m away, how long does a wave pulse take to return to you?

(5)

Answer:

Question #2: The wave function $y\,(x, t) = (0.030\ \mathrm{m})\ \sin[(2.2 m^{-1})x - (3.5 s^{-1})\,t]$ is for a harmonic wave on a string. (a) In what direction does this wave travel and what is its speed? (b) Find the wavelength, frequency, and period of this wave. (c) What is the maximum displacement of any point on the string? (d) What is the maximum speed of any point on the string?

(15)

Answer:

Question #3: One end of a 6.0 m long string is moved up and down with simple harmonic motion at a frequency of 60 Hz. If the wave crests travel the length of the string in 0.50 s, find the wavelength of the waves on the string.

(5)

Answer:

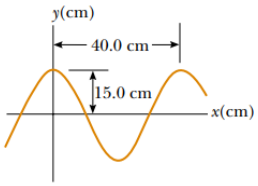
Question #4: A harmonic wave on a string with a frequency of 80 Hz and an amplitude of 0.025 m travels in the +*x* direction with a speed of 12 m/s. (a) Write a suitable wave function for this wave. (b) Find the maximum speed of a point on the string. (c) Find the maximum acceleration of a point on the string.

(10)

Answer:

Question #5: A sinusoidal wave traveling in the positive *x* direction has an amplitude of *15.0 cm*, a wavelength of *40.0 cm*, and a frequency of *8.00 Hz*. The vertical position of an element of the medium at *t = 0* and *x = 0* is also *15.0 cm*, as shown in Figure. (a) Find the wave number *k*, period *T*, angular frequency *ω*, and speed *v* of the wave. (b) Determine the phase constant *ϕ,* and write a general expression for the wave function.

(15)



Answer: