Assignment 7

The due date for submitting this assignment has passed.

For your records you have not submitted this assignment.

1. Which of the following does not change for a wave propagating from one medium to another medium? 1 point
   - Frequency
   - Wavelength
   - Speed
   - Amplitude
   - Phase
   - None of the above
   - Accepted Answer: None of the above

2. A message is transmitted over a wave packet. What is the speed with which the message is transmitted? 1 point
   - The angular phase velocity of the wave packet
   - The angular speed of the wave packet
   - The group velocity of the wave packet
   - None of the above
   - Accepted Answer: The group velocity of the wave packet

3. The frequency range of a wave packet is 30 Hz. What is the maximum time interval for which the form of the wave packet is unaltered? 1 point
   - 1/20 s
   - 1/10 s
   - 2/3 s
   - 4/3 s
   - Accepted Answer: 1/10 s

4. Waves are propagating through a string. The length of the string is 2 L, the mass of the string is 3.1 kg, and the uniform tension in the string is 1.9 N. 1 point
   - The linear mass density of the string is represented by the function \( \rho(x) = \text{constant} \) and is the distance in the string from the end. How much time does it take for a wave pulse to travel from one end of the string to the other? 1 point
   - \( 1/30 \) s
   - \( 1/15 \) s
   - \( 3/15 \) s
   - 4/3 s
   - Accepted Answer: 1/15 s

5. The ends of a string are attached to two fixed rigid walls such that the string is fixed and transverse. The length of the string is 2 L, and the linear mass density is \( \rho(x) = \text{constant} \). 1 point
   - A standing wave in the string is represented by the function \( u(x, t) = A \sin(\pi x/L) \cos(\pi t) \) where \( A \) is the amplitude constant and \( x \) is the position on the wave. Which of the total energy of the segment of the string between any two nodes of this standing wave? 1 point
   - 4\( x \), \( 4\pi x \), \( 4\pi \pi x \), \( 4\pi \pi \pi x \)
   - Accepted Answer: 4\( x \)

For Questions 6-8:

An Incident wave is represented by the function \( u(x, t) = 2 \cos(2\pi x - 3\lambda t) \), propagates through a string towards an interface with a second string at \( z = 0 \). 1 point

At the interface, the energy of the incident wave is transferred partly to the second string as the transmitted wave and partly back to the first string as the reflected wave. The speed of the transmitted wave is \( 2v \).

6. What is the speed of the incident wave? 1 point
   - 25 s
   - 23
   - 50 s
   - 30
   - Accepted Answer: 23

7. What is the amplitude of the transmitted wave? 1 point
   - 10
   - 5
   - 20
   - Accepted Answer: 5

8. Which of the following functions represents the reflected wave? 1 point
   - \( u(x, t) = 2 \cos(2\pi x - 3\lambda t) \)
   - \( u(x, t) = 2 \cos(2\pi x + 3\lambda t) \)
   - \( u(x, t) = 2 \cos(2\pi x - 3\lambda t) \)
   - Accepted Answer: 2 \cos(2\pi x + 3\lambda t)