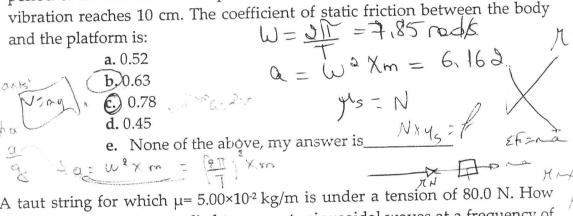
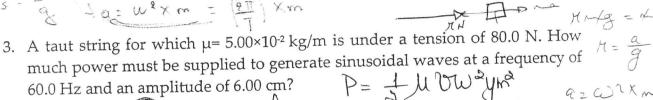
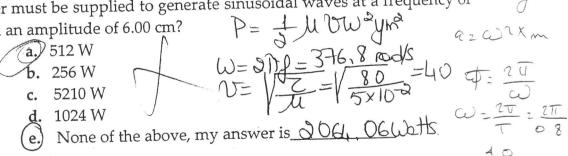
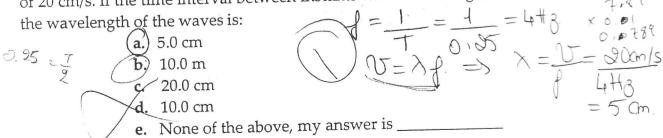


(e.) None of the above, my answer is



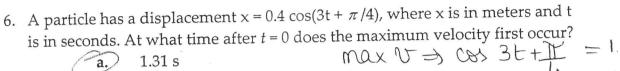




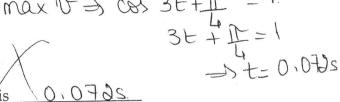


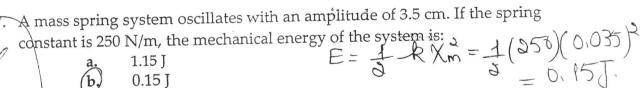
- 5. The amplitudes of two sinusoidal string waves are 3.0 cm and 4.0 cm, and they have the phase constants of 0 and  $\pi/2$  rad, respectively. They have the same frequency and they are traveling in the same direction and medium. When they are combined, the amplitude of the resultant wave is:  $y' = \sqrt{(3)^{\alpha} + (4)^{\alpha}} = 5 \text{ cm}$ 
  - a. 1.0 cm
  - b. 3.5 cm

  - **c.** 7.0 cm **d.** 5.0 cm
  - None of the above, my answer is



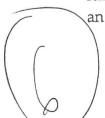
- b. 3.1 s
- 13.1 s C.
- 0.26 sd.
- None of above, my answer is \_ (e.)



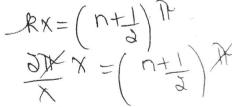


- 0.15 J
  - 1.1 T

  - None of the above, my answer is\_
- 8. Two sinusoidal waves combining in a medium are described by the wave functions  $y_1 = (3cm)\sin(\pi x + 0.6t)$  and  $y_2 = (3cm)\sin(\pi x - 0.6t)$ , where x is in cm an t in seconds. Antinodes could occur at:



- (a.) 1.5 cm
- 1.0 cm b.
- 2.0 cm C.
- 3.0 cm d.
- None of the above.





9. The position of a particle is given by  $x = 2.5 \cos \pi t$ , where x is in meters and t is in seconds. The acceleration of the particle when x = 1.5 m is

a. 
$$14.8 \text{ m/s}^2$$

d. 
$$-6.28 \text{ m/s}^2$$

$$Q = -W^2 \times m = (3.14)^2 (1.5)$$

$$= -44.8 \, \text{m/s}^{\frac{3}{2}}$$

10. Two identical waves, moving in the same direction along a stretched string, interfere with each other. The combined wave has an amplitude 1.5 times that of the common amplitude of the two combining waves. The phase difference between the two waves is:

(b) 
$$\pm 0.732 \, \text{rad}$$

c. 
$$\pm 41.4^{\circ}$$

d. 
$$\pm 0.23\lambda$$

1.5 
$$\frac{1.5}{3}$$
 =  $\frac{1.5}{2}$  = 0.75  
=>  $\frac{0}{2}$  =  $\frac{1}{2}$  cos 0.75  
=>  $0$  =  $\frac{1}{2}$  1.45 nod

## **PART II**

## Problem 1

A massless spring hangs from the ceiling. A small object is attached to its lower end. The object is initially held at rest in a position where the spring is unstretched and then released. It oscillates up and down, with its lowest position being 10 cm below the initial position.

- a) What is the frequency of the oscillation?
- b) What is the speed of the object when it is 8 cm below the initial position?

a) 
$$Xm = 90 \text{ cm} = 0.1 \text{ m}$$
  
 $\Sigma = 0.1 \text{ m}$   
 $\Sigma = 0.08 \text{ cm}$   
 $\Sigma = 0.08 \text{ cm}$ 

b) 
$$0 - 3 \cdot 8 \cdot cm$$
  
 $\kappa = -3$  in  $x(t) = 5 \cdot cm \cdot cos \cdot (49t) = 5 \cdot t = 0.4585$   
in  $0 \cdot (t) = -16 \cdot (0.05) \cdot sm \cdot (44 \times 0.458)$   
 $v = -0.56 \cdot m \cdot s$ 

## Problem 2

$$f=601+7\qquad \lambda=\frac{v}{f}=\frac{36}{60}$$

A string with both ends held fixed is vibrating in its second-harmonic mode. The waves have a speed of 36 m/s and a frequency of 60 Hz. The amplitude of the standing wave at an antinode is 0.6 cm.

a) Calculate the amplitude of the motion of points on the string a distance

of i) 30 cm;

0.6 ii) 15 cm; and

0.62 iii) 7.5 cm

from the left-hand end of the string.

X = X = 2: - (K x - - +)

12 = You Sim (Kxxwd).

b) At each of the points in part a), how much time does it take the string to go from its largest upward displacement to its largest downward Y'= Y, + Y2 = 2(Y~) sink \*(W+) displacement?

6

a) 
$$0 = 36 \text{ m/s}$$
  $f = 60 \text{ H/s}$ .  
i)  $f = 0$   $0 = 3(36) = 130 \text{ H/s} = 2 \text{ ym sinkx coord}$ .

(ii) f = 3(36) = 340 + 3.

$$\frac{3(0.15)}{3(0.075)} = \frac{73}{0.15} = 4.80 + 3 \times \frac{211}{5.6} = \frac{211}{6.6}$$

$$\frac{111}{3(0.075)} = \frac{73}{0.15} = 4.80 + 3 \times \frac{211}{6.6} = \frac{211}{6.6}$$

$$\frac{111}{3(0.075)} = \frac{36-15}{60 + 2}$$

$$\frac{111}{3(0.075)} = \frac{36-15}{60 + 2}$$

 $(5)(i)^{T} = \frac{1}{4} = \frac{1}{130} = 8.33 \times 40^{-3} \text{s.}$ 

ii) 
$$T = 1 = 4.166 \times 10^{-3} \text{ s}$$
  
 $340$ 
 $3.083 \times 10^{-3}$ 

$$340$$
 $t = \frac{1}{480} = 3.083 \times 10^{-3} \text{ s}$ 





