First major exam Phys -102 Term 992

(1)Q0 A transverse sinusoidal wave travels along a string of linear
16 Q0 mass density 5.00 g/m. The amplitude of the wave is 2.00 cm,
Q0 its frequency is 60.0 Hz, and the tension in the string is
Q0 20.0 N. What is the power transmitted by this wave?
Q0
A1 8.99 W
A2 90.0 W
A3 285 W
A4 2.54 W
A5 512 W
Q0
(2)Q0 The equation of a wave traveling along a string, under a
16 Q0 tension of 10 N, is given by:
Q0 y = (6.0 cm) sin(0.02*pi*x+40.0*pi*t),
Q0 where x is in centimeters and t is in seconds.
Q0 Determine the mass per unit length of the string.
Q0
A1 25 g/m
A2 60 g/m
A3 50 g/m
A4 10 g/m
A5 72 g/m
Q0
(3)Q0 A transverse sinusoidal wave traveling in the negative x
16 Q0 direction has an amplitude of 10.0 cm, a wavelength of 20.0 cm,
Q0 and a frequency of 8.00 Hz. Write the expression for y as a
Q0 function of x(in meters) and t(in seconds)if y(0,0) = 10.0 cm.
Q0
A1 y = (0.1 m) sin[31.4*x+50.3*t+(pi/2)]
A2 y = (0.1 m) sin[20.0*x-8.00*t-(2*pi)]
A3 y = (0.1 m) sin[20.0*x+8.00*t+(2*pi)]
A4 y = (0.1 m) sin[31.4*x-50.3*t-(pi/2)]
A5 y = (0.1 m) sin[31.4*x+50.3*t+pi]
Q0
(4)Q0 Transverse waves, with fixed amplitude, are being generated
16 Q0 on a rope under constant tension. When the frequency of the
Q0 wave is increased, which one of the following statements
Q0 is correct:
Q0
A1 The wavelength decreases and the transmitted power increases
A2 The wavelength increases and the transmitted power is the same
A3 The maximum transverse speed is the same and the transmitted
A3 power increases
A4 Both the wavelength and the linear mass density decrease

A5 Both the wavelength and the maximum transverse speed increase
Q0
(5)Q0 An ambulance siren emits a sound of frequency 1.60 kHz. A
17 Q0 person running with a speed of 2.50 m/s hears a frequency of
Q0 1.70 kHz as the ambulance approaches him from the back. How
Q0 fast is the ambulance moving? (speed of sound is 340 m/s).
Q0
A1 22.4 m/s
A2 17.7 m/s
A3 12.2 m/s
A4 25.6 m/s
A5 2.50 m/s
Q0
(6)Q0 A source of sound (1000 Hz) emits uniformly in all directions.
17 Q0 An observer 3.0 m from the source measures a sound level of
Q0 40 dB. Calculate the average power output of the source.
Q0
A1 1.13 micro-W
A2 2.87 micro-W
A3 0.34 micro-W
A4 10.5 micro-W
A5 5.23 micro-W
Q0
(7)Q0 Consider two sound waves A and B propagating in the same
17 Q0 medium. Find the ratio of the intensity of the sound wave A
Q0 to the intensity of the sound wave B if the sound level of
Q0 wave A is 20 dB greater than the sound level of wave B.
Q0
A1 100
A2 20
A3 5
A4 15
A5 10
Q0
(8)Q0 The equation for a standing wave is given by:
18 Q0 y = 4.00*10**(-3) sin(2.09 x) cos(60.0 t) (SI units).
Q0 What is the distance between two consecutive antinodes?
Q0
A1 1.50 m
A2 0.560 m
A3 2.20 m
A4 5.00 m
A5 3.00 m
Q0
(9)Q0 The frequencies of two consecutive harmonics of a pipe, closed
18 Q0 at one end, are 929 Hz and 1300 Hz. The length of the pipe is

Q0 0.450 m. What is the speed of the wave in the pipe?
Q0
A1 334 m/s
A2 343 m/s
A3 350 m/s
A4 340 m/s
A5 348 m/s
Q0
10 Q0 Two speakers are driven by a common oscillator and face each
18 Q0 other at a distance of 1.500 m. A man is standing at 0.700 m
Q0 from one of the speakers along the line joining the two
Q0 speakers. What is the highest frequency of the oscillator,
Q0 within the audible range (20.0 Hz to 20.0 kHz), so that the
Q0 man hears a minimum sound? (Speed of sound = 343 m/s).
Q0
A1 18.9 kHz
A2 19.9 kHz
A3 10.3 kHz
A4 12.6 kHz
A5 15.9 kHz
Q0
11 Q0 Fully DESTRUCTIVE interference between two sinusoidal waves
18 Q0 of the same frequency and amplitude occurs only if they:
Q0
A1 travel in the same direction and are 180 degrees out of phase
A2 travel in opposite directions and are 90 degrees out of phase
A3 travel in opposite directions and are in phase
A4 travel in the same direction and are 90 degrees out of phase
A5 travel in the same direction and are in phase
Q0
12 Q0 Which one of the following statements is wrong?
19 Q0
A1 Two bodies can be in thermal contact for a very long time
A1 without being in thermal equilibrium
A2 The density of most substances decreases when they are heated
A3 If two bodies are in thermal equilibrium than they must have
A3 the same temperature
A4 Generally liquids expand more than solids for the same
A4 temperature change
A5 Most solid materials contract when cooled
Q0
13 Q0 The volume expansion coefficient of benzene is
19 Q0 1.24*10**(-4) / C-degree. If a 100 cm**3 steel container is
Q0 filled with benzene when the temperature is 20.0 degrees-C,
Q0 how much benzene will spill over when the temperature is
Q0 raised to 50.0 degrees-C?

Q0 (neglect the thermal expansion of the steel container.)
Q0
A1 0.372 cm**3
A2 0.436 cm**3
A3 0.124 cm**3
A4 0.865 cm**3
A5 0.236 cm**3
Q0
14 Q0 A steel vessel contains 5 moles of an ideal gas at 0 degree-C
19 Q0 and a pressure of 1 atm. It is heated at constant volume until
Q0 its temperature is 100 degrees-C. How many moles of gas should
Q0 be removed from the container to keep the pressure of the gas
Q0 constant at 1 atm?
Q0
A1 1.34 moles
A2 0 moles
A3 4.32 moles
A4 3.66 moles
A5 2.45 moles
Q0
15 Q0 How much ice at -20 degrees-C must be mixed with 0.25 kg of
20 Q0 water, initially at 20 degrees-C, in order for the final
Q0 temperature to be 0 degrees-C with the ice all melted?
Q0 (neglect the heat capacity of the container.)
Q0 C(water) = 4186 J/Kg C-degrees, C(ice) = 2000 J/kg C-degrees
Q0 Lf(ice) = 33.4*10**4 J/kg.
Q0
A1 56 g
A2 63 g
A3 85 g
A4 75 g
A5 12 g
Q0
16 Q0 Which one of the following statements is true?
20 Q0
A1 In a cyclic process, the change in internal energy is zero
A2 In an adiabatic process, the heat flow is positive
A3 In an isovolumetric process, the work done is positive
A4 The internal energy of a system is not a state function
A5 In an isobaric process, the change in internal energy is
A5 always zero
Q0
17 Q0 Consider an isothermal compression of 0.1 moles of an ideal
20 Q0 gas at a temperature of 0 degree-C. The initial pressure of
Q0 the gas is 1 atm and the final volume is 1/5 the initial
Q0 volume. Find the thermal energy transfer for this process.

Q0
A1 365 J lost by the gas
A2 365 J gained by the gas
A3 0 J
A4 124 J lost by the gas
A5 124 J gained by the gas
Q0
18 Q0 A glass window has an area of 0.50 m**2 and a thickness
20 Q0 of 0.60 cm. If the rate of heat flow between the faces is
Q0 500 kJ/hour, find the temperature difference between the
Q0 window's faces. K(glass) = 0.80 W/m C-degrees.
Q0
A1 2.1 C-degrees
A2 3.5 C-degrees
A3 1.2 C-degrees
A4 12 C-degrees
A5 45 C-degrees
Q0
19 Q0 A cylinder contains 4 moles of a diatomic ideal gas (Cv = 5R/2)
21 Q0 at a temperature of 27 degrees-C and a pressure of 1.5 atm.
Q0 The gas is heated under constant pressure until its
Q0 temperature reaches 127 degrees-C. How much work is done by
Q0 the gas in this process?
Q0
A1 794 calories
A2 418 calories
A3 150 calories
A4 562 calories
A5 986 calories
Q0
20 Q0 Consider 100 g of helium (He) gas at 77 K. How much heat
21 Q0 energy must be supplied to the gas to increase its
Q0 temperature to 24 degrees-C, if the process is isovolumetric?
Q0 (M(He) = 4 g/mole and He is a monatomic gas.)
Q0
A1 69 kJ
A2 71 kJ
A3 43 kJ
A4 24 kJ
A5 12 kJ