Phys102-Final Exam - 012

Q1 Q0 Figure (1) shows two different wires, joined together end to
012Q0 end, and are driven by a vibrator of frequency 120 Hz. Wire(2)
17 Q0 has a linear density four times that of wire(1). If a wave
Q0 has a wavelength of 1 m in wire(1), what is the wavelength
Q0 of the wave in wire(2)?
Q0
A1 0.5 m.
A2 2.0 m.
A3 1.5 m.
A4 0.3 m.
A5 4.0 m.
Q0
Q2 Q0 You are standing at a distance D from a point source of sound
18 Q0 wave. You walk 30.0 m toward the source and observe that the
Q0 intensity of these waves has doubled. Calculate the distance D.
Q0
A1 102 m.
A2 300 m.
A3 232 m.
A4 493 m.
A5 15 m.
Q0
Q3 Q0 A 1024 Hz tuning fork is used to obtain a series of resonance
18 Q0 levels in a gas column of variable length, with one end closed
Q0 and the other open. The length of the column changes by 20 cm
Q0 from one resonance to the next resonance. From this data, the
Q0 speed of sound in this gas is:
Q0
A1 410 m/s.
A2 20 m/s.
A3 51 m/s.
A4 102 m/s.
A5 205 m/s.
Q0
Q4 Q0 Which of the following statements are true?
19 Q0
Q0 (I) Temperatures that differ by 10 C-degrees must differ by
Q0 18 F-degrees.
Q0 (II) Zero degree-C is the lowest temperature that one can
Q0 reach.
Q0 (III) Heat conduction refers to the transfer of thermal energy
Q0 between objects in contact.
Q0 (IV) The entropy of a system never decreases.
Q0 (V) Heat is a form of energy.
Q0
A1 I, III, and V.
A2 I, II, and IV.
A3 II, III, and IV.
A4 I, III, and IV.
A5 II, III, and V.
Q0
Q5 Q0 The temperature of a 0.5 kg sample in a glass cup increases
19 Q0 by 20 C-degrees when 2.8*10**4 J of heat are added. The cup

PDF created with pdfFactory trial version www.pdffactory.com

Q0 absorbs 9.0*10**3 J of the heat added. What is the specific
Q0 heat of the sample?
Q0
A1 1900 J/(kg*K).
A2 475 J/(kg*K).
A3 226 J/(kg*K).
A4 1475 J/(kg*K).
A5 275 J/(kg*K).
Q0
Q6 Q0 Find the rms speed of nitrogen molecules (M=28 g/mole) at
20 Q0 0 degree-C.
Q0
A1 4.9*10**2 m/s.
A2 3.9*10**2 m/s.
A3 3.2*10**2 m/s.
A4 1.7*10**2 m/s.
A5 zero.
Q0
Q7 Q0 A Carnot refrigerator has a coefficient of performance
012Q0 equal to 6. If the refrigerator expels 80 J of heat to
21 Q0 a hot reservoir in each cycle, find the heat absorbed
Q0 from the cold reservoir.
Q0
A1 69 J.
A2 21 J.
A3 15 J.
A4 30 J.
A5 5 J.
Q0
Q8 Q0 One mole of an ideal gas is taken through the cycle shown in
012Q0 the T-S diagram of figure (2). Calculate the efficiency of
21 Q0 the cycle.
Q0
A1 0.50.
A2 0.82.
A3 0.20.
A4 0.46.
A5 0.60.
Q0
Q9 Q0 A mass with a charge "Q" is suspended in equilibrium from
22 Q0 a beam balance. A point charge q = + 10 micro-C is then
012Q0 fixed at a distance d = 5.0 cm below "Q" and an extra mass
Q0 m = 4.0 g has to be placed on the pan to obtain equilibrium,
Q0 see figure (3). Find the value of the charge "Q".
Q0
A1 - 1.1*10**(-9) C.
A2 + 1.1*10**(-9) C.
A3 - 3.3*10**(-9) C.
A4 + 3.3*10**(-9) C.
A5 + 6.2*10**(-9) C.
Q0
Q10Q0 In figure (4), what is the magnitude of the electric field
23 Q0 at point P due to the four point charges shown?
012Q0

PDF created with pdfFactory trial version www.pdffactory.com

A1 zero
A2 5*q N/C.
A3 12*q N/C.
A4 q*Sqrt(2) N/C.
A5 90*q N/C.
Q0
Q11Q0For the electric field:
Q0 ->
Q0 E = (24 i + 30 j + 16 k) N/C,
24 Q0 the electric flux through a 2.0 m**2 portion of the yz-plane
012Q0 is:
Q0 (i, j, and k are the unit vectors in the directions of x,
Q0 y, and z, respectively).
Q0
A1 48 N*m**2/C.
A2 32 N*m**2/C.
A3 92 N*m**2/C.
A4 80 N*m**2/C.
A5 60 N*m**2/C.
Q0
Q12Q0 Suppose that a potential function is given by the relation:
25 Q0 V(x) = (3*x**2 - 15*x + 7) Volts
Q0 where x is in meters. The electric field strength is zero
Q0 at x = :
Q0
A1 2.5 m.
A2 5.0 m.
A3 -3.0 m.
A4 9.3 m.
A5 -9.3 m.
Q0
Q13Q0 Three identical capacitors have a capacitance of 3.0*10**(-6)F
26 Q0 each. The equivalent capacitance of their series connection
Q0 is "Cs" and the equivalent capacitance of their parallel
Q0 connection is "Cp". The ratio Cs/Cp is:
Q0
A1 1/9.
A2 1/4.
A3 2.
A4 1.
A5 9.
Q0
Q14Q0 A cylindrical copper rod has resistance R. It is reformed to
27Q0 half of its original length with no change in the volume.
Q0 It's new resistance is:
Q0
A1 R/4.
A2 2*R.
A3 R.
A4 8*R.
A5 R/2.
Q0
Q15Q0 In figure (5), all the resistors have a value of 2 Ohms. The
28 Q0 battery is ideal with an emf = 15 V. What is the potential

PDF created with pdfFactory trial version www.pdffactory.com

Q0 difference across the resistor R3?
Q0
A1 3.0 Volts.
A2 5.0 Volts.
A3 15 Volts.
A4 1.5 Volts.
A5 2.5 Volts.
Q0
Q16Q0 At t=0, a 2.0*10**(-6) Farad capacitor is connected in series
28 Q0 to a 20-V battery and a 2.0*10**6 Ohm resistor. How long does
Q0 it take for the potential difference across the capacitor to
Q0 be 12 V?
Q0
A1 3.7 s.
A2 2.0 s.
A3 2.8 s.
A4 1.2 s.
A5 0.6 s.
Q0
Q17Q0 A portion of a circuit is shown in figure (6), with the
28 Q0 values of the currents given for some branches. What is
Q0 the direction and value of the current I?
Q0
A1 Down, 6 A.
A2 Up, 6 A.
A3 Down, 4 A.
A4 Up, 4 A.
A5 Down, 2 A.
Q0
Q18Q0 The current in the 5.0-ohm resistor in the circuit shown
28 Q0 in figure (7) is:
Q0
A1 5.0 A.
A2 0.42 A.
A3 0.67 A.
A4 2.4 A.
A5 3.0 A.
Q0
Q19Q0 In figure (8), what is the potential difference Va-Vb
28 Q0
Q0
A1 26 V.
A2 10 V.
A3 8 V.
A4 6 V.
A5 2 V.
Q0
Q20Q0 Particle #1 (of mass m and charge q) and another particle #2
29 Q0 (of mass 3 m and charge q) are accelerated through a common
012Q0 potential difference V. The two particles enter a uniform
Q0 magnetic field B along a direction perpendicular to B. If
Q0 particle #1 moves in a circular path of radius r1, then the
Q0 radius r2 of the circular path of particle #2 is:
Q0

PDF created with pdfFactory trial version www.pdffactory.com

A1 r1*Sqrt(3).
A2 2.0*r1.
A3 r1*Sqrt(5).
A4 r1*Sqrt(2).
A5 r1*Sqrt(6).
Q0
21 Q0 Which of the following statements are true?
29 Q0
Q0 (I)   The magnetic field unit is the tesla.
Q0 (II) A magnetic field cannot change the kinetic energy of
Q0   a charged particle.
Q0 (III) A charged particle moving parallel to a magnetic field
Q0   will be deflected.
Q0 (IV) The unit of magnetic dipole moment is ampere/meter.
Q0
A1   I, and II.
A2   II, and III.
A3   II, III, and IV.
A4   I, III, and IV.
A5   III, and IV.
Q0
Q20Q0 In figure (9), a loop of wire carrying a current, I, of 3.0 A
29 Q0 is in the shape of a right triangle with two equal sides, each
002Q0 2.0 m long. A 2.0 T uniform magnetic field is in the plane of
Q0 the triangle and is parallel to the hypotenuse. The resultant
Q0 torque on the loop is:
Q0
A1   12   N*m.
A2   24   N*m.
A3   16   N*m.
A4   3   N*m.
A5   15   N*m.
Q0
Q23Q0 At one instant an electron is moving with a velocity:
Q0   ->
29Q0   v = (5*10**5 i + 3*10**5 j) m/s
Q0   ->
Q0 in a magnetic field of B = (0.8 i) T.
Q0 At that instant the magnetic force on the electron is:
Q0 (i, j, and k are the unit vectors in the directions of x,
Q0 y, and z, respectively).
Q0
A1   3.8*10**(-14) k N.
A2 - 3.8*10**(-14) k N.
A3   6.4*10**(-14) k N.
A4   7.5*10**(-14) j N.
A5 - 6.4*10**(-14) k N.
Q0
Q24Q0 Figure (10) shows four long straight wires passing through
30 Q0 the plane of the paper. They are fixed at the corners of a
012Q0 square of diagonal 2.0 cm. Each wire carries a current of
Q0 2 A. Three of them are out of the paper and one is into the
Q0 paper. The magnitude of the magnetic field at the center
Q0 "C" of the square has magnitude:

PDF created with pdfFactory trial version www.pdffactory.com

Q0
A1 8.0*10**(-5) T.
A2 1.0*10**(-5) T.
A3 3.0*10**(-5) T.
A4 5.1*10**(-6) T.
A5 zero.
Q0
Q25Q0 Three parallel wires lie in the xy-plane. The separation
30 Q0 between adjacent wires is 0.1 m, and each wire carries a
Q0 10-A current in the same direction. Find the magnitude
Q0 of the net force per unit length on one of the outer wires.
Q0
A1 3.0*10**(-4) N.
A2 1.1*10**(-4) N.
A3 5.0*10**(-7) N.
A4 6.0*10**(-4) N.
A5 7.5*10**(-4) N.
Q0
Q26Q0 A circular loop of radius 0.1 m has a resistance of 6 Ohms.
30 Q0 If it is attached to a 12 V battery, how large a magnetic
Q0 field is produced at the center of the loop?
Q0
A1 1.3*10**(-5) T.
A2 5.2*10**(-5) T.
A3 3.0*10**(-5) T.
A4 0.5*10**(-5) T.
A5 zero.
Q0
Q27Q0 Which one of the following statements is True?
30 Q0
Q0
A1 A uniform magnetic field can be found at the center of a
A1 solenoid.
A2 The torque on a magnetic dipole is zero when it is in a
A2 uniform magnetic field.
A3 The magnetic field is smallest where the field lines are
A3 closest.
A4 If the current in each of two parallel current-carrying
A4 wires is doubled, the force between them will be doubled.
A5 The magnetic field due to a long straight wire increases with
A5 increasing distance from the wire.
Q0
Q28Q0 Solenoid 2 has twice the radius and six times the number of
30 Q0 turns per unit length as solenoid 1. If they have the same
012Q0 current, then the ratio of the magnetic field in the interior
Q0 of 2 to that in the interior of 1 is:
Q0
A1 6.
A2 3.
A3 2.
A4 12.
A5 1/3.
Q0
Q29Q0A rectangular loop of wire is placed midway between two long

PDF created with pdfFactory trial version www.pdffactory.com

31 Q0 straight parallel conductors as shown in figure (11). The
012Q0 conductors carry currents i1 and i2 as indicated. If i1 is
Q0 increasing and i2 is constant, then the induced current in
Q0 the loop is:
Q0
A1 counterclockwise.
A2 zero.
A3 clockwise.
A4 depends on i1 - i2.
A5 depends on i1 + i2.
Q0
Q30Q0 The square coil shown in figure(12) is 20 cm on a side and
31 Q0 has 15 turns of wire on it. It is moving to the right at
Q0 2 m/s. Find the induced emf in it at the instant shown,
Q0 and the direction of the induced current in the coil. (The
Q0 magnetic field is 0.2 T and its direction is out of the page.)
Q0
A1 1.2 V, clockwise
A2 1.2 V, counter-clockwise
A3 3.6 V, counter-clockwise
A4 3.6 V, clockwise
A5 zero

PDF created with pdfFactory trial version www.pdffactory.com

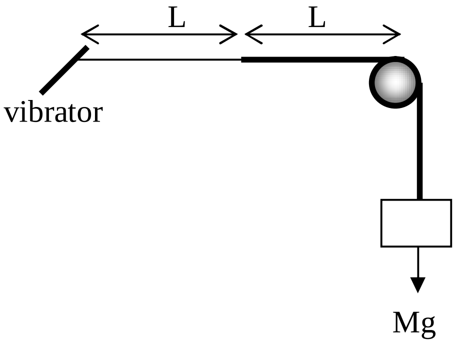

Fig.1

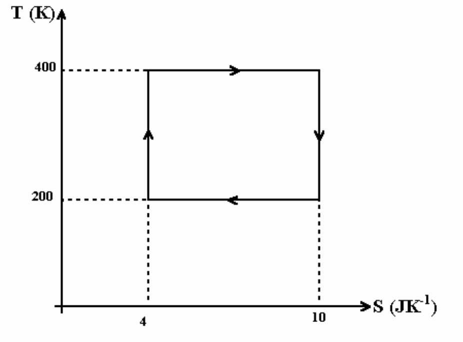

Fig.2

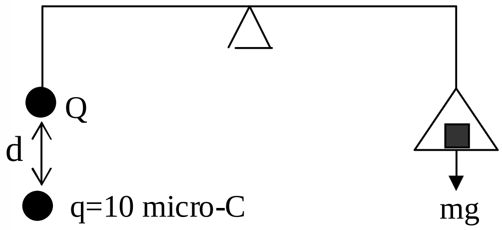

Fig.3

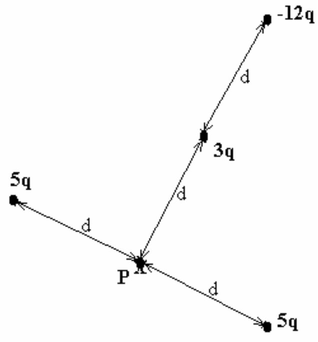

Fig.4

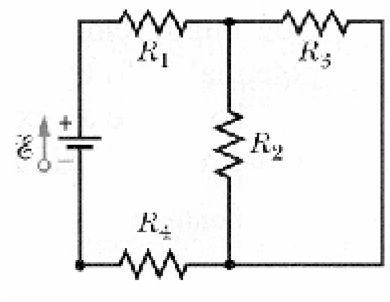

Fig.5

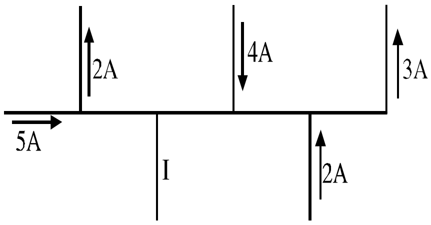

Fig.6

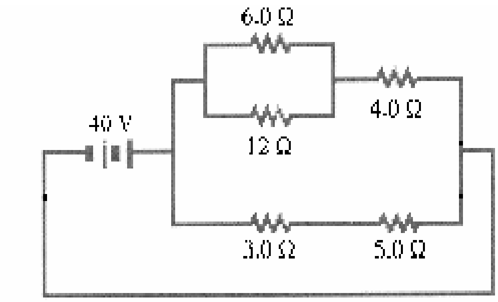

Fig.7

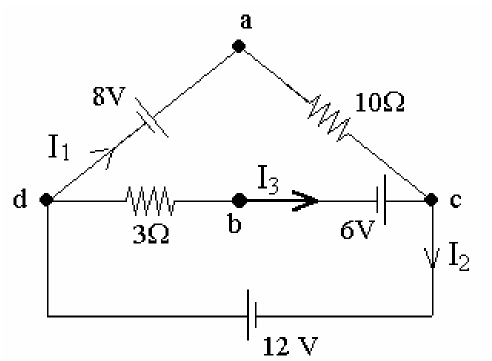

Fig.8

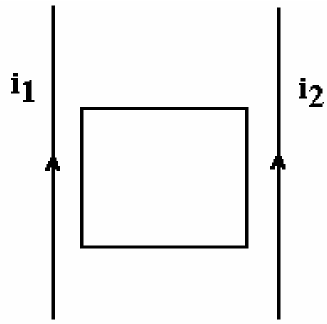

Fig.11

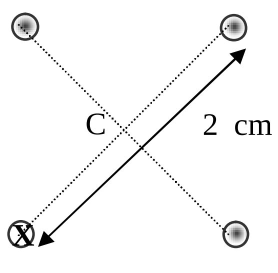

Fig.10

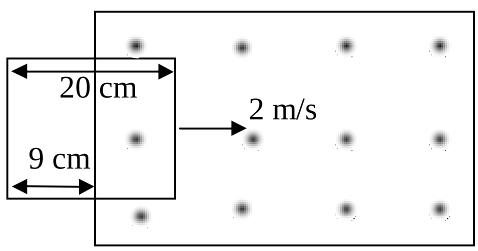

Fig.12

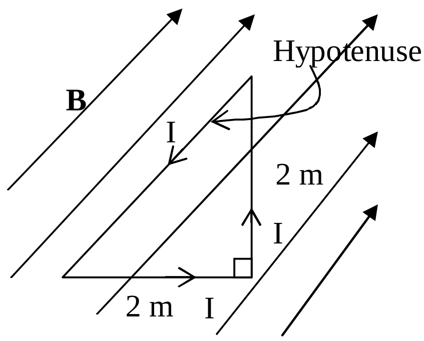

Fig.9

PDF created with pdfFactory trial version www.pdffactory.com