Final Exam
T-031

1 Q0 A tuning fork, of frequency of 512 Hz, is used to generate
Q0 the fundamental resonance in an open, at both ends, air tube
Q0 of length 30 cm. The frequency of the fork that used to
Q0 generate the fundamental resonance in the same air column
Q0 when one of its ends is closed is:
Q0
A1 256 Hz.
A2 512 HZ.
A3 128 HZ.
A4 1024 HZ.
A5 64 Hz.
Q0
2 Q0 The volume of an oxygen container is 50.0 L. As oxygen leaks
Q0 from the container, the pressure inside the container drops
Q0 from 21.0 to 9.00 atm, and its temperature drops from
Q0 303 to 283 K. The number of moles that leaks from the
Q0 container is:
Q0
A1 22.8 mol.
A2 42.2 mol.
A3 19.4 mol.
A4 11.1 mol.
A5 65.3 mol.
Q0
3 Q0 A sound wave travels from air to water, then
Q0
A1 its speed increases.
A2 its frequency increases.
A3 its speed decreases.
A4 its frequency decreases.
A5 its wavelength will remain unchanged.
Q0
4 Q0 The whistle on a train generates a tone of 440 Hz as the train
Q0 approaches a station at 30.0 m/s. Find the frequency that a
Q0 stationary observer standing at the station will hear.
Q0 (assume the speed of sound = 330 m/s.)
Q0
A1 484 Hz.
A2 493 Hz.
A3 472 Hz.
A4 440 Hz.
A5 528 Hz.
Q0
5 Q0 The ratio of the intensities of two sound waves is 5.
Q0 Find the difference in their intensity levels.
Q0
A1 7 dB.
A2 4 dB.
A3 2 dB.
A4 1 dB.
A5 6 dB.
Q0
6 Q0 The average translation kinetic energy of an ideal gas
Q0 of helium atoms at room temperature (300 Kelvin) is
Q0 5.54*10**(-21) J. The average translation kinetic energy
Q0 of the ideal argon gas at room temperature is:

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   Q0 [Atomic mass of helium = 2.0 Kg/Kmole,
   Q0  Atomic mass of argon  = 8.0 Kg/Kmole]
   Q0
   A1   5.54*10**(-21) J.
   A2   1.11*10**(-20) J.
   A3   2.21*10**(-20) J.
   A4   2.77*10**(-21) J.
   A5   1.40*10**(-21) J.
   Q0
   Q0
7  Q0 A bar of copper is heated from 280 K to 300 K. Which of the
   Q0 following statements is NOT TRUE?
   Q0
   A1   Its density will increase slightly.
   A2   Its length will increase slightly.
   A3   Its electrical resistance will increase slightly.
   A4   Its mass will remain unchanged.
   A5   Its weight will remain unchanged.
   Q0
8  Q0 In a vibrating string waves travel a distance of 45 cm in
   Q0 3.0 s. If the distance between two successive crests is
   Q0 3.0 cm, what is the frequency of the vibrator causing
   Q0 the waves?
   Q0
   A1    5.0 Hz.
   A2    7.5 Hz.
   A3   11.5 Hz.
   A4   20.0 Hz.
   A5   15.0 Hz.
   Q0
9  Q0 5.00 kg of water is to be cooled from 100 to 0 degrees-C.
   Q0 The quantity of ice needed is:
   Q0 [For water: the specific heat = 4.19 kJ/(kg.K)
   Q0 and the latent heat of fusion = 333 kJ/kg.]
   Q0
   A1  6.29 kg.
   A2  0.89 kg.
   A3  4.25 kg.
   A4  12.5 kg.
   A5  9.22 kg.
   Q0
10 Q0 An ideal heat engine has a power output of 200 W. The engine
   Q0 operates between two reservoirs at 300 K and 600 K.
   Q0 How much energy is absorbed per hour?
   Q0
   A1   1.44*10**6 J.
   A2   1.92*10**6 J.
   A3   6.31*10**3 J.
   A4   5.46*10**6 J.
   A5   1.93*10**5 J.
   Q0
11 Q0 Two moles of helium gas (monatomic) are initially at
   Q0 a temperature of 27.0 degrees-C and occupy a volume
   Q0 of 20.0 liters. The helium gas is expanded at constant
   Q0 pressure until its volume is doubled. Find the change
   Q0 in the internal energy.
   Q0
   A1   7.5*10**3 J.
   A2   9.2*10**3 J.
   A3   1.3*10**3 J.
   A4   5.4*10**6 J.
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A5   1.9*10**5 J.
Q0
12 Q0 A noncoducting shell has a uniform negative charge of
Q0 magnitude 5.0*10**(-5) C. Its inner and outer radii
Q0 are 5.0 cm and 6.0 cm, respectively. The electric
Q0 field at r = 3.0 cm, from the center, is:
Q0
A1   zero.
A2   1.5*10**9 N/C, inward.
A3   1.5*10**9 N/C, outward.
A4   4.5*10**9 N/C, inward.
A5   4.5*10**9 N/C, inward.
Q0
Q0
13 Q0 An isolated conducting sphere whose radius R is 2.00 cm has
26 Q0 a charge q = 16.0*10(-9) C. What is the energy density at
Q0 the surface of the sphere?
Q0
A1   0.57 J/m**3.
A2   1.22 J/m**3.
A3   3.66 J/m**3.
A4   0.01 J/m**3.
A5   2.22 J/m**3.
Q0
14 Q0 A cylindrical wire of radius R = 2.0 mm has a uniform current
27 Q0 density J = 2.0*10**(5) A/m**2. What is the current through
Q0 the portion of the wire between radial distances R/3 and R/2?
Q0 (see figure 1)
Q0
A1 0.35 A.
A2 3.73 A.
A3 1.95 A.
A4 5.31 A.
A5 9.11 A.
Q0
15 Q0 A heater element of resistance 10**3 Ohm is constructed
27 Q0 to operate at 110 V. How much thermal energy is produced
Q0 in one hour by the heater?
Q0
A1 4.4*10**4 J.
A2 1.9*10**5 J.
A3 6.2*10**5 J.
A4 5.1*10**2 J.
A5 2.2*10**7 J.
Q0
16 Q0 In figure 2, a battery of emf of 12-Volt and internal
28 Q0 resistance of r = 3.0 Ohm is connected to a bulb of
Q0 resistance R. If the bulb will light at a steady current
Q0 of 0.1 A, what should the value of R be?
Q0
A1   117 Ohm.
A2   40 Ohm.
A3   130 Ohm.
A4   35 Ohm.
A5   200 Ohm.
Q0
17 Q0 A resistor R = 30*10**6 Ohm is connected in series with
28 Q0 a capacitor C = 3.0 micro-F and a 21-Volt battery for
Q0 long time. The battery was removed, then R and C are
Q0 connected in a loop. What is the energy stored in the
Q0 capacitor C after one minute?

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   Q0
   A1   174 micro-J.
   A2    47 micro-J.
   A3   204 micro-J.
   A4    24 micro-J.
   A5    11 micro-J.
   Q0
18 Q0 In figure 3, if R = 10 Ohm find the current in R.
28 Q0
   Q0
   A1   - 0.2 A.
   A2     0.2 A.
   A3   - 0.4 A.
   A4     0.4 A.
   A5   - 1.1 A.
   Q0
 19Q0 What is the power dissipated in 4.0 Ohm resistor in Figure 4.
 28Q0
   A1   9.0  W.
   A2   3.0  W.
   A3   1.2  W.
   A4   6.0  W.
   A5   4.3  W.
   Q0
20 Q0 An electron that has velocity
29 Q0
   Q0          ->             ^
   Q0          v =  3.2*10**7 i m/s
   Q0
   Q0 traveling parallel to a uniform magnetic field of strength
   Q0 2.60*10**(-3) Tesla. The force on the electron is:
   Q0  ^
   Q0 [i is the unit vectors in the directions of x]
   Q0
   A1   zero.
   A2   6.1*10**(-15) N.
   A3   2.3*10**(-15) N.
   A4   1.4*10**(-15) N.
   A5   5.0*10**(-15) N.
   Q0
21 Q0 A straight horizontal length of copper wire is located in a
29 Q0 place where the magnetic field of the earth B = 0.5*10**(-4)T
   Q0 (see figure 5). What minimum current in the wire is needed
   Q0 to balance the gravitational force on the wire?
   Q0 [The linear density of the wire is 60.0 gram/m]
   Q0
   A1   1.2*10**4  A into the page.
   A2   1.2*10**4  A out of the page.
   A3   4.3*10**4  A into the page.
   A4   4.3*10**4  A out of the page.
   A5   3.2*10**4  A into the page.
   Q0
22 Q0 The path of a charged particle in a magnetic field, when
29 Q0 its direction of motion is not at right angle to the
   Q0 magnetic field, will be a:
   Q0
   A1   helix.
   A2   circle.
   A3   parabola.
   A4   straight line.
   A5   hyperbola.
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   Q0
23 Q0 An electron moving at right angle to a uniform magnetic
29 Q0 field completes a circular orbit in 10**(-8) s. What
   Q0 is the magnitude of the magnetic field.
   Q0
   A1   3.6*10**(-3) T.
   A2   2.5*10**(-3) T.
   A3   1.0*10**(-3) T.
   A4   4.2*10**(-3) T.
   A5   6.3*10**(-3) T.
   Q0
24 Q0 Two parallel wires, carrying equal currents of 10 A, attract
30 Q0 each other with a force F. If both currents are doubled,
   Q0 and the distance between them reduced by 50%, the new force
   Q0 will be:
   Q0
   A1    8*F.
   A2   16*F.
   A3    4*F.
   A4      F.
   A5    F/4.
   Q0
 25Q0 Four long straight wires carry equal currents into page
 30Q0 as shown in Figure 6.  The magnetic force exerted on wire
   Q0 “A” is:
   Q0
   A1   East.
   A2   West.
   A3   North.
   A4   South.
   A5   Zero.
   Q0
26 Q0 Consider two solenoids, A and B, having the same current.
30 Q0 Solenoid B has twice the radius and six times the number
   Q0 of turns per unit length as solenoid A.  The ratio of
   Q0 the magnetic field in the interior of solenoid B to that
   Q0 in the interior of solenoid A is:
   Q0
   A1   6.
   A2   4.
   A3   3.
   A4   2 .
   A5   1.
   Q0
27 Q0 The segment of wire is formed into the shape as shown in
30 Q0 Figure 7 and carries a current I = 6 A. When R = 6.28 cm,
   Q0 what is the magnetic field at the point P?
   Q0
   Q0
   A1   3.0*10**(-5) T      into the page.
   A2   6.1*10**(-5) T      out of the page.
   A3   6.1*10**(-5) T      into the page.
   A4   3.0*10**(-5) T      out of the page.
   A5   Zero.
   Q0
28 Q0 A long straight wire is in the plane of a rectangular
31 Q0 conducting loop as shown in Figure 8.  The straight
   Q0 wire carries an increasing current “i” in the direction
   Q0 shown. The current in the rectangular is:
   Q0
   A1   counter clockwise.
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A2 clockwise.
A3 zero.
A4 clockwise in the left side and counter clockwise in
A4 the right side.
A5 counter clockwise in the left side and clockwise
A5 in the right side.
Q0
29 Q0 The circuit shown in figure 9 is in a uniform magnetic field
31 Q0 that is into the page and is decreasing in the magnitude
Q0 at the rate of 150 T/s. The current in the circuit is:
Q0
A1 0.22 A.
A2 0.15 A.
A3 0.40 A.
A4 0.18 A.
A5 0.62 A.
Q0
30 Q0 Figure 10 shows a bar moving to the right on two conducting
31 Q0 rails. To make an induced current in the direction
Q0 indicated, a constant magnetic field in region “A” should
Q0 be in what direction?
Q0
A1 Into the page.
A2 Out of the page.
A3 Left.
A4 Right.
A5 Impossible; this cannot be done with a constant
A5 magnetic field.

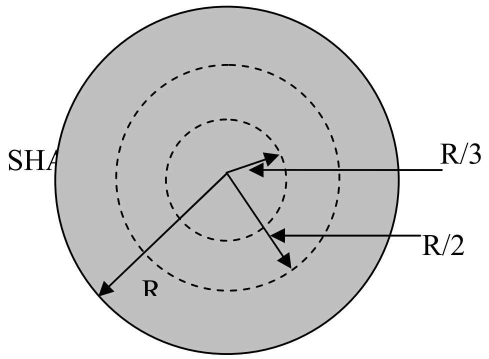

Figure 1

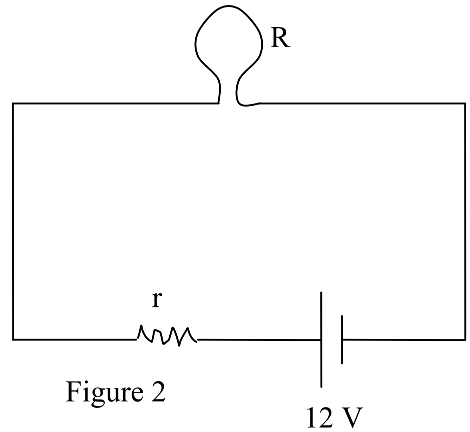

Figure 2

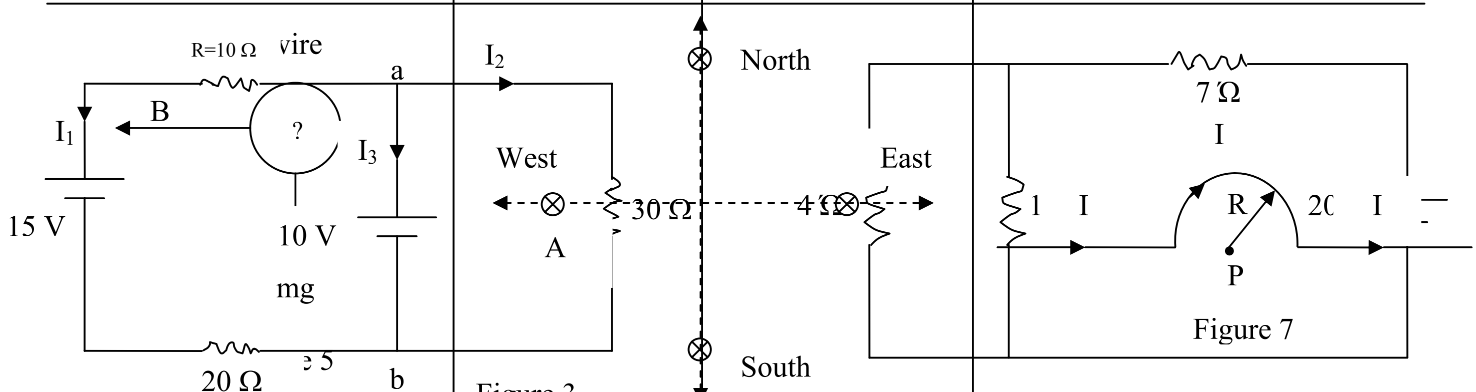

Figure 3

Figure 6

Figure 4

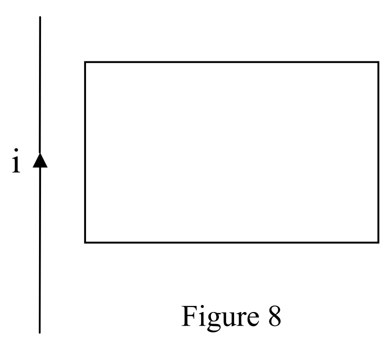

Figure 8

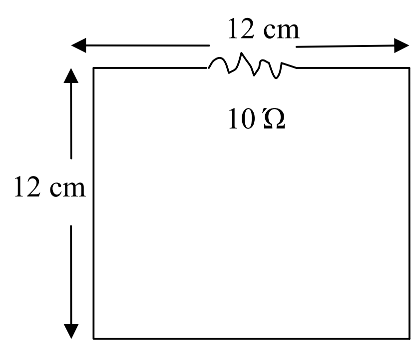

Figure 9

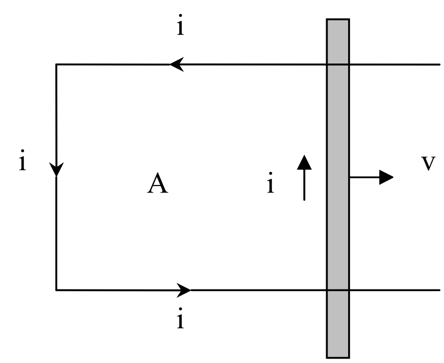

Figure 10