PHYS 212 (11 AM) Test #4 Spring 2012 Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

You can tear this page and use it as your worksheet.

Equations of kinematics are given below: (acceleration due to gravity = 9.8 m/s2, down)

Final velocity = *v*, Initial velocity = *v0*, Acceleration = *a*, Time interval = *t*, Displacement = *x-x0*

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g = 9.8 m/s2. $e=1.6 x 10^{-19}C$  Electron Mass = 9.11 x 10-31Kg
Coulomb’s law is given by,  (k = Coulomb’s constant = 9 × 109 N.m2/C2)

Magnetic force on a moving charge: 

Newton’s second law: **Fnet** = ma Kinetic energy = $\frac{1}{2}mv^{2}$

$i=\frac{dq}{dt}$ Power = P = iv = v2/R = i2R Ohm’s law: v = iR $R=ρ\frac{L}{A}$

Electric field at a distance r from a point charge (q) is given by, 
Gauss’ Law is given by, $ε\_{0}∮\_{}^{}\vec{E}∙\vec{dA}=q\_{enc}$. $(ε\_{0}=8.85×10^{-12} C^{2}/(N.m^{2})$
Volume of a sphere = $\frac{4}{3}πr^{3}$ Surface of a sphere = 4πr2 Density = Mass/Volume
Newton’s second law: **Fnet** = ma Kinetic energy = $\frac{1}{2}mv^{2}$

Avagadro’s number = 6.022 x 1023

PHYS 212 Spring 2011 Test #4 Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

I. For the following MC questions write your answer in the space next to the question #.

\_\_\_\_1. Ohm’s law is given by: v = iR. In this equation i is,
a. Voltage b. Potential difference c. Current d. Resistance

\_\_\_\_2. The current in a single-loop circuit with one resistance, *R* is 6 A. When an additional resistance of 2 Ω is inserted in series with *R*, the current drops to 5 A. What is *R*?
a. 2 Ω b. 4 Ω c. 5 Ω d. 6 Ω e. 8 Ω f. 10 Ω

\_\_\_\_3. The path of the integral is shown below when finding the magnetic field inside a long solenoid using the ampere’s law, . Which part of the path gives a non-zero value for the integral?



1. ab
2. bc
3. cd
4. da

\_\_\_\_4. Each of the eight conductors in the Figure below carries 5.00 A of current into or out of the page. Two paths are indicated for the line integral . What is the value of the integral for path 1?

a. 5μ0 T.m b. -5μ0 T.m c. 15μ0 T.m d. -15μ0 T.m
e. 10μ0 T.m f. -10μ0 T.m g. 20μ0 T.m h. -20μ0 T.m



5-6) Figure below shows the path of a proton that passes through two regions containing uniform magnetic fields of magnitudes *B*1 and *B*2. Its path in each region is a half-circle.



\_\_\_\_5. Which field is stronger?
a. B1 b. B2

\_\_\_\_6. The direction of B2 is,
a. into the page b. out of the page

Ohm’s law: v = iR R in Series = add; R in parallel= R-1=R1-1+ R2-1 +R3-1….

I. Figure below shows a portion of a circuit through which there is a current *I* = 5.0 A. The resistances are *R*1 = 3.0 Ω, *R*2 =6.0 Ω, *R*3 = 5.5 Ω, and *R*4 = 2.5 Ω. What is the current *i*1 (in A) through resistor 1?



II. In the figure below, the current in resistance 6 is *i*6 = 0.3 A and the resistances are *R*1 = *R*2 = *R*3 = 2.0 Ω, *R*4 = 4.0 Ω, *R*5 = 7.0 Ω, and *R*6 = 3.0 Ω. What is the emf of the ideal battery?



III. To make a galvanometer into a voltmeter, connect a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(high or low) resistance in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(parallel or series).

IV. The magnetic field due to a long straight wire, carrying a current I, at a distance r is given by;
(μ0= 4πx10-7 T.m/A)

 $B=\frac{μ\_{0}I}{2πr}$

a. Show the magnetic field, at both sides
of the long-wire carrying current I, using
crosses and dots, in the diagram.

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b. In the figure below, two long straight wires are perpendicular to the page and separated by distance *d*1 = 0.75 cm. Wire 1 carries 6.5 A into the page. What are the (a) magnitude and (b) direction (into or out of the page) of the current in wire 2 if the net magnetic field due to the two currents is zero at point *P* located at distance *d*2 = 1.50 cm from wire 2?

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V. Faraday’s law of induction is given by:

 

1. Describe the meaning of each term in the above equation including the minus sign.

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2. P7: In Fig. [30-36](http://edugen.wiley.com/edugen/courses/crs4957/halliday9118/halliday9088c30/halliday9118/halliday9088c30/halliday9088c30xlinks.xform?id=halliday9088c30-fig-0036), the magnetic flux through the loop increases according to the relation *ΦB* = 5t4+ 4*t*3 + 3*t*2 + 2*t*, where *ΦB* is in milliwebers and *t* is in seconds. What is the magnitude of the emf induced in the loop when *t* = 2 s?
 

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| http://edugen.wiley.com/edugen/courses/crs4957/common/art/pixel.gif |

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3. A uniform magnetic field is perpendicular to the plane of a circular wire loop of radius *r*. The magnitude of the field varies with time according to *B* = *B*0*e*-*t/τ*, where *B*0 and *τ* are constants. Find an expression for the emf in the loop as a function of time.

Equations of kinematics: $e=1.6 x 10^{-19}C$ Electron Mass = 9.11 x 10-31Kg

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Magnetic force on a moving charge: 

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(a) What is the magnitude of the electron's acceleration due to ?
(b) What is the electron's distance from the *x* axis when the electron reaches, *x* = 20 cm?