Prince Sultan University

*Department of Mathematics & Physics*

***PHY 205- General Physics2***

***Second Exam***

First Semester, Term 141

Sunday 30/11/2014

**Examination Time : 60 minutes**

**Name (Please Print)** ---------- **Section/Class time**

**Student I.D.** ----------

**CONSTANTS:**

$$k = 9\times10^{9}\,\frac{N.m^2}{C^2}\ ,\quad \varepsilon_o = 8.85\times10^{-12}\,\frac{C^2}{N.m^2}\ ,\quad \mu_o = 4\pi\times10^{-7}\,\frac{T.m}{A}$$

*Velocity of light = c= 3 x $10^8$ m/s*

*Proton mass = 1.67x$10^{-27}$ kg, Proton charge = 1.6x$10^{-19}$ C*

*Electron mass = 9.1x$10^{-31}$ kg, Electron charge = 1.6x$10^{-19}$C*

$q(t) = q_o\,(1 - e^{-t/RC})$ ; $I(t) = I_o\, e^{-t/RC}$ ; $B = \mu_o\, n\, I$

***Important Instructions:***

1. *You can use a scientific calculator that does not have programming or graphing capabilities.*
2. *You may **NOT** borrow a **calculator** from anyone.*
3. *Do not use **RED pen**.*
4. *This is a closed books and notes exam. Do **NOT** use notes or textbooks.*
5. *There should be **NO** talking during the examination.*
6. *Your will be **expelled** immediately from the exam if your mobile phone is seen or heard.*
7. *Any signs of **cheating** may cause you being expelled from the exam.*
8. *This examination has **2 parts**.*

***Part 1** has **7 multiple choice** questions, each question worth **1 point**. **Part 2** has **two** workout problems that worth a sum of **8 points.***

*Make sure your paper has all the questions and problems.*

**Part 1: 7 Multiple Choice Questions (1 mark each)**

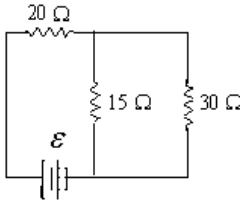
1- If a current of 2 A is in a wire, how many electrons pass through the cross section of the wire in 1second?

a) $125 \times 10^{17}$ b) $625 \times 10^{16}$ c) $4.8 \times 10^{-16}$ d) $0.625 \times 10^{19}$

2- The resistivity of a metal wire depends on

a) The length of the wire. b) The cross sectional area of the wire. c) Nature of material of the wire. d) all of the above

3- What is the current through 15 ohm resistor if $\mathcal{E} = 9$ V?




a) 0.1 A b) 0.2 A c) 0.36 A d) 3.3 A

4- The charge flowing through a light bulb attached to a 12.0-V battery in 14.0 seconds is 30.0 C. What is the average power supplied by the battery during this process?

a) 36 W b) 12 W c) 25.7 W d) 5.65 W

5- Two long parallel wires 40 cm apart are carrying currents of 10 A and 20 A in opposite directions. What is the magnitude of the magnetic field halfway between the wires?

a) $1 \times 10^{-5}$ T b) $3 \times 10^{-5}$ T c) $3.6 \times 10^{-5}$ T d) $4 \times 10^{-5}$ T

6- In classifying magnetic materials iron is classified as

a) Diamagnetic. b) Paramagnetic. c) Ferromagnetic. d) None of these.

7- Superconductors can carry very large currents with no resistance. If a superconducting wire is formed into a solenoid of length 50.0 cm with 500 turns, what is the magnetic field inside the solenoid when the current is $10^4$ A?

a) 1.25 T b) 2.5 T c) 3.5 T d) 12.6 T

**Part 2: Solve the following two problems in the space provided in between showing all your steps**

**Problem 1 (4 marks):**

An uncharged capacitor and a resistor are connected in series to a 12 V battery. If C = 5 μF and R = 0.8 MΩ.

(a) What will be the maximum charge on capacitor after long time?

(b) The charge on capacitor after 6 seconds.

(c) The current in the resistor at 6 seconds.

**Problem 2** **(4 marks):**

An electron enters a perpendicular magnetic field of $4.6 \times 10^{-3}$T. It moves in a circular path of radius of 2.8 mm.

(a) What is electrons speed? How its speed compares with the speed of light?

(b) What magnetic field value should be set to double the radius of electron?

**Scratch paper. DO NOT REMOVE**