



Prince Sultan University
 Department of Mathematics & Physics
PHY 205- General Physics2
Second Exam
 First Semester, Term 131
 Thursday 5/12/2013
Examination Time : 60 minutes

Name (Please Print) _____ Student I.D. _____

CONSTANTS:

$$k = 9 \times 10^9 \frac{N.m^2}{C^2}, \quad \epsilon_o = 8.85 \times 10^{-12} \frac{C^2}{N.m^2}, \quad \mu_o = 4\pi \times 10^{-7} \frac{T.m}{A}$$

Proton mass = $1.67 \times 10^{-27} \text{ kg}$, Proton charge = $1.6 \times 10^{-19} \text{ C}$

Electron mass = $9.1 \times 10^{-31} \text{ kg}$, Electron charge = $-1.6 \times 10^{-19} \text{ C}$

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 **6 multiple choice** questions, each question worth **1 point**. **Part 2** has **three** workout problems each problem worth **3 points**.

Make sure your paper has all the questions and problems.

	Possible Score	Student's Score	Student's Total Score
Part 1 Questions	6	1 x	
P. # 1	3		
P. # 2	3		
P. # 3	3		
Total	15		/15

Part 1: 6 Multiple Choice Questions (1 mark each)

1- A particle of mass 3 g and charge $6\text{ }\mu\text{C}$ has a speed $7\times 10^{-3}\text{ m/s}$. It is desired to use a magnetic field to bend the particle into a circle of radius 14 m. What is the magnitude of the required magnetic field?

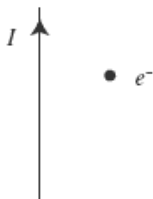
- a) 0.5 T b) 1 T c) 0.75 m d) 0.25 T

2- A proton enters a solenoid. Upon entry, the proton is moving in a straight line along the axis of the solenoid. Which of the following is a correct description of the proton's motion within the solenoid?

- a) The proton will be bent in a circular path.
b) The proton will continue in its straight path at constant velocity.
c) The proton will continue in its straight path and slow down.
d) The proton will continue in its straight path and speed up.

3- A wire carries a current toward the top of the page. An electron is located to the right of the wire, as shown above. In which direction should the electron be moving if it is to be repelled by the wire?

- a) into the page.
b) out of the page.
c) toward the bottom of the page.
d) toward the top of the page.



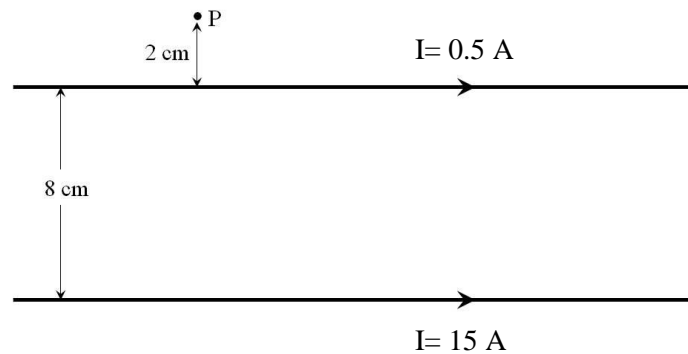
4- An electric heater is rated at 1100 watt when operated at 220 volt. How many electrons pass through this electric heater in 3 minutes?

- a) 900 electrons b) 5 electrons c) 5.6×10^{21} electrons d) 1.78×10^{-22} electrons

5- The direction of the force on a current-carrying wire placed in a magnetic field depends on

- a) the direction of the current only.
b) the direction of the field only.
c) the direction of current as well as the direction of the field.
d) neither the direction of current nor the direction of the field.

6-Two long parallel wires 8 cm apart carry electric currents of 15 A and 0.5 A in the same direction. What is the magnitude of the net magnetic field at point P which is 2 cm away from the smaller current as shown?



- a) $2.5 \times 10^{-5} \text{ T}$ b) $0.5 \times 10^{-5} \text{ T}$ c) $3 \times 10^{-5} \text{ T}$ d) $3.5 \times 10^{-5} \text{ T}$

Part 2: Solve the following three problems in the space provided in between showing all your steps (3 marks each)

Question 1(3 marks): A $80 \mu\text{f}$ capacitor is connected in series to a $50 \text{ k}\Omega$ resistor thorough a battery of 200 volts. If the circuit is closed at $t=0$,

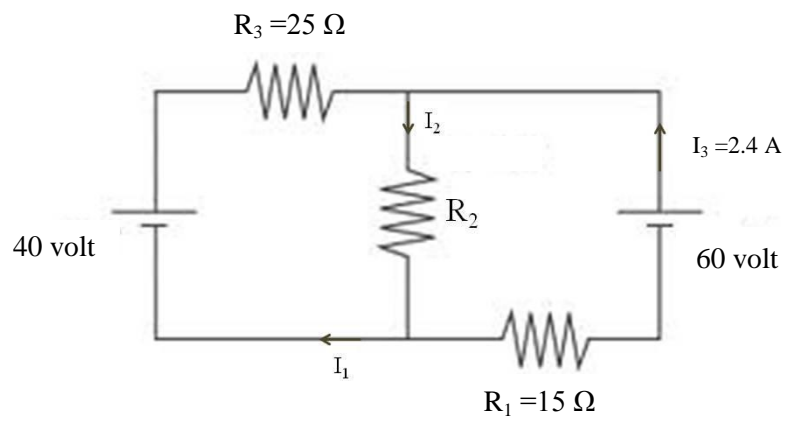
a) find the time constant of the circuit.

b) find the charge on the capacitor at $t=3.5 \text{ s}$.

c) how much time is needed for the current in the circuit to drop to 20% of its maximum value?

Question 2(3 marks):

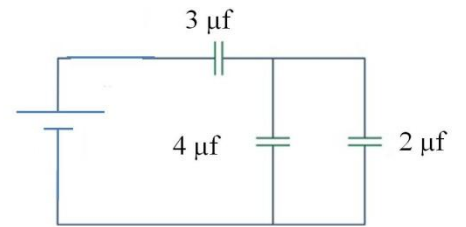
In the circuit shown, use Kirchhoff's rules to find the values of the unknowns R_2 , I_1 , I_2



Question 3 (3 marks):

In the circuit shown, find

a) the equivalent capacitance in the circuit.



b) the battery voltage if the charge carried by the $4\ \mu\text{f}$ capacitor is $16\ \mu\text{C}$.

c) the energy stored by the $3\ \mu\text{f}$ capacitor

Scratch Paper