



Prince Sultan University
Department of Mathematics & Physics
PHY 205- General Physics2
First Exam
Second Semester, Term 162
Monday 10/4/2017
Examination Time: 60 minutes

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

CONSTANTS:

$$k = 9 \times 10^9 \frac{N.m^2}{C^2},$$

$$\epsilon_0 = 8.85 \times 10^{-12} \frac{C^2}{N.m^2}$$

Proton mass = $1.67 \times 10^{-27} \text{ kg}$, Proton 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 **4 multiple choice** questions, each question worth **1 point**. **Part 2** has **three** workout problems all worth **9 points**.

Make sure your paper has all the questions and problems.

Part 1: 4 Multiple Choice Questions (1 mark each)

1- A proton has a speed of 3.5×10^5 m/s at a point where the electric potential is 600 V. It moves through a point where the electric potential is 1000 V. What is the proton's speed at this second point?

- a) 1.7×10^5 m/s b) 2.1×10^5 m/s c) 9.2×10^5 m/s d) 3.2×10^5 m/s

2- Consider an electric field of magnitude 4500 N/C directed in the positive x-direction. Calculate the work done by this electric field on a charge of 200 μ C that travels from the point (2m, 7m) to the point (8m, 5m) in the electric field.

- a) 2.7×10^4 J b) 1.35×10^4 J c) 5.4 J d) 2.7 J

3- A light bulb is rated at 55 watt when operated at 110 volt. How many electrons pass through this light bulb in 5 minutes?

- a) 3.75×10^{21} b) 1.62×10^{19} c) 6.25×10^{19} d) 9.38×10^{20}

4- A Porcelain-filled parallel-plate capacitor is designed with plate area of 24 cm^2 and plate separation 0.4 mm. If this capacitor is connected to a 28 volt battery, calculate the amount of charge carried by each plate of this capacitor given that the dielectric constant of Porcelain is 6.

- a) 8.9 nC b) 1.5 nC c) 11.3 pC d) 1.9 pC

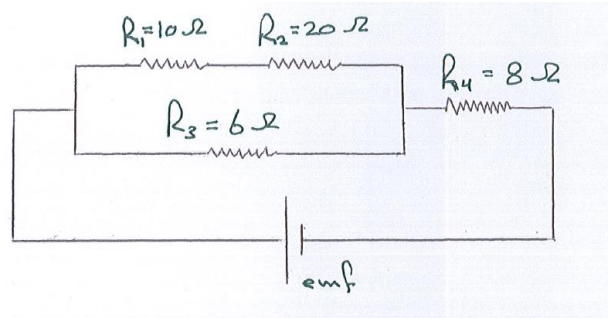
Part 2: Solve the following three problems in the space provided in between showing all your steps.

Problem 1 (4 marks, 1 mark each): Three point charges $3\ \mu\text{C}$, $-3\ \mu\text{C}$, and $5\ \mu\text{C}$ are located at the points $(2\text{ cm}, 0)$, $(0, 2\text{ cm})$, and $(0, 0)$, respectively.

- Calculate the magnitude and direction of the electric field at the point (2 cm, 2 cm)
- Calculate the magnitude of the electric potential generated at the point (0, -2 cm)
- What is the net electric flux through a sphere of radius 2.5 cm centered at (2 cm, 2 cm)
- If a fourth $-10 \mu\text{C}$ charge is placed at (2 cm, 2 cm), find the magnitude and the direction of the electrostatic force acting on it.

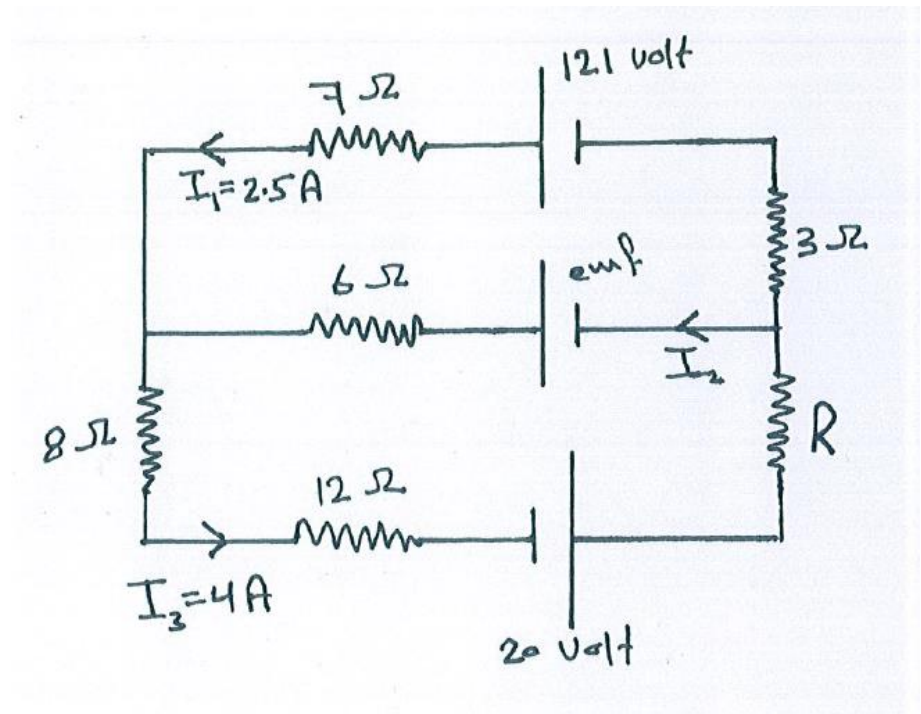
Problem 2 (2 marks): In the figure shown,

a) (1 mark) find the equivalent resistance in the circuit?



b) (1 mark) If the current through R_3 is 1.5 A, What is the emf of the battery?

Problem 3 (3 marks): In the circuit shown, use Kirchhoff's rules to find the values of R , I_2 , and emf



Scratch paper