Prince Sultan University
Deanship of Educational Services
Department of Mathematics
and General Sciences

COURSE DETAILS:

Physics II	PHY205	MAJOR EXAM I
Semester:	Fall Semester --Term 181	
Date:	Thursday, OCT. 16. 2018	
Time Allowed:	60 minutes	

STUDENT DETAILS:

Student Name:		
Student ID Number:		
Section:	680(8AM: S, T, TH)	544(9AM: S, T, TH):
Instructor's Name:	Dr. Asif Zaidi	

INSTRUCTIONS:

- You may use a scientific calculator that does not have programming or graphing capabilities.
- NO borrowing calculators.
- NO talking or looking around during the examination.
- NO mobile phones. If your mobile is seen or heard, your exam will be taken immediately.
- Show all your work and be organized.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.

GRADING:

	Page 1	Page 2	Page 3	Page 4	Total	Total
Questions	1-5	1	2			
Marks	5	5	5			15

Part 1: 5- Multiple Choice Questions (1 mark each)

1) If distance between the two charges is increased by 4 times then new force 'F' between charges will be:

a) 1/12 F b) 1/16 F c) 2 F d) 16 F

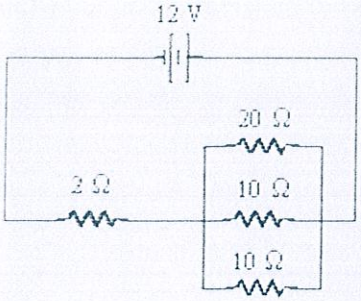
2) A proton (charge 1.6×10^{-19} C) moves on a path perpendicular to the direction of a uniform electric field of strength 5.0 N/C. How much work is done on the proton by the electric field as it moves 10 cm?

a) 4.8×10^{-20} J b) -4.8×10^{-20} J c) 1.6×10^{-20} J d) zero

3) How many charges flow per second if current through a conductor is 16 mA?

a) 10^4 b) 10^{15} c) 10^{17} d) 10^{19}

4) What is the power dissipated by the resistive circuit below?



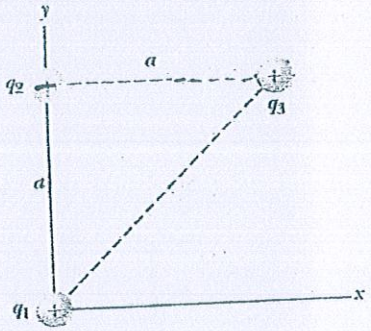
a) 6.4 W b) 9.5 W c) 16 W d) 24 W

5) Draw electric field lines for electric dipole.

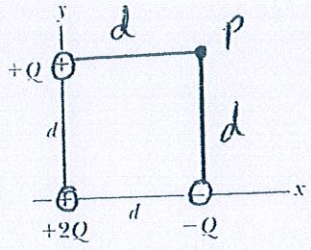
Part 2: Solve the following two problems in the space provided in between showing all your steps.

Problem 1: (5 marks)

(a) Find Force on charge q_3 in the diagram, $q_1 = 10\ \mu C$; $q_2 = -10\ \mu C$; $q_3 = 2\ \mu C$ & $a = 10$ cm. Write your result in vector form.



(b) Calculate electric potential at point "p". $Q = 5$ n C and $d = 50$ cm.



Problem 2: (5 marks)

Consider a parallel plate capacitor initially without dielectric inside, this capacitor has plate area of $0.2\ m^2$ and the plates are 1 cm apart and 3kV voltage is applied to it.

(a) What is the capacity of this capacitor?

(b) How much is the charge on each plate?

(c) Now a dielectric is inserted between the plates of this capacitor, charge remains the same but voltage drops to 1kV. What is the value of dielectric constant of material inserted between plates?

(d) If dielectric strength of this material is $2x10^6$ V/m, how much maximum voltage can be applied on this capacitor?

(e) How much energy this capacitor can store after putting dielectric in between its plates?

GIVEN DATA

$k = 9 \times 10^{9} \frac{N.m^2}{C^2}$, $\varepsilon_o = 8.85 \times 10^{-12} \frac{C^2}{N.m^2}$, $e = 1.6 \times 10^{-19} C$

Proton mass $= 1.67 \times 10^{-27} kg$, electron mass $= 9.1 \times 10^{-31} kg$

Scratch paper (DO NOT REMOVE)