Post Graduation Geophysics
Physics
2/2019

Name:	
Date:	
Time:	90 minutes
Please, write down your name in all the solution pages	
Please read the information carefully	

1. In the charge system shown in Figure 1, q_1 = + *8q* and q_2 = *-2q*. Determine (2,0 points)

(a) The electrical forces acting on q_2.

(b) The position on the x-axis for which the net-forces on a third charge q_3 = *+1q* is zero.

(c) The net force acting on q_3 in the position shown on Figure 2

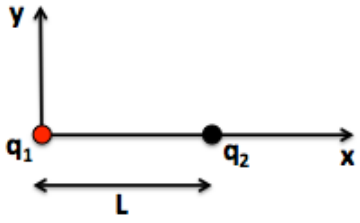

Figure 1

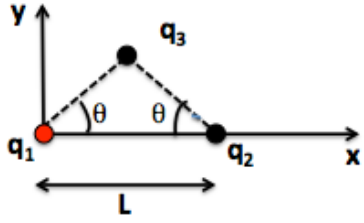

Figure 2

2. (2,0 points) Two spherical cavities, of radii *10,0 cm* e *15,0 cm* are charged with *4,0 x* 10^{-8} *C* and *2,0 x* 10^{-8} *C*, respectively. What is the electrical field in (a) *r = 12,0 cm*; (b) *r = 20 cm*.

3. (2,0 points) Determine the electromotive force around a rectangular loop shown on Figure 3 (*L = 40 cm* e *W = 25 cm*) when the magnetic field **B**, is

(a) $\vec{B}_1 = 4{,}0\times10^{-2}\ y\ \hat{z}$ [T/m]

(b) $\vec{B}_2 = 6{,}0\times10^{-2}\ t\ \hat{k}$ [T/s]

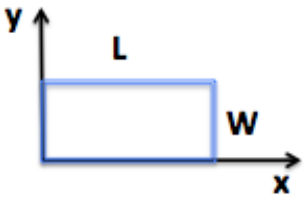

Figure 3

4. (2,0 points) A uniform magnetic field B = 1,2 mT is oriented in z-axis direction. A 5,3 MeV energetic proton moving in the y-axis direction enter into the B-field region. Determine the net force acting on the proton motion. The proton mass is 1,67 x 10^{-27} kg (Considerer in this problem non-relativistic kinetic energy and the Earth's magnetic field equal to zero)

5. (2,0 points) Uses the Ampère Law to calculate the magnetic field **B** at the distance (a) *d = 1,0 cm* and (b) *d = 8,0 cm* produced by a wire conducting an electrical current *i = 30.*