	UNIVERSITY OF GAZIANTEP **DEPARTMENT OF ENGINEERING PHYSICS** **EP 106 General Physics II** **First Midterm Exam Questions**	**2004** **TIME 100 min.** **SUMMER SCHOOL**

1. Two similar charges each have a mass of 10 g. How great a charge should be placed to counter balance the gravitational force between the charges. The distance between the charges is much greater than their radii.

Hint:

The magnitude of the gravitational force between two masses m_1 and m_2 separated by distance r is given by:

$$F = G\frac{m_1 m_2}{r^2}$$

where is a G constant and has the value $G = 6.67\text{x}10^{-11}$ N.m^2/kg^2

2. A charge of $8\text{x}10^{-5}$ C is placed in an electric field by

$E_x=3\text{x}10^3$ N/C, E_y=-600 N/C, and E_z=0.

(a) What are the magnitude and direction of the force on the charged particle.

(b) If the particle starts from rest at the origin, what will be its co ordinates after 3 sec.

(Take mass of the particle m=10 g.)

3. A thick spherical shell has a charge Q, an inner radius a, and an outer radius b. The charge distribution between a and b is spherically symmetric but varies with distance from the center : $\rho=A/r$, where A is a constant. A point charge q is placed at the center of the sphere.

(a) Determine q in terms of Q, a, and b

(b) What is the field for $r<a$?

(c) What is the field for $r>b$?

4. A positive charge q is distributed uniformly throughout a <u>non-conducting</u> spherical volume of radius R. Calculate the potential at a distance r from the center from the sphere where $r < R$.

<u>Useful Constants</u>:

k=$9\text{x}10^9$ Nm^2/C^2; 1 μC=$1\text{x}10^{-6}$ C $m_e=9.1\text{x}10^{-31}$ kg, e=$-1.6\text{x}10^{-19}$ C,