	UNIVERSITY OF GAZIANTEP **DEPARTMENT OF ENGINEERING PHYSICS** **EP 106 General Physics II** **First Midterm Exam Questions**	**2003** **TIME 110 min.** **SUMMER SCHOOL**

[1]. For the charge system given right

(a) What is the electric field E at the center of the system.

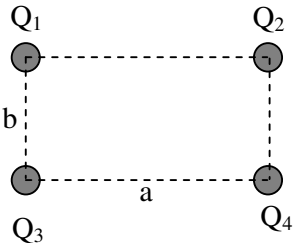
(b) What is the electric potential at the center of the system.

(c) Assume that you bring a fifth charge Q_5 = 10 pC very slowly from infinity to the center of the system. How much work must you do?

(d) What is the electric force acting on Q_5.

(e) What is the potential energy of the charge Q_5.

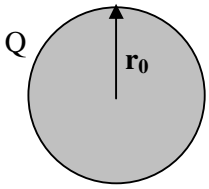
(Assume Q_1=8 pC, Q_2=4 pC, Q_3=8 pC, Q_4=4 pC, and a=34 mm, b=17 mm)



[2]. Consider a spherical uniform volume charge density ρ with Q = 61 nC and r_0 = 48 mm.

(a) Determine the volume charge density ρ.

(b) Find the magnitude of electric field (E) at a distance r = 24, 48, and 96 mm from the center of the sphere.



[3]. For the given <u>non-conducting</u> system

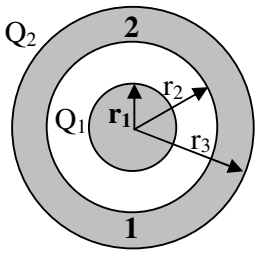
(a) What is the electric potential of sphere 2.

(b) What is the electric potential difference between sphere 2 and 1.

(c) What is the potential of sphere 1.

(d) Assume that a tiny particle of charge q=4.0 μC and mass m=2.0x10^{-8} kg is released from rest from the surface of the sphere 2. What velocity does the particle have when it reaches a distance 2r_3 from the center of sphere 1.

(r_1=3.535 mm, r_2=4.4 mm, r_3=5.4 mm, Q_1=4 pC, Q_2=2 pC)



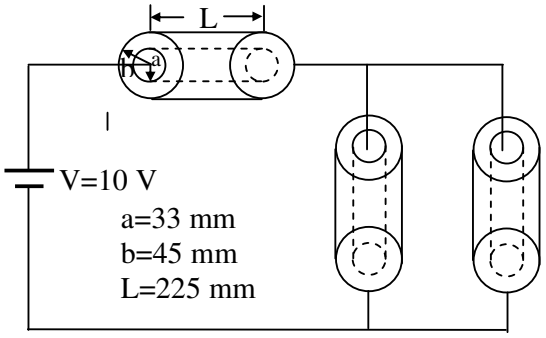
[4]. Three identical coaxial cable (with inner radius a and outer radius b) capacitor are connected as shown in Figure.

(a) Find the capacitance of one capacitor.

(b) Find the equivalent capacitance of the system.

(c) What is the charge on each capacitor.

(d) What is the potential difference across each capacitor.



<u>Useful Constants</u>: k=9x10^9 Nm^2/C^2;

1 nC=1x10^{-9} C, 1 pC=1x10^{-12} C, 1 μC=1x10^{-6} C

ε_0=8.85x10^{-12} C^2/Nm^2,