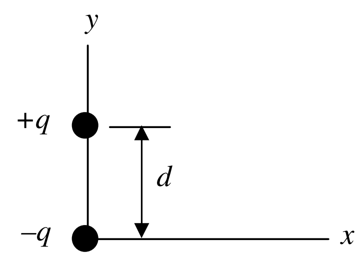
	UNIVERSITY OF GAZIANTEP **DEPARTMENT OF ENGINEERING PHYSICS** **EP 106 General Physics II** **Final Exam Questions**	**03/06/2005** **TIME 120 min.**

1. The charges of a dipole are placed at points (0,0) and (0, d) as shown in Figure given right.

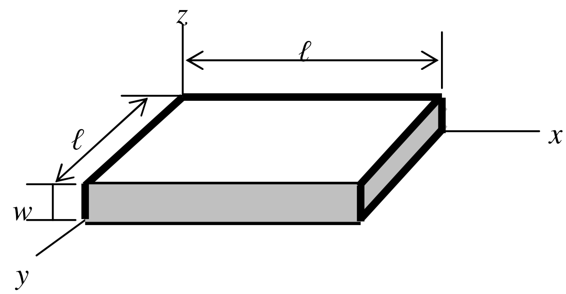
(a) Find a point (x,y) such that potential is zero.
(b) Find the potential difference between points P(2d,0) and Q(d,d).



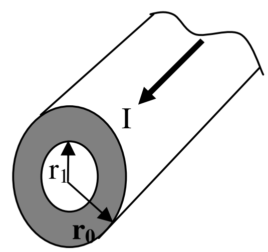
2. A parallel-plate capacitor has an plate area of $A=\ell x \ell$ and a plate speration d. It is completely filled with a non-uniform dielectric material whose dielectric constant varies linearly across the capacitor. At $x = 0$ $\kappa = \kappa_0$ and at $x = \ell$ $\kappa = \kappa_1$. We can express it as a function of x

$\kappa = \kappa_0 + (\kappa_1 - \kappa_0)x/\ell$. Calculate the capacitance of the capacitor.

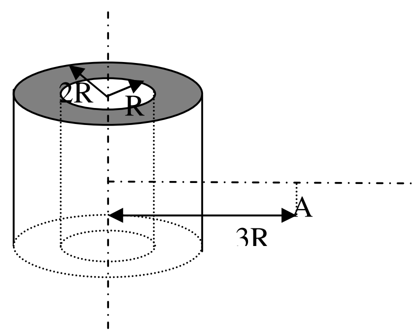
(Hint: Use $dC = \kappa\varepsilon_0\ell\ dx/w$, dC means the differential of capacitance as a function of x)



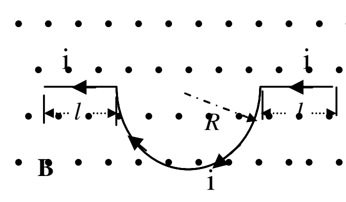
3. Consider a hollow cylinder of an iner radius r_1=10cm and outer radius r_0=20cm with a uniform current 20A. The sense of the current is out of page as seen in figure. Calculate the magnitude of magnetic field at the distance, a) r=25cm, b)r=15cm and c) r=5cm.



4. Consider an infinitely long nonconducting cylindrical shell of inner radius R and outer radius 2R, as shown in the figure. Find the electric field in the region r=3R and r=3R/2



5. A wire bent as shown in the figure carries a current i and is placed in a uniform magnetic field **B** that emerges from the plane of the figure. Derive an expression for theforce acting on the wire and calculate the magnitude of the force when i=10A, R=20cm, l=30cm and B=2T. The magnetic field is represented by field lines, shown emerging from the page The dots show that the sense of **B** is up out of the page.



Usuful constants: $\mu_0 = 4\pi x 10^{-7}$ T.m/A $k = 9x10^9$ N.m^2/C^2