

Name _____

PHY2049C, Homework 3

A- Submit a handwritten version of the solutions (clearly readable) at the beginning of class.

Problem 1

Equation (8.3) in the book shows that the capacitance of a parallel-plate capacitor becomes larger as the plate separation d decreases. However, there is a practical limit to how small d can be made, which places limits on how large C can be. Explain what sets the limit on d . (Hint: What happens to the magnitude of the electric field as $d \rightarrow 0$?)

Problem 2

Consider a point charge Q placed in $y=1\text{cm}$. What is the electric flux due to that charge in the x - z plane? (that is, in the entire, infinite, x - z plane).

Problem 3

A capacitor with unknown capacitance C is charged to 100V . Then, it is connected in parallel to a $60\text{ }\mu\text{F}$ Capacitor initially discharged. If the potential difference on this second capacitor then becomes 40V , what is C ?

Problem 4

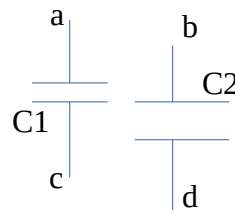
Determine the potential at a point 2.5 mm away from a big negative plate in a parallel plate arrangement separated 10mm and connected to a 24V battery (take the potential in the negative plate to be $V=0$).

Problem 5

If one requires 6J of work to move two point charges of the same magnitude together from a distance of 1m to 1cm , what could you conclude of the sign and value of the charges?

Problem 6

Two parallel plate capacitors are shown. $C_1 = 0.4\text{ }\mu\text{F}$ and $C_2 = 1.2\text{ }\mu\text{F}$. The volate of the capacitors are V_1 and V_2 respectively, and the total stored energy is 1.14 mJ . If the terminals b and c are connected, the potential difference $V_a - V_d = 80\text{ V}$, but if the a terminal is connected to the b terminals, and c is connected to d , $V_a - V_d = 10\text{ V}$. Find the initial voltages V_1, V_2



Problem 7

A capacitor has a charge of $15\text{ }\mu\text{C}$ when its potential difference is V . When the charge is augmented to $18\text{ }\mu\text{C}$, its potential difference increases 6 volts . What is the capacitance C of the capacitor?