

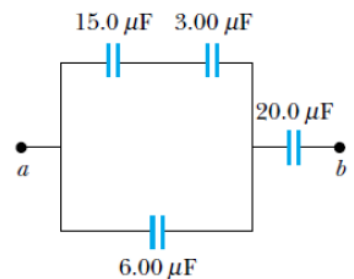
## 106 PHYS – Homework 3

### Chapter 3 Capacitance and Dielectrics

### Chapter 26&28 in the text book

1. When a potential difference of 150 V is applied to the plates of a parallel-plate capacitor, the plates carry a surface charge density of  $30.0 \text{ nC/cm}^2$ . What is the spacing between the plates?
2. Two capacitors when connected in parallel give an equivalent capacitance of  $9.00 \text{ pF}$  and give an equivalent capacitance of  $2.00 \text{ pF}$  when connected in series. What is the capacitance of each capacitor?

3. Four capacitors are connected as shown in Figure. (a) Find the equivalent capacitance between points  $a$  and  $b$ . (b) Calculate the charge on each capacitor if  $\Delta V_{ab} = 15.0 \text{ V}$ .



4. Consider a series RC circuit for which  $R=1.00 \text{ M}\Omega$ ,  $C=5.00 \mu\text{F}$ , and  $\mathcal{E}=30.0 \text{ V}$ . Find (a) the time constant of the circuit and (b) the maximum charge on the capacitor after the switch is closed. (c) Find the current in the resistor  $10.0 \text{ s}$  after the switch is closed.
5. A fully charged capacitor stores energy  $U_0$ . How much energy remains when its charge has decreased to half its original value?
6. Find the equivalent capacitance between points  $a$  and  $b$  for the group of capacitors connected as shown in Figure below. Take  $C_1 = 5.00 \mu\text{F}$ ,  $C_2 = 10.0 \mu\text{F}$ , and  $C_3 = 2.00 \mu\text{F}$ . If the potential difference between points  $a$  and  $b$  is  $60.0 \text{ V}$ , what charge is stored on  $C_3$ ?

