In the figure below, \( C_1 = 10.0 \, \mu F \), \( C_2 = 5.00 \, \mu F \), and \( C_3 = 4.00 \, \mu F \). Assume \( V = 1.0 \, V \).

1) Find the equivalent capacitance of the network of capacitors.

2) Find the charge on each capacitor.

3) Find the potential difference across each capacitor.

4) Find the energy stored in each capacitor.

5) Capacitor \( C_1 \) is removed from the network and connected to a \( 5 \, V \) battery. Assume the plates in this capacitor are separated by a distance \( d = 1.40 \, \text{mm} \). A material with dielectric constant \( \kappa = 4.40 \) is placed between the parallel plates of the capacitor. (a) What is its capacitance with the dielectric in place? (b) How much charge is on each plate? (c) How much energy is stored in the capacitor? (d) What is the electric field magnitude between the plates? (e) What is the energy density between the plates?

*Hint: The energy density is the energy stored in the capacitor divided by the volume between the plates.*