Physics 200

Chapter 26   Capacitance and Dielectrics (Homework)

1. Determine the capacitance of a conducting sphere of radius, a.

2. Determine the effective capacitance of three capacitors in parallel.

3. A capacitor, C_1, is in series with two capacitors, C_2 and C_3, which are in parallel with each other. Calculate the capacitance of the system.

4. Determine the energy stored in a capacitor consisting of a two concentric conducting spheres. The radius of the inner sphere is "a" and the radius of the outer sphere is "b". There is a charge, Q, on the inner sphere and a charge, - Q, on the outer sphere.

5. Determine the energy stored per unit length in a coaxial cable whose inner conductor has radius, "a", and whose outer conductor has radius, "b". The inner charge density is λ and the outer charge density is $-\lambda$.

6. What is the total energy stored in two plate capacitors (C_1 and C_2) if C_1 has charge, Q_0, on it initially and C_2 has no charge initially? How much is stored after you connect them together?

7. Calculate the capacitance of a parallel plate capacitor (plate area = A, separation distance = x) with a dielectric (plate area = A, thickness = x/2, dielectric constant = κ).

8. Calculate the capacitance of a parallel plate capacitor (plate area = A, separation distance = x) with a dielectric (plate area = A/2, thickness = x/2, dielectric constant = κ).

9. A coaxial cable has an inner radius, a, and an outer radius, b. The coaxial cable is filled with a dielectric, κ. Calculate the capacitance per unit length.

10. Determine the energy stored in a capacitor consisting of a two concentric conducting spheres. The radius of the inner sphere is "a" and the radius of the outer sphere is "b". There is a charge, Q, on the inner sphere and a charge, - Q, on the outer sphere. The space between the spheres is filled with a dielectric, κ.