AP **~~Unit 8~~ – Worksheet 5 – Capacitance** ANSWERS

1. The plates of a parallel-plate capacitor are 5mm apart and 2 meters squared in area. The plates are separated only by air. A potential difference of 10,000 V is applied across the capacitor.
   a. Find the capacitance
   b. Find the charge on each plate
   c. Find the electric filed in the space between them.

2. A capacitor is charged by connecting it to a potential difference of 120 V. If the capacitor has a capacitance of 8 microfarads, find the energy stored in the capacitor.

3. The parallel plates of a capacitor have an area of 2E-1 meters squared and are 1 cm apart. The original potential difference between them is 3000 V. It decreases to 1000V when a sheet of dielectric is inserted between the plates.
   a. Find the original capacitance.
   b. Find the charge on each plate.
   c. Find the capacitance after the dielectric is inserted.
   d. Find the dielectric constant.

4. A parallel plate capacitor filled with benzene has a capacitance of 500 pF (picofarads is 1E-12) and a charge of 2E-7 C on each plate. The plates are 0.2 mm apart.
   a. What is the potential difference between the plates?
   b. What is the area of each plate?
   c. What is the electric field between the plates?
   d. What is the surface charge density of each plate?

5. A parallel plate capacitor (air) has a capacitance of 1E-9 F.
   a. What potential difference is required for a charge of 1E-7C on each plate?
   b. What is the stored energy?
   c. If the plates are 1mm apart, what is the area of the plates?

6. An 8E-6 F capacitor has a plate separation of 4mm and is charged to a potential difference of 500 V. Calculate the energy density in the region between the plates (in J/m^3).