Home Work Problem Set 5

5-1 Figure 25-30 shows a variable "air gap" capacitor of the type used in manually tuned radios. Alternate plates are connected together; one group is fixed in position and the other group is capable of rotation. Consider a pile of n plates of alternate polarity, each having an area A and separated from adjacent plates by a distance d. Show that this capacitor has a maximum capacitance of

5-2 A parallel-plate capacitor has plates of area A and separation d and is charged to a potential difference V. The charging battery is then disconnected, and the plates are pulled apart until their separation is 2d. Derive expressions in terms of A, d, and V for (a) the new potential difference, (b) the initial and final stored energy, and (c) the work required to separate the plates.

5-3 In Fig. 25-33, a 20.0 V battery is connected across capacitors of capacitances C1 = C6 = 3.00μF and C3 = C5 = 2.00C2 = 2.00C4 = 4.00μF. What are (a) the equivalent capacitance Ceq of the capacitors and (b) the charge stored by Ceq? What are (c) V1 and (d) q1 of capacitor 1, (e) V2 and (f) q2 of capacitor 2, and (g) V3 and (h) q3 of capacitor 3?

