PHYS 202 Capacitance Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Capacitor is a device where electrical charge can be stored. Capacitance is the capacity of a capacitor to store charge. The capacitance, *C*, of a capacitor is defined as the magnitude of the charge stored on one plate, *q* per unit potential difference, *V*. Sketch a capacitor and show the charges and *V*.



The capacitance of a parallel plate capacitor with area *A*, separation *d*, and dielectric of dielectric constant *κ* is given by, where ε0 = 8.85 × 10-12 C2/N.m2, is the permittivity of free space. Sketch a parallel plate capacitor and show *d*, *A*, dielectric, charges, and *V*.



Electrical energy stored in a capacitor is given by, 

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P57) An axon is the relatively long tail-like part of a neuron, or nerve cell. The outer surface of the axon membrane (dielectric constant = 5, thickness = 10 nm) is charged positively, and the inner portion is charged negatively. Thus, the membrane is a kind of capacitor. Assuming that the membrane acts like a parallel plate capacitor with a plate area of 5 mm2, what is its capacitance?

P45) The electronic flash attachment for a camera contains a capacitor for storing the energy used to produce the flash. In one such unit, the potential difference between the plates of an 850 µF capacitor is 280 V.

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| **(a)** | Determine the energy that is used to produce the flash in this unit. | |  | | --- | |  | |
| **(b)** | Assuming that the flash lasts for 3.9 ms, find the effective power or “wattage” of the flash. | |