Name _____

UNIVERSITY OF ALABAMA
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PH 106-4 / LeClair Fall 2008

Quiz 4: Capacitance

$$\Delta PE = -W = q\Delta V \qquad C_{\text{filled}} = \kappa C$$
$$Q = C\Delta V \qquad C = \frac{\epsilon_o A}{d} \quad \text{parallel plate}$$

1. Capacitors connected in parallel *must always* have the same:

- □ Charge
- □ Potential difference
- □ Energy stored
- □ None of the above

2. An ideal parallel plate capacitor is completely charged up, and then disconnected from a battery. The plates are then pulled a small difference apart. What happens to the capacitance, C, and charge stored, Q, respectively?

- □ decreases; increases
- □ increases; decreases
- □ decreases; stays the same
- □ stays the same; decreases

3. An isolated conductor has a surface electric potential of 10 Volts. An electron on the surface is moved by 0.1 m. How much work must be done to move the charge? (e is the electron charge.)

- □ $1e$ Joules
- □ $0.1e$ Joules
- □ $10e$ Joules
- □ 0

4. A parallel plate capacitor is shrunk by a factor of two in every dimension – the separation between the plates, as well as the plates' length and width are all two times smaller. If the original capacitance is C_0, what is the capacitance after all dimensions are shrunk?

- □ $2C_0$
- □ $\frac{1}{2}C_0$
- □ $4C_0$
- □ $\frac{1}{4}C_0$

5. A capacitor with air between its plates is charged to 120 V and then disconnected from the battery. When a piece of glass is placed between the plates, the voltage across the capacitor drops to 30 V. What is the dielectric constant of the glass? (Assume the glass completely fills the space between the plates.)

- □ 4
- □ 2
- □ 1/4
- □ 1/2