PHYSICS 242 BLOCK 4 DRILL SET, SPRING '17 NAME ______________________________

Slide this paper under Marteena 308's door any time *before* 7:50 AM Friday, February 10, or give me it in Marteena 312 *by* 8:00 AM that day. Use one different equation from the Block 4 objectives for each problem.

1. The 2.00 cm^3 volume between the plates of a 249 pF parallel-plate capacitor is filled with a dielectric. The area of each plate is 0.00500 m^2 and the plates are 400 μm apart. Find the permittivity of the dielectric.

EQUATION USED (ONE EQUAL SIGN)	SOLUTION	ANSWER
=		

2. To one significant figure, find the maximum energy density of an electric field in production-quality polystyrene (Table 24.2, page 802).

EQUATION USED (ONE EQUAL SIGN)	SOLUTION	ANSWER
=		$\_\_{}_m = \_\_ \times 10^{\_\_}$ ___

3. A 3.0 kF capacitor stores 3.0 watt•hours = 10.8 kJ in its electric field. What is its stored charge?

EQUATION USED (ONE EQUAL SIGN)	SOLUTION	ANSWER
=		

4. Find the distance (in μm) between the plates of a parallel plate capacitor if, in the dielectric completely filling that region, an electric field of magnitude 88.8 MV/m gives a potential difference of 22.2 kV between the plates.

ONE EQUATION USED	SOLUTION	ANSWER
=		μm

5. *In vacuum*, the potential difference between the non-parallel plates of a capacitor is given by $\frac{(0.0345\ \text{m}^{-1})Q}{\varepsilon_0}$. Calculate the numerical value of the capacitance of this capacitor *after* neoprene at 20˚C completely fills the volume between the plates so there is *no* change in symmetry from the vacuum case. (Use Table 24.1, page 798.)

DEFINING EQUATION USED	SOLUTION	ANSWER
≡	Step 1: With the dielectric in place, we simply replace ε_0 in the vacuum expression for the potential difference with __ε_0. Step 2: Substituting neoprene's K from Table 24.1 then gives potential difference of $\frac{(0.0345\ \text{m}^{-1})Q}{(\quad)(\qquad\qquad \text{F/m})}$.	

(your Step 2 denominator must contain the *numerical* values of K and ε_0).

Step 3: Now show all of your numbers and the necessary algebraic cancellation as you substitute your Step 2 expression into your defining equation, giving the capacitance =