THE IUG **PHYSB 1301** **DEPT. OF PHYSICS**
DATE:7-4-2009 **FIRST MID EXAM.** **TIME:1-Hr**

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Part I	Part II				Total
	Q1	Q2	Q3	Q4	
(4´) =					

PART I: choose the correct answer (15×4=60 pts)

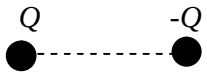
1) To make an object charged with negative charge we must

a) add some electrons
b) remove some electrons
c) add some atoms
d) remove some atoms

2) Which of the following is **correct** concerning the force between two point charges.

a) It is directely proportional to the square of the distance between them.
b) It is directely proportional to the magnitude of one of these charges.
c) It is directed along the line joining them.
d) It is attractive only.

3) Two equal but opposite point charges Q and $-Q$ are located along the same line as shown. Where can we place a third charge q so that the net force on it is zero.



a) between the two charges
b) to the left of Q
c) to the right of $-Q$
d) no where

4) The unit of Coulomb's constant K is:

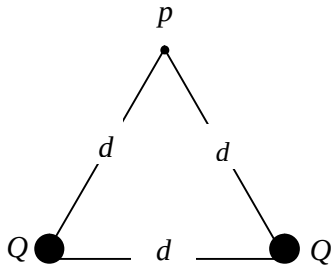
a) N^2/C^2 b) $N.m/C^2$ c) $N.m^2/C^2$ d) $N^2.m^2/C^2$

5) A uniform electric field directed east. The electric force **F** acting on an electron exists in this field is directed

a) north b) south c) east d) west

6) Two similar positive charges are arranged as shown. The direction of the electric field at point p is

a) up b) down c) left d) right



7) A point charge q is placed at the center of a cube. The electric flux through one face of the cube is

a) q/ε_o b) $6q/\varepsilon_o$ c) $q/4\varepsilon_o$ d) $q/6\varepsilon_o$

8) Consider Gauss's law: $\oint \boldsymbol{E} \cdot d\boldsymbol{A} = q_{in}/e_o$. Which of the following is **incorrect:**

a) E must be due to the charge inside the Gaussian surface only.
b) q_{in} is the net charge inside the Gaussian surface.
c) A is area of the Gaussian surface.
d) The law applied for any closed surface.

9) ***E*** on the surface of a conductor in perpendicular to the surface, otherwise it will violate

a) Gauss's law b) Coulomb's law
c) Conservation of charge principle d) Electrostaic equilibrium condition

10) The unit of Volt is equivalent to

a) J b) J.C c) J/C d) N/C

11) The potential difference between two points is 100 V. If 2 C is transferred from one point to the other, the work done is

a) 200 J b) 100 J c) 50 J d) 2 J

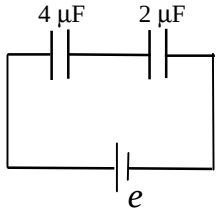
12) Two point charges of 5.5 μC and -2.3 μC are 3.5 cm apart. The potential energy of this two-charges system is

a) 3.3 J b) - 3.3 J c) 93 J d) -93 J

13) The unit of Farad is equivalent to

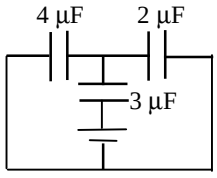
a) V/C b) C/V c) J/V d) V/J

14) Two capacitors are connected as shown. If the charge on the 4-μF capacitor is 8 μC, the charge on the 2-μF capacitor is



a) 8 μC b) 4 μC c) 16 μC d) 6 μC

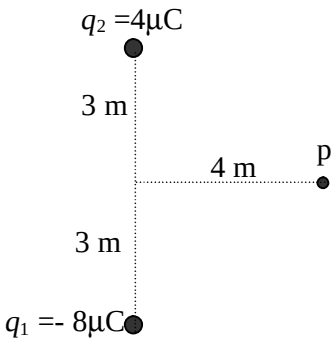
15) Considering the circuit shown, The equivalent capacitance of the circuit is



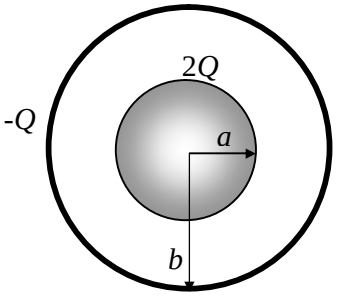
a) 0.9 μF b) 9 μF c) 2 μF d) 4.3 μF

PART II: Solve the following problems **(4×10=40 pts)**

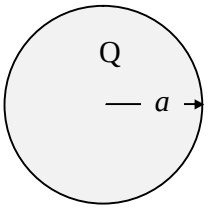
Q1) Three point charges, $q_1 = -8mC$, $q_2 = 4mC$, arranged as shown in the figure. Find the electric field **E** at point p. $K=9\times10^9 N.m^2/c^2$



Q2) A solid **conducting** sphere of radius *a* has a charge 2*Q*. Concentric with this sphere is a thin spherical shell of radius *b* and a net charge -*Q*. Find the electric field at (a < *r* < *b*).



Q3) A conducting sphere of radius *a* has a total charge *Q*. Find the elctric potential at a point inside the sphere ($r < a$). The electric field outside the sphere is given by $E_{out} = K\frac{Q}{r^2}$



Q4) Consider the circuit shown in the figure. find the charge in the 4-μF capacitor.