**Applied Physics BS 101**

**Electric Potential**

**Problem 1:** In a typical lightening flash, the potential difference between cloud and ground is and the quantity of charge transferred is 30C. (a) What is the decrease in energy of that transferred charge? (b) If all that energy could be used to accelerate a 1000kh automobile from rest, what would be the automobile final speed?



**Ans.:** (a) (b)

**Problem 2:** What potential difference is needed to stop an electron having an initial speed of ?



**Ans.:**

**Problem 3:** The difference in potential between the accelerating plates in the electron gun of a TV picture tube is about 25 000 V. If the distance between these plates is 1.50 cm, what is the magnitude of the uniform electric field in this region?

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**Ans.:**

**Problem 4:** The potential in a region between *x =* 0 and *x* = 6.00 m is , where *a* = 10.0 V and *b* =-7.00 V/m. Determine the magnitude and direction of the electric field at *x* = 0, 3.00 m, and 6.00 m.

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**Ans.:**

**Problem 5:** Over a certain region of space, the electric potential is . (a) Find the expressions for the electric field over this region. (b) What is the magnitude of the field at the point *P* that has coordinates (1, 0, -2) m?



**Ans.:**

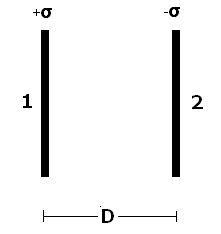
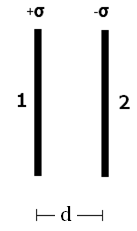
**Problem 6:** When an uncharged conducting sphere of radius *a* is placed at the origin of an *xyz* coordinate system that lies in an initially uniform electric field the resulting electric potential is for points inside the sphere and

for points outside the sphere, where *V*0 is the (constant) electric potential on the conductor. Use this equation to determine the expressions for the resulting electric field both inside and outside the conducting sphere.



**Ans.:** }k

**Problem 7:** Two very large flat metal plates 1 and 2 having charge densities +σ and -σare parallel and separated by distance D as shown in fig.(a). Find the potential difference between plates 1 and 2. (b) Now if we bring two plates closer until distance between them is d as shown in fig. (b), what will be the potential; difference between plates now?

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**Ans.:** ,

**Problem 8:** A spherical conductor has a radius of 14.0 cm and charge of 26.0 µC. Calculate the electric field and the electric potential (a) *r* = 10.0 cm, (b) *r* = 20.0 cm, and (c) *r* = 14.0 cm from the center.



**Ans.:**

**Problem 9:** Over a certain region, the electric field is

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Find the electric potential at x = 3m

**Problem 10:** Over a certain region, the electric field is

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Find the electric potential at point P(2,3).

**Problem 11:** Over a certain region of space, the electric field is

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Find the electric potential at point P(1,3,-1).

V=

V=

E= dV/dx