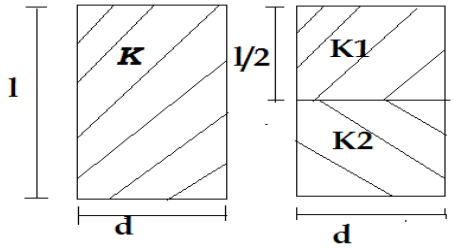
KENDRIYA VIDYALAYA , ADOOR

HOLIDAY HOMEWORK

WORKSHEET 3

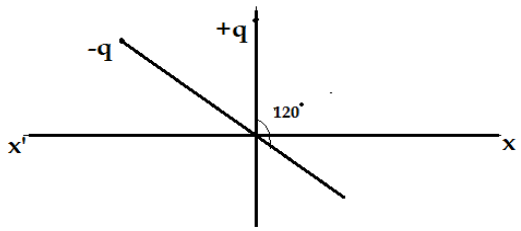
1)Two identical parallel plate (air) capacitor C1and C2 have capacitance C each.The space between the plates is now filled with dielectrics as shown .If the two capacitors still have equal capacitance ,obtain the relation between dielectric constants K,K1 AND K2.(2K=K1+K2)



2)Net capacitance of three identical capacitors in series is 1micro farad.What will be their net capacitance if connected in parallel?Find the ratio of energy stored in the two configurations ,if they are connected to the two configurations,if they are both connected to the same source(9micro farad,1/q)

3)Two uniformly large parallel thin plates having charge densities +sigma – sigma are kept in the x – z plane at distance ‘d’ apart.sketch an equipotential surface due to the electric field between the plates if a particle of mass ‘m’ and chrge –q remains stationary between the plates ,what is the magnitude and direction of this field?(E=mg/q,directed upside down).

4)Two small identical electrical dipoles AB and CD each of dipole moment ‘p’ are kept at an angle of 120 degree.What is the resultant dipole moment of this combination?if this system is subjected to electric field ‘E’,directed along +x direction,what will be the magnitude and direction of the torque acting on this?

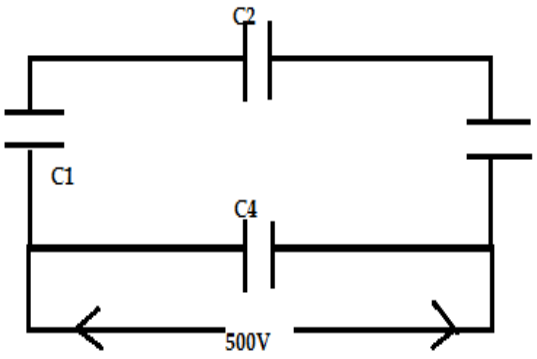


5) Find the ratio of potential difference that must be applied across the parallel and series combination of two indentical capacitors so that the energy stored in the two case becomes the same.(Vp/Vs=2/1)

6) (a) How is the electric field due to a charged parallel plate capacitor affected when a dielectric is inserted between the plates fully occupies the intervening region?

(b) A slab of dielectric constant ‘K’ has the same area as the plates of a parallel plate capacitor but has thickness 1/2d,where d is the sepration between the plates .find the expression for the capacitance where the slab is inserted between the plates .($C=2k/k+1C_0$).

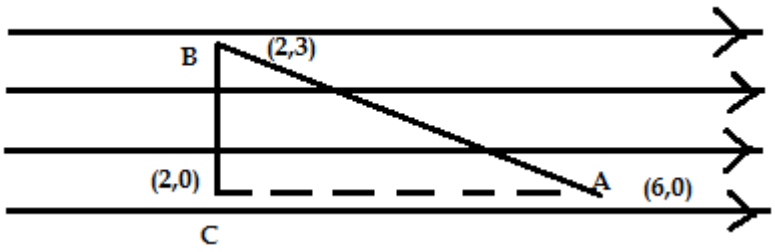
7)A network of 4 capacitors each of 12 micro farad connected to 500v supply.find a) equivalent capacitance of the network &(b) charge on the each capacitor.



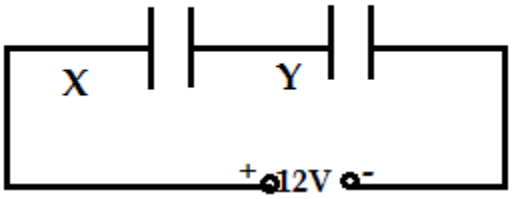
[C_{eq}=16 micro farad, $Q_4 = 6*10^{-3}$

$Q_1 = 2*10^{-3}$ C, Q2=Q3]

8) A test charge ‘q’ is moved without acceleration from A to C along the path from A to B and then from B to C in an electric field ’E’ .
(a)calculate the p.d between A and C (B) at what point (of the two) is the electric potential more and why?



9)Same area of plates and same separtion between them X has between plates while Y contains a dielectric medium of Er(epsilon r)=L.



9)(a) Calculate the capacitance of each capacitor if equivalent capacitance of the combination is 4 micro farad.

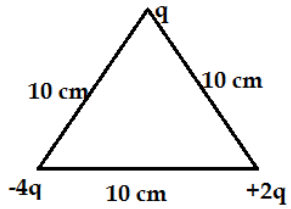
(b) calculate the p.d between the plates of X and Y.

(c)find the ratio of of electrostatic energy stored in X and Y?

[Cx=C,C_4=4c,C=5microfarad,.:.X=5microfarad,Y=20microfarad]

[V_X=9.6V,V_Y=2.4V.4:1]

10)Calculate the work done to dissociate the system of three charges placed on the vertices of a triangle .(here q= $1.6*10^{-10}$ C)



KENDRIYA VIDYALAYA ADOOR SHIFT 2

HOLIDAY HOMEWORK

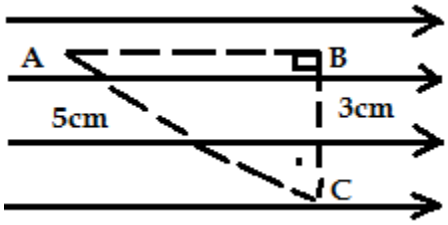
WORKSHEET-4

1) Which physical quantity has unit $N C^{-1}$?

2) Sketch the electric field lines for q>0.

3) Distingush between polar and nonpolar dielectrics with one example for each.

4) Three points A,B and C lie in a uniform dielectric field 'E' of $5*10^{3}$ N/C as shown .find the p.d between A and C.



5) Plot a graph comparing the variation of potential V and electric field 'E' due to a point charge 'q' as a function of distance 'r' from the point charge.

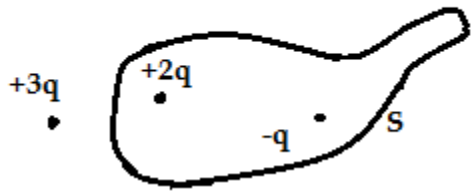
6) Brifely explain how an insulated metal sphere can be positively charged by induction.

7) (a)The sum of two point charges is 7 micro coloumb.they repel each other with a force of 1 N when kept 30cm apart in free space. Calculate the value of each charge.

(b) Explain the vector form of coloumb's law.

8)Show that in a uniform electric field a dipole experiences only a torque but not net force .Derive an expession for torque.

9)What is meant by electric flux?calculate the electric flux due to the configuration given below through the surface 'S'?



10)(a)State gauss's theorem in electrostatics.Use it to obtain an expression for electric field intensity at a point near a uniformly charged infinite plate sheet. (b)An infinite line charge charge produces a field of $9*10^{4}$ N/C at a distance of 2cm .calculate the linear charge density.

11)(a)Find an expression for electric potential at any point due to an electric dipole.

(b)calculate the amount of work done , in rotating a dipole of dipole moment $5*10^{-8}$ Cm from its position of stable equibrium to the position of unstable equilibrium in a unform electric field of intensity 10^{4} N/C.

12)(a) Two extremely small charged copper spheres have their centres seprated by a distance of 50cm vacuum .what is the mutual of electrostatic repulsion if the charge on each is $6.5*10^{-7}$ C?

(b)what will be the force of repulsion if (1)the charge on each sphere is doubled and their sepration is halved ?

(2)the two spheres are placed in water (dielectric constant of water =80)