SUB:PHYSICS   Session:2019 – 20

1:   Three point charges (+2 micro coul,-3 micro coul and -3 micro coul) are kept at the vertices A ,B and C respectively of an equilateral triangle of side 20cm.What should be the sign and magnitude of the third charge q placed at the mid point M of the side BC in order to keep the charge +2 micro coul at A in equilibrium?

2:   Two identical charged spheres are suspended by strings of equal lengths. The strings make an angle 30^0 with each other. When suspended in a liquid of density 800kgm^{-3}, the angle remains the same. What is the dielectric constant of the medium? The density of the material of the sphere is 1600kgm^{-3}.

3:   A small ball of mass 2×10^{-3} kg having a charge of 1 micro coul is suspended by a string of length 0.8 m. Another identical ball having same charge is kept at the point of suspension. Determine the minimum horizontal velocity ,which should be imparted to the lower ball so that it can make a compete revolution?

4:   It is required to hold 4 equal point charges +q in equilibrium at the corners of a square. Find the point charge that will do this if placed at the centre of the square.

5:   Write and depict pictorially the properties of electric lines of force.

6:   The electric field at any point ,whose position vector with the mid point makes an angle θ with the dipole moment of the dipole,is 1 N/C.If dipole moment of the dipole is 0.11×10^{-9} and distance of the point from the mid point of the dipole is $(2.5)^{1/6}$ then, estimate θ.

7:   A mass-less ,rigid ,non conducting rod has two point particles each of mass M and charge +q and –q attached at its ends and the rod is placed in a uniform electric field E, such that the rod makes a small angle(say 5^0) with the field direction. Find an expression for the time taken by the dipole for the rod to become parallel to the field after it is set free.

8:

Fig - 1   Fig - 2
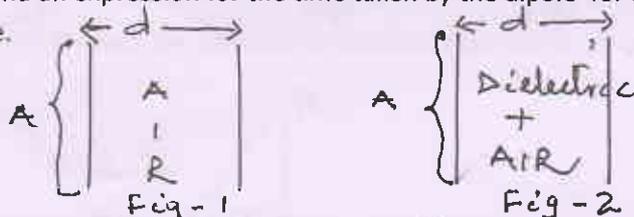
If the capacity of the capacitor in fig 1 is C_0 then to have the capacity of the capacitor shown in fig 2 as $1.8C_0$, what should be thickness and DEC of the di-electric to be inserted in b/w the plates?

9:   Two Carbon resistors connected in series give equivalent resistance 900 ohm and 200 ohm when connected in parallel. Considering that the larger one has a tolerance of 10% and the smaller one has 5%,write the colour codes for both of them

10:
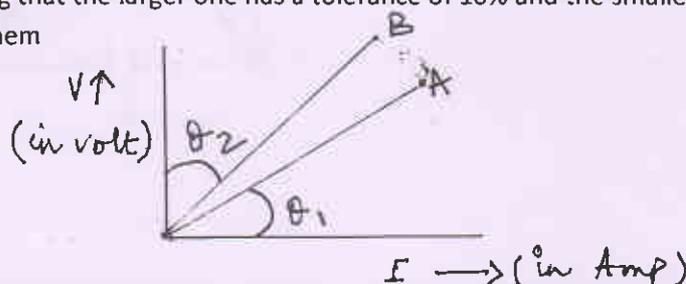
If the resistance of A is R_1 and that of B is R_2 then, find the equivalent resistance when both are connected in (i)series and (ii) parallel. (In trigonometric terms).

11: A right circular cylinder of length L (in metre) and radius R (in metre) has its cetre at the origin and the length along X axis. A uniform electric field $E = E_x i \, NC^{-1}$(for x>0) and $E = -E_x i \, NC^{-1}$(for x<0) exists over the cylinder. Find the net outward electric flux and the charge enclosed by the cylinder.

12:
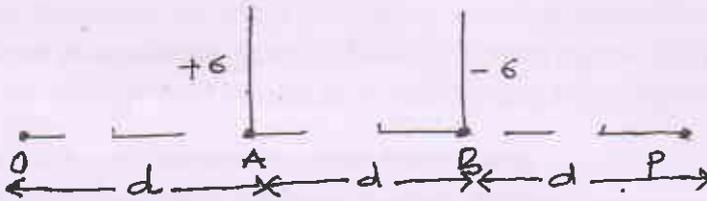
Two long, flat, parallel sheets A and B having uniform charge densities +σ and – σ respectively are held as shown above. Graphically represent the variation of electric field due to two sheets as one moves from the point O to P.

13: A 1 mg ball carrying a charge of 0.02μC hangs from a thread. When a large conducting plate is brought near the ball , the thread makes an angle of 30° with the plate. What is the surface density of charge of the plate?
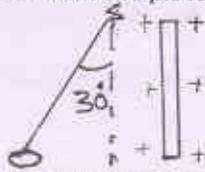
14: Find the current in the three resistors as shown in the network.
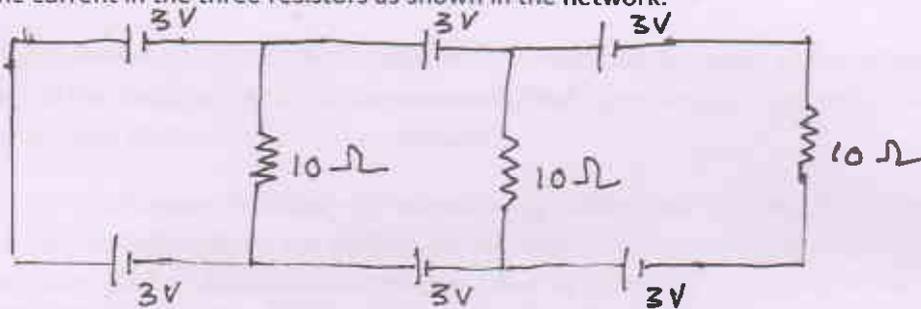
15: Calculate the current through the 6V battery. Also calculate the PD across A and B of the network shown below.