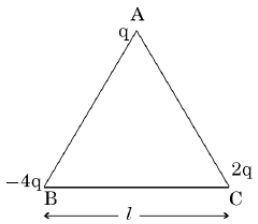
D.A.V MUKHYAMANTRI PUBLIC SCHOOL PATRATU

Summer Vacation Homework (2020 - 21)

Class: XII Subject: Physics

PHYSICS

1. (a) Use Gauss's theorem to find the electric field due to a uniformly charged infinitely large plane thin sheet with surface charge density
   (b) An infinitely large plane thin sheet has a uniform surface charge density . Obtain the expression for the amount of work done in bringing a point charge q from infinite to a point, distance r , in front of the charged plane sheet. (**CBSE 2017)**
2. (a) Three point charges q, – 4q and 2q are placed at the vertices of an equilateral triangle ABC of side 'l' as shown in the figure. Obtain the expression for the magnitude of the resultant electric force acting on the charge q.

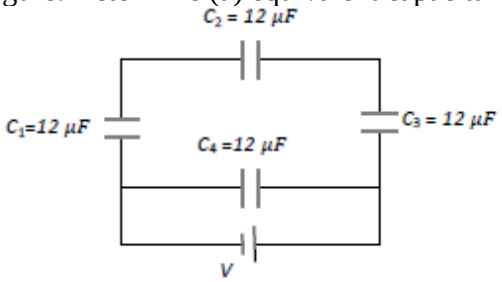


(b) Find out the amount of the work done to separate the charges at infinite distance. **(CBSE 2018)**

3. **(a)** Derive an expression for the electric field E due to a dipole of length '2a' at a point distance r from the centre of the dipole on the axial line.
   (b) Draw a graph of E versus r for.
   (c) If the dipole were kept in a uniform external field E_0 , diagrammatically represent the position of the dipole in stable and unstable equilibrium and write the expression for the torque acting on the dipole in both case. (**CBSE 2017)**

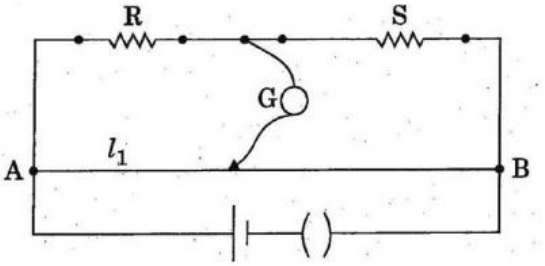
4. (a) Distinguish, with help of a suitable diagram, the difference in the behaviour of a conductor and a dielectric placed in external electric field. How does polarised dielectric modify the original external field?
   (b)A capacitor of capacitance C is charged fully by connecting it to a battery of emf E. It is then disconnected from the battery. If the separation of plates of the capacitor is now doubled, how will the following change
   (i) charge stored by the capacitor.
   (ii) Field strength between the plates.
   (iii) energy stored by the capacitor. Justify your answer in each case. **(CBSE 2016)**

5. A network of four capacitors each of 12µF capacitance is connected to a 500 V supply as shown in the figure. Determine (a) equivalent capacitance of the network and (b) charge on each capacitor. 12µF

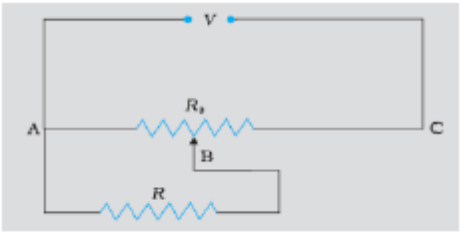


6. Draw a labelled diagram of Van of Graaff generator. State its working principle to show how by introducing a small charged sphere into a larger sphere, a large amount of charge can be transferred to the outer sphere. State the use of this machine and also point out its limitations. **(CBSE 2014)**
7. Deduce the expression for the torque acting on dipole of dipole moment P in the presence of a uniform electric field E.

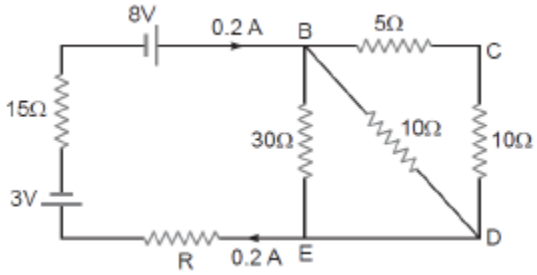
8. **(i)** State the principle of working of a meter bridge.
(ii) In a meter bridge balance point is found at a distance l_1 with resistances R and S as shown in the figure. When an unknown resistance X is connected in parallel with the resistance S, the balance point shifts to a distance l_2 . Find the expression for X in terms of l_1 , l_2 and S. **(CBSE 2017)**



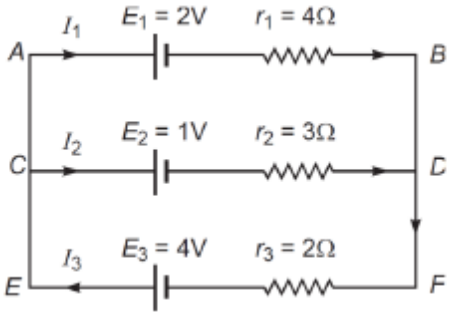
9. A potential difference V is applied across a conductor of length L and diameter D. How is the drift velocity, v_d, of charge carriers in the conductor affected when (i) V is halved, (ii) L is doubled and (iii) D is halved ? Justify your answer in each case. **(CBSE 2015)**
10. A cell of emf 'E' and internal resistance 'r' is connected across a variable resistor 'R'. Plot a graph showing variation of terminal voltage 'V' of the cell versus the current 'I'. Using the plot, show how the emf of the cell and its internal resistance can be determined. **(CBSE 2014)**
11. A resistance of R Ω draws current from a potentiometer. The potentiometer has a total resistance R0 Ω Fig. A voltage V is supplied to the potentiometer. Derive an expression for the voltage across R when the sliding ter.



12. Calculate the value of the resistance R in the circuit shown in the figure so that the current in the circuit is 0.2 A. What would be the potential difference between points B and E? **(CBSE 2012)**

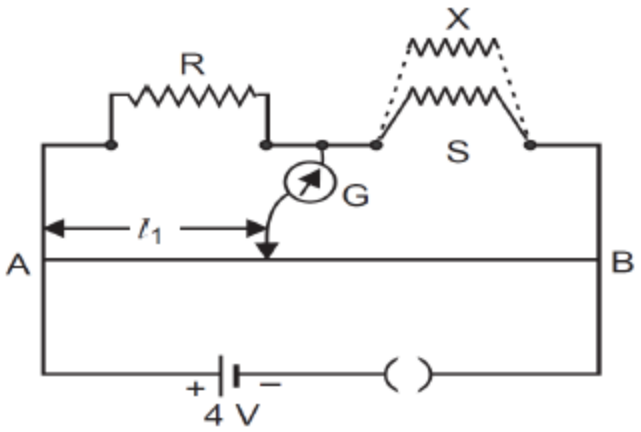


13. State Kirchhoff's rules. Use these rules to write the expressions for the currents and in the circuit diagram shown. **(CBSE 2010)**



14. (i) State the principle of working of a meter bridge.
(ii) In a meter bridge balance point is found at a distance with resistances R and S as shown in the figure.

When an unknown resistance X is connected in parallel with the resistance S, the balance point shifts to a distance l_2 . Find the expression for X in terms of l_1 , l_2 and S. **(CBSE 2009)**



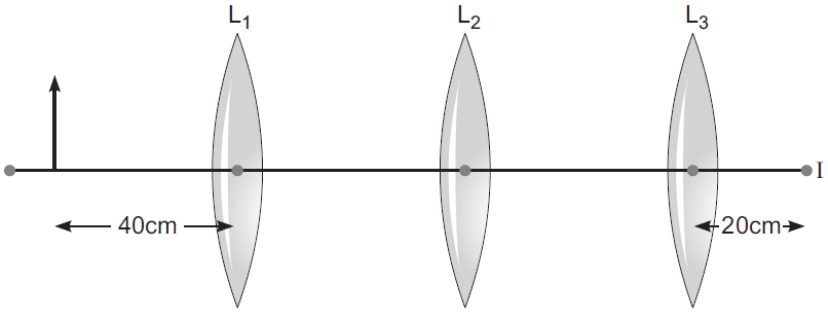
15. Draw a ray diagram to show the image formation by a combination of two thin convex lenses in contact. Obtain the expression for the power of this combination in terms of the focal lengths of the lenses. (CBSE 2017)

16. **(a)** Draw a labelled ray diagram showing the formation of image by a compound microscope in normal adjustment. Derive the expression for its magnifying power.

17. Draw a labeled ray diagram of a refracting telescope. Define its magnifying power and write the expression for it. Write two important limitations of a refracting telescope over a reflecting type telescope.

18. Draw a labelled ray diagram of a reflecting telescope. Mention its advantages over the reflecting telescope.

19. You are given three lenses L_1, L_2 and L_3 each of focal length 20cm. An object is kept at 40 cm in front of L_1 , as shown. The final real image is formed at the focus 'I' of L_3. Find the separations between L_1, L_2 and L_3.



20. Use the mirror equation to show that

(a) An object placed between f and 2f of a concave mirror produces a real image beyond 2f.

(b) a convex mirror, always produces a virtual image independent of the location of the object.

(c) An object is placed between pole and the focus of a concave mirror produces a virtual and enlarged image.

21. A convex lens made up of glass of refractive index 1.5 is dipped, in turn , in

(i) a medium of refractive index 1.6,

(ii) a medium of refractive index 1.3.

(a) Will it behave as a converging or a diverging lens in the two cases?

(b) How will its focal length change in the two media?

Chapter's: **1. Electrostatic & Electric fields**
2. Electrostatic Potential and Capacitance
3. Current Electricity
4. Ray Optics.

**** Online MCQ test during the vacation****