



## ASSIGNMENT FOR SUMMER VACATION 2017-18

Class: XII

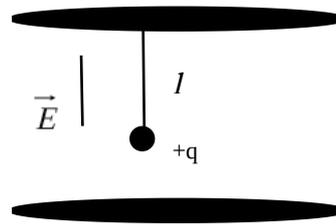
Sub:

PHYSICS

---

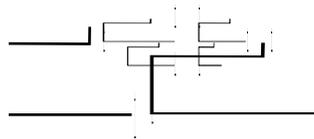
1. Show that, for a point outside, a uniformly charged hollow sphere behaves as if its entire charge were concentrated at its centre.
2. Using Gauss's theorem, calculate the field due to a thin plane infinite sheet of charge, having a uniform surface charge density.
3. How can we understand the process of charging by induction? Can we charge an insulator by induction?
4. Why do we say that repulsion alone is a surest-test of electrification?
5. What is the direction of the electric field due to an electric dipole at a point on its (i) axial line, (ii) equatorial line?
6. Does a single conductor possess capacitance?
7. Can we give any desired charge to a capacitor?
8. The radius of the earth is 6400 km, what is its capacitance?
9. Can a solid conducting sphere hold more charge than a hollow sphere of the same radius? Would electrons move from higher potential to lower potential or Vice Versa?
10. A body with a charge  $-q$  is introduced through a small orifice into a hollow current-conducting sphere with a radius  $R$  carrying a charge  $+Q$ . What is the potential of a point in space at a distance of  $R > r$  from the centre of the sphere?
11. Can two like-charged balls be attracted to each other ?
12. A charged body has some energy. What is the source of the energy in a body which receives charge as a result of electrostatic induction?
13. Is the electrostatic potential necessarily zero at a point where the electric field strength is zero? Give an example to illustrate your answer.
14. A test charge is placed at a point in a non uniform electric field. Will it necessarily move along the line of force passing through that point?
15. Two copper spheres of the same radii, one hollow and other solid are charged to same potential. Which, if any, of the two will have more charge? Why?
16. Calculate the electric field intensity required to just support a water droplet of mass  $10^{-7}$  kg and having charge  $1.6 \times 10^{-19}$  C.
17. A cone of radius  $R$  and height  $h$  is located in a uniform electric field parallel to its base. What is the electric flux entering the cone?
18. Calculate the electric field due to an electric dipole of length 20 cm consisting of a charge  $\pm 150 \mu\text{C}$  at a point 30 cm from each charge.

19. A pendulum consisting of an insulating bob of mass  $m$  and charge  $q$  is hung as shown in the figure. What is the time period of the pendulum if uniform electric field  $\vec{E}$  is set up between the plates? Give an expression for the torque experienced by the bob.



An electric flux through the surface of a cube is  $16 \times 10^3 \text{ Nm}^2 \text{ C}^{-1}$ .

- (a) How much electric flux would pass through the surface if the radius is doubled?  
 (b) Find the value of charge causing this flux.
20. Two conductors having capacities  $5\mu\text{F}$  and  $10\mu\text{F}$  are charged up to  $100\text{V}$  and  $200\text{V}$  respectively. If these are connected by a wire then calculate the common potential and loss of energy.
21. In a Van de Graff generator, the shell is at  $25 \times 10^5 \text{ V}$ . if the dielectric strength of gas surrounding the electrode is  $\text{V m}^{-1}$ ; find the radius of the shell.
22. Each capacitor in the following figure has a capacitance of  $10\mu\text{F}$ . The emf of the battery is  $100\text{V}$ . find the energy stored in each of the four capacitors.



23. A parallel plate capacitor with the plate area  $100\text{ cm}^2$  and the separation between the plates  $1.0\text{ cm}$  is connected across the battery of emf  $24\text{ V}$ . find the force of attraction between the plates.
24. Two parallel plates have equal and opposite charges. When the space between the plates is evacuated, the electric field is  $E = 3.20 \times 10^5 \text{ V/m}$ . When the space is filled with dielectric, the electric field is  $2.50 \times 10^5 \text{ V/m}$ . (a) what is the charge density on each surface of the dielectric? (b) What is the dielectric constant?
25. Find the ratio of the capacitances of a capacitor filled with two dielectric of same dimensions but of different constants  $K_1$  and  $K_2$ , respectively.
26. Find the equivalent capacitance of the combination shown in the following figure between the indicated points.