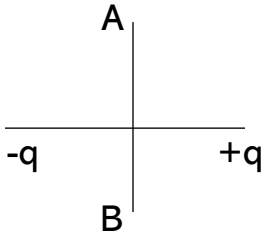
# Physics Test M.M.-25

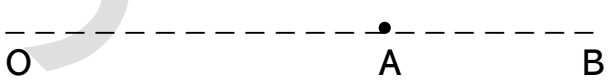
## Electrostatics Class XII Time-1hr

Q1. Answer the following: 1 x15 = 15

a. How can you charge a metal sphere positively without touching it?
b. How many electrons are contained in one cubic centimeter of a material?
c. A charge q is moved from a point A above a dipole moment p to a point B below the dipole in equatorial plane without acceleration. Find the work done in the process.

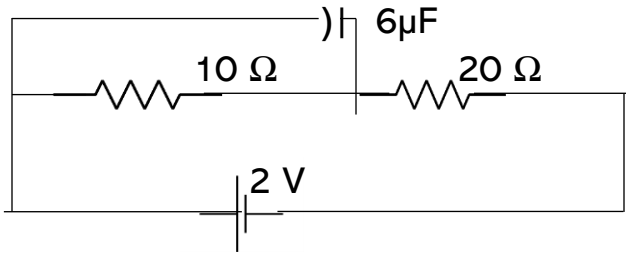



d. What is the electric flux through a cube of side 1 cm which encloses an electric dipole?
e. What is the geometrical shape of equipotential surfaces due to a single isolated charge?
f. Why do the electric field lines never cross each other?
g. Why must electrostatic field at the surface of a charged conductor be normal to the surface at every point? Give reason.
h. Why is the potential inside a hollow spherical charged conductor constant and has the same value as on its surface?
i. Define the term potential energy of charge q at a distance r in an external electric field.
j. Define dipole moment of an electric dipole. It is a scalar or a vector?
k. Draw an equipotential surface for a uniform electric field.
l. Why is there no work done in moving charge from one point to another on an equipotential surface?
m. A hollow metal sphere of radius 6 cm is charged such that the potential on its surface is 12 V. What is the potential at the center of the sphere?
n. A metal plate is introduced between the plates of a charged parallel plate capacitor. What is its effect on the capacitance of the capacitor?
o. A point charge Q is placed at point O as shown in the figure. Is the potential difference $V_A - V_B$ positive, negative, or zero, if Q is (i) positive (ii) negative



Q2. Answer the following: 2 x 5 = 10

a. Find the charge on the capacitor as shown in the circuit.




b. Two concentric metallic spherical shells of radii R and 3R are given charges Q1 and Q2 respectively. The two surface charge densities on the outer surfaces of the shells are equal. Determine the ratio Q1 : Q2.

c. i. Net capacitance of three identical capacitors in series is 2 μF. What will be their net capacitance if connected in parallel?

ii. Find the ratio of energy stored in the two configurations if they are both connected to the same source.

d. Calculate the amount of work done in rotating a dipole, of dipole moment 3 x $10^{-8}$cm. from its position of stable equilibrium to the position unstable equilibrium, in a uniform electric field of intensity $10^4$ N/C.

e. Figure shows a sheet of aluminum foil of negligible thickness placed between the plates of a capacitor. How will its capacitance be affected if:

(i) the foil is electrically insulated?

(ii) the foil is connected to the upper plate with a conducting wire?