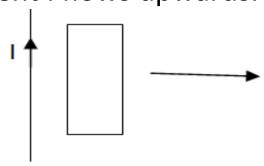
SARALA BIRLA PUBLIC SCHOOL

Mahilong, Ranchi.

Revision Test (Physics)

Class – XII

1. A rectangular loop of wire is pulled to the right, away from the long straight wire through which a steady current I flows upwards. What is the direction of induced current in the loop?



2. The magnetic susceptibility χ of a given material is -0.5. Identify the magnetic material. Draw the modification of the field pattern on keeping a piece of this material in a uniform magnetic field.

Assertion-Reason

Direction (Q. Nos.3-4) In each of the following questions, a statement of Assertion is given by the orresponding statement of Reason. Of the statements, mark the correct answer as.

(A) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(B) If both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

(C) If Assertion is true, but Reason is false.

(D) If Assertion is false, but Reason is true.

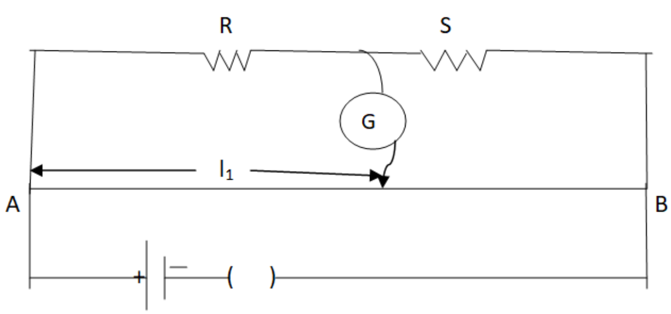
3. Assertion: In a series LCR resonance circuit, the impedance is equal to the ohmic resistance.
   Reason: At resonance, the inductive reactance exceeds the capacitive reactance.

4. Assertion: When a charged capacitor is filled completely with a metallic slab, its capacitance is increased by a large amount.
   Reason: The dielectric constant for metal is infinite.

or

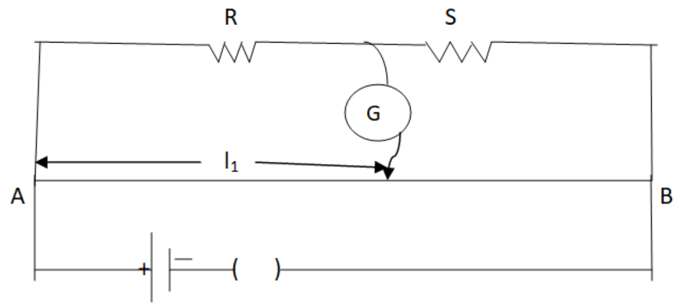
Assertion: The capacitance of a parallel plate capacitor increases with increase of distance between the plates.
Reason: Capacitance of a parallel plate capacitor c α 1/d.

5. (i) Write the principle of working of a metre bridge. **(Understanding)**
   (ii) In a metre bridge, the balance point is found at a distance l_1, with resistance R and S as shown in figure.



An unknown resistance X is now connected in parallel to the resistance S and the balance point is found at a distance l_2. Obtain the formula for X in terms of l_1 and l_2 and S.

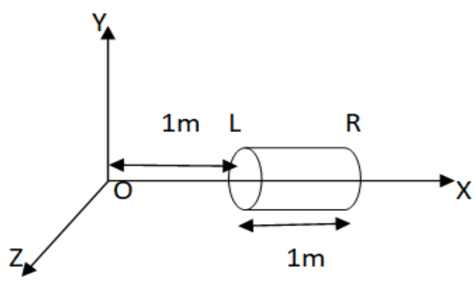
or



In a metre bridge with R and S in the gaps, the null point is found at 40 cm from A. If a resistance of 30 Ω is connected in parallel with S, the null point occurs at 50 cm from A. Determine the values of R and S.

6. Two metal spheres one of radius R and the other of radius 2R, both have same surface charge density σ. They are brought in contact and separated. What will be the new surface charge densities on them?
7. A hollow cylindrical box of length 1 m and area of cross-section 25 cm^2 is placed in a three dimensional coordinate system as shown in the figure. The electric field in the region is given by $\vec{E} = 50\,x\,\hat{i}$, where E is in NC^{-1} and x is in metres. Find

(i) Net Flux through the cylinder.
(ii) Charge enclosed by the cylinder.



8. A parallel plate capacitor is charged by a battery, which is then disconnected. A dielectric slab is then inserted in the space between the plates. Explain what changes, if any, occur in the values of:

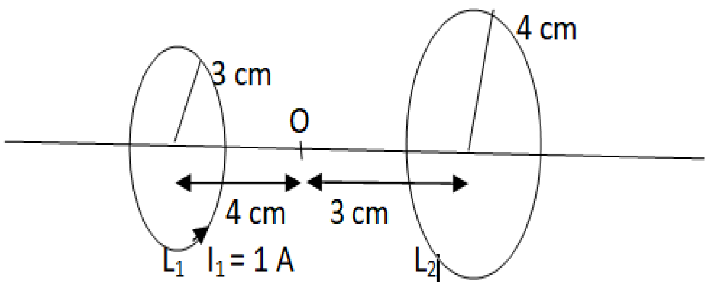
(i) capacitance
(ii) potential difference between the plates.
(iii) electric field between the plates and
(iv) the energy stored in the capacitor.

or

Derive the expression for the capacitance of a parallel plate capacitor having plate area A and separation d with dielectric material of thickness t with dielectric constant K between the plates.

9. Use Gauss' law to derive the expression for the electric field between two uniformly charged parallel sheets with surface charge densities σ and –σ respectively.
10. (i) Derive an expression for the magnetic field at a point on the axis of a current carrying

circular loop.
(ii) Two co-axial circular loops L_1 and L_2 of radii 3 cm and 4 cm are placed as shown. What should be the magnitude and direction of the current in the loop L_2 so that the net magnetic field at that point O be zero?



or

Derive an expression for the force per unit length between two long straight parallel current carrying conductors. Hence define S.I. unit of current (Ampere)

11. (i) Draw a labelled ray diagram to obtain the real image formed by an astronomical telescope in normal adjustment position. Define its magnifying power.
(ii) You are given three lenses of power 0.5 D, 4 D and 10 D to design a telescope.
(a) Which lenses should be used as objective and eyepiece? Justify your answer.
(b) Why is the aperture of the objective preferred to be large?

or

Derive the mathematical relation between refractive indices n_1 and n_2 of two radii and radius of curvature R for refraction at convex spherical surface. Consider the object to be a point since lying on the principal axis in a rarer medium of refractive index n_1 and a real image formed in the denser medium of refractive index n_2. Hence derive lens maker's formula.
The focal length of an equiconvex lens is equal to the radius of curvature of either face. What is the value of refractive index of the material of the lens?

12.) Draw a labelled diagram of a moving coil galvanometer. State its principle of working. **(Applying)**
(b) What is the function of uniform radial magnetic field and soft iron core inside the coil of a galvanometer?
(c) Define current sensitivity and voltage sensitivity of galvanometer. Increasing the current sensitivity may not necessarily increase the voltage sensitivity of a galvanometer, justify your answer.