O P JINDAL SCHOOL, SAVITRINAGAR

ASSIGNMENT

CLASS XII PHYSICS

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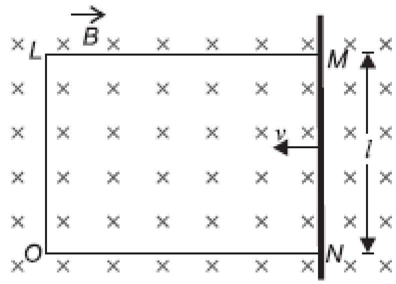
41 (a) Describe a simple experiment (or activity) to show that the polarity of emf induced in a coil is always such that it tends to produce a current which opposes the change of magnetic flux that produces it.
(b) The current flowing through an inductor of self-inductance L is continuously increasing.
Plot a graph showing the variation of 1
(i) Magnetic flux versus the current
(ii) Induced emf versus dI/dt
(iii) Magnetic potential energy stored versus the current.

42 Calculate self-inductance for a long solenoid of length l, number of turns N and radius r. 1

43 The magnetic flux through a coil perpendicular to its plane is varying according to the relation $\varphi = (5t^3 + 4t^2 + 2t - 5)$ weber. Calculate the induced current through the coil at $t = 2$ sec if the resistance is 5 ohm. 1

44 The magnetic flux linked with a closed circular loop of radius 20 cm and resistance 2 Ω at any instant of time is $\varphi = 4t + 3$. where φ is in milliweber and time 't' in sec. 1
Find (i) flux linked with a loop at t = 3 s (ii) induced emf at t = 2 s and (iii) plot a graph between (a) φ and t (b) ε and t.

45 A rectangular conductor LMNO is placed in a uniform magnetic field of 0.5 T. The field is directed perpendicular to the plane of the conductor. When the arm MN of length of 20 cm is moved towards left with a velocity of 10 ms^{-1}, calculate the emf induced in the arm. Given the resistance of the arm to be 5 Ω (assuming that other arms are of negligible resistance) find the value of the current in the arm. 1



46 A square of side L metres lies in the x-y plane in a region, where the magnetic field is given by $B = B_o(2\hat{i} + 3\hat{j} + 4\hat{k})$T, where B_o is constant. The magnitude of flux passing through the square is 1

(a) $2B_oL^2$ Wb. (b) $3B_oL^2$ Wb.
(c) $4B_oL^2$ Wb. (d) $\sqrt{29}\ B_oL^2$ Wb.

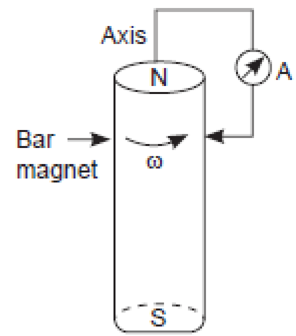
47 A loop, made of straight edges has six corners at A(0, 0, 0), B(L, 0, 0) C(L, L, 0), D(0, L, 0), E(0, L, L) and F(0, 0, L). A magnetic field B = B_o $(\hat{i} + \hat{k})$ T is present in the region. The flux passing through the loop ABCDEFA (in that order) is 1

(a) B_oL^2 Wb. (b) $2B_oL^2$ Wb.
(c) $\sqrt{2}B_oL^2$ Wb. (d) $4B_oL^2$ Wb.

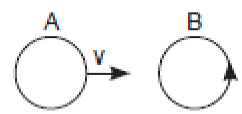
48 A cylindrical bar magnet is rotated about its axis (Figure). A wire is connected from the axis and is made to touch the cylindrical surface through a contact. Then (a) a direct current flows in the ammeter A.
(b) no current flows through the ammeter A. 1

(c) an alternating sinusoidal current flows through the ammeter A with a time period T = $\frac{2\pi}{\omega}$.

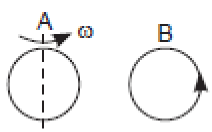
(d) a time varying non-sinosoidal current flows through the ammeter A.



49 There are two coils A and B as shown in Figure. A current starts flowing in B as shown, when A is moved towards B and stops when A stops moving. The current in A is counterclockwise. B is kept stationary when A moves. We can infer that [NCERT Exemplar]
(a) there is a constant current in the clockwise direction in A.
(b) there is a varying current in A. 1
(c) there is no current in A.
(d) there is a constant current in the counterclockwise direction in A.



50 Same as question 4 except the coil A is made to rotate about a vertical axis (Figure). No current flows in B if A is at rest. The current in coil A, when the current in B (at t = 0) is counterclockwise and the coil A is as shown at this instant, t = 0, is [NCERT Exemplar] 1



(a) constant current clockwise.
(b) varying current clockwise.
(c) varying current counterclockwise.
(d) constant current counterclockwise.