O P JINDAL SCHOOL, SAVITRINAGAR

ASSIGNMENT

CLASS XII PHYSICS

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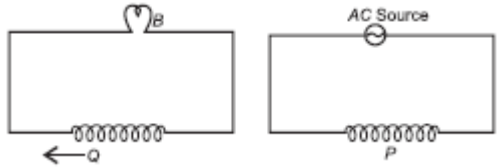
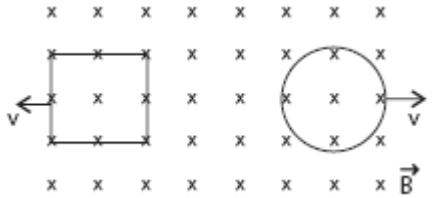
31 A coil Q is connected to low voltage bulb B and placed near another coil P as shown in the figure. Give reasons to explain the following observations:
(a) The bulb B lights.
(b) Bulb gets dimmer if the coil Q is moved towards left. 2



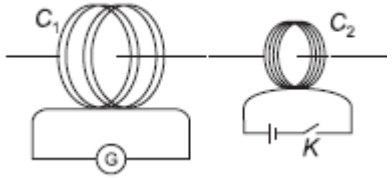
32 A rectangular loop and a circular loop are moving out of a uniform magnetic field to a field-free region with a constant velocity v as shown in the figure. Explain in which loop do you expect the induced emf to be constant during the passage out of the field region. The magnetic field is normal to the loops. 2



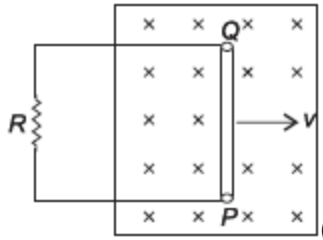
33 A conducting rod of length l is moved in a magnetic field of magnitude B with velocity v such that the arrangement is mutually perpendicular. Prove that the emf induced in the rod is $|\varepsilon| = Blv$. 2

34 (i) How are eddy currents reduced in a metallic core?
(ii) Give two uses of eddy currents. 2

35 A current is induced in coil C_1 due to the motion of current carrying coil C_2.
(a) Write any two ways by which a large deflection can be obtained in the galvanometer *G*.
(b) Suggest an alternative device to demonstrate the induced current in place of a galvanometer. 2



36 A conducting rod, PQ, of length l, connected to a resistor R, is moved at a uniform speed, v, normal to a uniform magnetic field, B, as shown in the figure.



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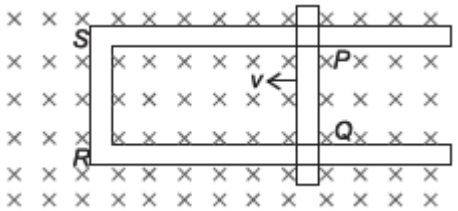
(i) Deduce the expression for the emf induced in the conductor.
(ii) Find the force required to move the rod in the magnetic field.
(iii) Mark the direction of induced current in the conductor.

37 State Lenz's Law. Does it violate the principle of conservation of energy. Justify your answer. 3

38 Figure shows a rectangular loop conducting *PQRS* in which the arm *PQ* is free to move. A uniform magnetic field acts in the direction perpendicular to the plane of the loop. Arm *PQ* is moved with a velocity *v* towards the arm *RS*. Assuming that the arms *QR*, *RS* and *SP* have negligible resistances and the moving arm *PQ* has the resistance *r*, obtain the expression for (i) the current in the loop (ii) the force and (iii) the power required to move arm *PQ*. 3



39 (a) Obtain the expression for the magnetic energy stored in a solenoid due to the current *I* flowing in it, in terms of magnetic field *B*, area of cross-section *A* and length *l* of the solenoid.
(b) How is this magnetic energy per unit volume compared with the electrostatic energy per unit volume stored in a parallel plate capacitor? 3

40 A rectangular conducting loop of length *l* and breadth *b* enters a uniform magnetic field *B* as shown.
The loop is moving at constant speed *v* and at $t = 0$ it just enters the field *B*. Sketch the following graphs for the time interval $t = 0$ to $3l/v$.
(i) Magnetic flux – time (ii) Induced emf – time (iii) Power – time
Resistance of the loop is R. 3