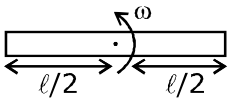
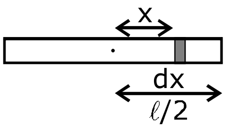
OBJECTIVE - I

Sol 1. B



Take a small element dx at a distance of 'x' centre

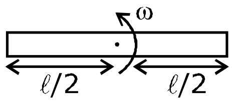
Þ 

$$d \in \int_0^{\frac{l}{2}} B\omega x dx = \left.\frac{Bwx^2}{2}\right|_0^{\frac{l}{2}}$$

$$\in = \frac{1}{8} Bwl^2$$

Sol 2. D

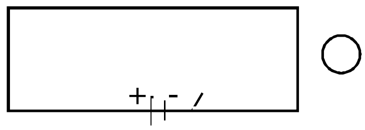
Emf at both end is same = $\frac{1}{8}Bwl^2$



So the potential difference between the two ends of therod is zero.

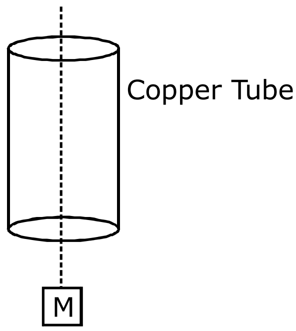
Sol 3. D

When the switch is closed than a clock wise current pulse generated (Because initially current flow the terminal to negative terminal).
Due to Mutual Induction, current is generated in the loop. If circuit is open after some time. Dut to loop an anticlock wise current pulse generated in
the circuit.



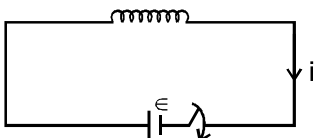
Sol 4. C
An anticlock wise current-pulse generated and then a clock-wise current pulse.

Sol 5. B

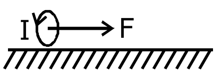


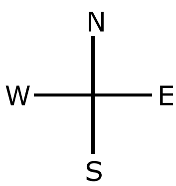
After sometime the Magnet will move with almost contant speed.

Sol 6. C



'LR' circuit





$$e = -L\frac{di}{dt}$$

Current flow in the CKt is clock wise direction, due to Mutual Induction current flow in the loop anti clockwise direction. The net force applied on the loop in east direction. So we can say that the ring will move away from the solenoid.

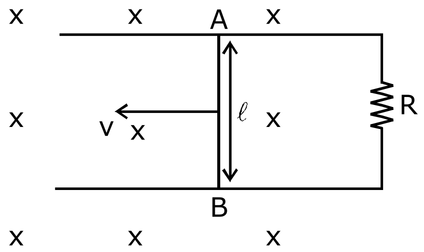
Sol 7. A

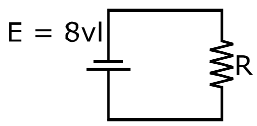
Þ An emf con be induced by moving a condcutor in a magnetic field
Î = Bvl

Þ An emf can be induced by charging the magnetic field.

$$\in = \frac{-d\phi}{dt} \qquad \phi \rightarrow \text{flux}$$

Sol 8. B





E =Bvl

If the wire AB is replaced by a semicircular wire, the magnitude of the induced current will be same. Because it is depend on the velcoty & lenght of the wire.

Sol 9. B

$\in = Bvl$

$$\text{Power} = \frac{v^2}{R} = \frac{\in^2}{R} = \frac{B^2v^2l^2}{R}$$

Here $P \times v^2$

$P \rightarrow$ Power
$v \rightarrow$ velocity
$B \rightarrow$ Magnetic field

Sol 10 . A

Due to Mutual induction, current is generated in second loop and that causes the two loops attract each other.

Sol 11. C

Sol 12. D

Induced emf is AB is Bvl and Induced emf is DC is also Bvl.
Net emf in the closed circuit (loop) is zero.
So induced current in the loop is zero.

OBJECTIVE - II

Sol 1. **BC**

Þ The north pole faces the ring and the magnet moves towards it
Þ The south Pole faces the ring and the Magnet moves away from it.

Sol 2. **D**

Potential difference appears across the two ends = Bvl
v ^ B , v ^ l , l ^ B

Sol 3. **CD**

Þ An emf is induced in the loop is it is rotated about a diameter.
Þ An emf is induced in the loop if it is deformed.

Sol 4. **ACD**

Sol 5. **ABC**

Sol 6. **BD**

$R = \frac{\rho l}{A}$ A - Crossectional Area

Thick wire "A" is large than thin wire.

R_{thick} wire < R_{thin} wire

Þ time constant Þ $\tau = \frac{L}{R}$

Þ Power dissipatedin Heating = I^2R

Sol 7. **D**

Sol 8. **B**

The end 'A' becomes, positively charged. Because magnetic field exerts an average Force $\vec{F_0} = q\vec{v} \times \vec{B}$ on each free electron where $q = 1.6 \times 10^{19}$C is the charge on the electron. This Force is towards AB and hence the free electrons will move towareds B. Negative charge is accumulated at 'B' and positive charge appears at A.

Sol 9. **ABC**

Þ Time constant t = RC in RC circuit

$$\text{frequency} = \frac{1}{\tau} = \frac{1}{RC} \quad ....(i)$$

Þ Time constant in LR circuit is $\tau = \frac{L}{RC}$

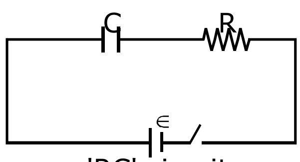
$$\text{frequency} = \frac{1}{\tau} = \frac{R}{L} \quad ....(i)$$

Þ eq. (i) & (ii) multiply Þ

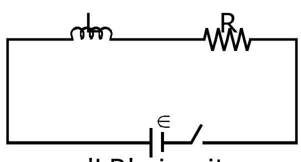
$$\text{frequency} = \frac{1}{LC}$$

$$\text{frequency} = \frac{1}{\sqrt{2C}}$$

Sol 10. **BC**



'RC' circuit



'LR' circuit

Þ A long time after capacitor is fully charged is equal to
Q = CV = CÎ Þ Q = CÎ (1-$e^{-t/t}$)

Þ The current in 'L' just before t = t_0 is
i= Î/R (1-$e^{-t/t}$) = Î/R