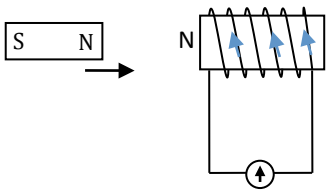
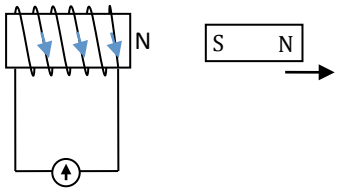
Chapter 16 Electromagnetic Induction Notes Answers

Check Your Understanding 1

1.



2.



3. $|\varepsilon| = \frac{\Delta(N\Phi)}{t} = \frac{1(3-1)}{4} = 0.5 \text{ V}$

since there is a decrease in flux, current flow counter-clockwise to produce magnetic field pointing out of the page to oppose the change.

4. $|\varepsilon| = \frac{\Delta(N\Phi)}{t} = \frac{(2-1)1}{2} = 0.5 \text{ V}$

since there is an increase in flux, current flow clockwise to produce magnetic field pointing into the page to oppose the change.

5. Ans: A

Magnetic field due to cable is either into or out of the page. Thus, C and D will have zero flux linkage.

B also has zero flux linkage since the magnetic flux on the right side will be opposite in sign to the flux on the left side. Thus, the scalar sum of flux gives zero.

6. Ans: A

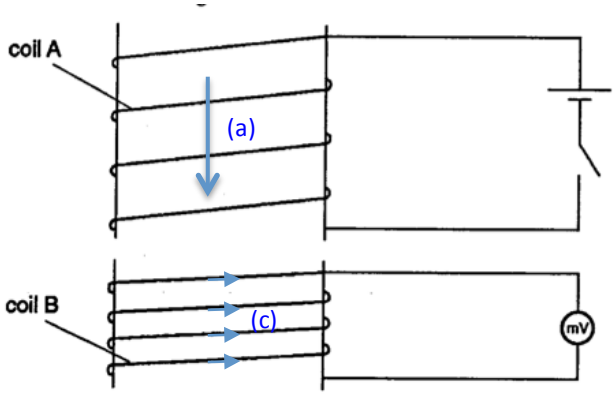
There is no change in flux linkage, thus induced emf is zero.

7. Ans: A

As magnet entering solenoid, induced current flow to produce north on right side. When magnet is leaving solenoid, induced current flow to produce north on left side. Hence, there must be a change in direction of current.

While magnet is in the middle of solenoid, there is no change in magnetic flux linkage, thus induced emf and induced current are zero.

8. (a)



(b) When current in coil A switched on, there is an increase in magnetic flux density produced by coil A. This in turn increase the magnetic flux linkage through coil B. By Faraday's law, an e.m.f. is induced in coil B.
Once the current and magnetic flux density in coil A reaches a maximum, it remains constant. Hence, the corresponding flux linkage through coil B remains constant and the e.m.f. drops to zero.

(d) inserting an iron core concentrates the magnetic flux density of coil A, leading to a further increase in flux linkage through coil B. By Faraday's law, an emf is induced.

Check Your Understanding 2

1. (a) magnetic flux density B, length L of wire in B-field, velocity of wire mutually perpendicular to B and L
   (b) electrons are deflected towards B. Thus, A at higher potential.

2. Ans: C
   Need to resolve component of B that is perpendicular to x and v.

3. Ans: B
   Free electrons are deflected towards B in the wire by Fleming's left-hand rule.

4. $\varepsilon = \frac{\Delta\Phi}{t} = \frac{B\pi L^2}{T} = \frac{BL^2\omega}{2}$ since $\omega = \frac{2\pi}{T}$
   P at higher potential