CHAPTER NO. 15
ELECTROMAGNETIC INDUCTION

1. **Encircle the correct answers.**

i. The magnitude of motional emf is given by:
a) $\varepsilon = -VBL$
b) $\varepsilon = VBL$
c) $\varepsilon = -\dfrac{V}{BL}$
d) $\varepsilon = \dfrac{L}{VB}$

ii. The unit of induced emf is:
a) Ampere
b) Volt
c) Joule/coulomb
d) Both (b) and (c)

iii. The negative sign in the equation $\varepsilon_L = -L\dfrac{\Delta I}{\Delta t}$ can be explained by:
a) Lenz's law
b) Faraday's law
c) Ampere' law
d) None of these

iv. One henry is equal to:
a) 1 ohm $\times$ 1 sec
b) 1 ohm $\times$ 1 hertz
c) 1 ohm $\times$ 1 metre
d) All of above

v. Self inductance of a long solenoid is given by:
a) $L = \dfrac{\mu_0 n^2}{l}$
b) $L = \mu_0 N I^2 A$
c) $L = \mu_0 n^2 A l$
d) None of the above

vi. A.C is converted into D.C by:
a) Dynamo
b) Rectifier
c) Motor
d) Transformer

vii. If the north pole of a magnet moves away from a metallic ring. Then the current flows:
a) Clockwise
b) Anticlockwise
c) First clockwise and then anticlockwise
d) None of above

viii. In case of a motor, if V is the applied emf and ε is the back emf then net emf in the circuit is:
a) $V - \varepsilon$
b) $V + \varepsilon$
c) $V \times \varepsilon$
d) $\dfrac{\varepsilon}{V}$

ix. When the back emf in a current is zero, it draws:
a) Zero current
b) Maximum current
c) Minimum current
d) Steady average current

x. 1 Henry=
a) VSA^{-1}
b) $VS^{-1}A^{-1}$
c) $V^{-1}SA$
d) VSA^{-2}

Q.2 Write the short answers.

i. Does the induced emf in a circuit depend on the resistance of the circuit? Does the induced current depend on the resistance of the circuit?

ii. Does the induced emf always act to decrease the magnetic flux through a circuit?

iii. Show that ε and $\dfrac{\Delta\phi}{\Delta t}$ have same units.

iv. Can a D.C motor be turned into a D.C generator? If so what is the consequence of this?

v. Can an electric motor be used to drive an electric generator with the output from the generator being used to operate the motor?

vi. Four unmarked wires emerge from a transformer, What steps would you take to determine the turns ratio?

vii. Can a step-up transformer increase the power level?

viii. When the primary of a transformer is connected to A.C. mains the current in it? Is very small if the secondary circuit is open, but.

Note: Long questions:

Q.3 **(a)** Define motional emf. Also derive the expression so the motional emf.

(b) two coils are placed side by side. An emf of 0.8 V is observed in one coil when the current is changing at the rate of 200 As^{-1} in the other coil. What is the mutual inductance of the coils?

Q.4 **(a)** what is transformer? Write its principle , construction and working.

(b) The back emf in a motor is 120 V when the motor is turning at 1680 rev per min. What is the back emf when the motor turns 3360 rev. per min?