CHAPTER-6
Electromagnetic Induction
## ASSIGNMENT-2

1-Mark Questions

Q1. A coil of area 100 cm^2 has 500 turns and magnetic field of 0.1 Wb/m^2 is perpendicular to the coil. The field is reduced to zero in 0.1 *second*. The induced e.m.f. in the coil is

(a)   1 *V*   (b) 5 *V*   (c) 50 *V*   (d)   Zero

Q2. A coil of area $A = 2$ m^2 is situated in a uniform magnetic field $B = \sqrt{3}.0$ *wb/m²* and area vector makes an angle of 30º with respect to the magnetic field as shown in figure. The value of the magnetic flux through the area A would be equal to

(a) 2 *weber*   (b)1 *weber*   (c)3 *weber*   (d)$\frac{3}{2}$*weber*
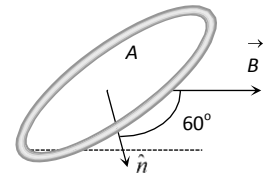
Q3. In the diagram shown if a bar magnet is moved along the common axis of two single turn coils A and B in the direction of arrow

(a) Current is induced only in A & not in B

(b) Induced currents in A & B are in the same direction

(c) Current is induced only in B and not in A

(d) Induced currents in A & B are in opposite directions
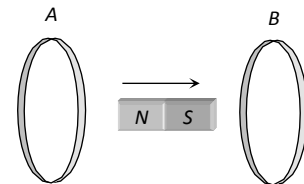
Q4. Magnetic flux ϕ (in *weber*) linked with a closed circuit of resistance 10 *ohm* varies with time

t (in seconds) as $\phi = 5t^2 - 4t + 1$

The induced electromotive force in the circuit at $t = 0.2$ *sec*. is

(a) 0.4 *volts*   (b) – 0.4 *volts*   (c)– 2.0 *volts*   (d) 2.0 *volts*

ASSERTION AND REASON

(a)   If both assertion and reason are true and the reason is the correct explanation of the assertion.

(b)   If both assertion and reason are true but reason is not the correct explanation of the assertion.

(c)   If assertion is true but reason is false.

(d)   If the assertion and reason both are false.

Q5. **Assertion** : The induced e.m.f. will be same and current will be different in two identical loops of copper and aluminium, when rotated with same speed in the same magnetic field.

Reason : Induced e.m.f. is proportional to rate of change of magnetic field while induced current depends on resistance of wire.

Q6. **Assertion**: In the phenomenon of mutual induction, self-induction of each of the coils persists.

Reason: Self-induction arises when strength of current in same coil changes. In mutual induction, current is changing in both the individual coils.

Q7. **Assertion** : Only a change in magnetic flux will maintain an induced current the coil.

Reason : The presence of large magnetic flux through a coil maintains a current in the coil.

Q8. A horizontal loop *abcd* is moved across the pole pieces of a magnet as shown in fig. with a constant speed *v*. When the edge *ab* of the loop enters the pole pieces at time $t = 0$ *sec.* Which one of the following graphs represents correctly the induced emf in the coil
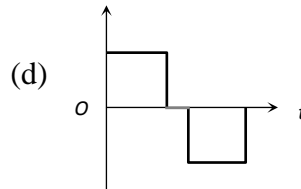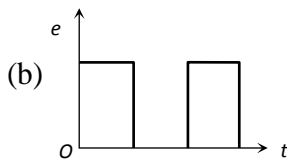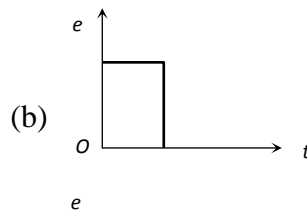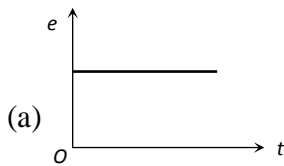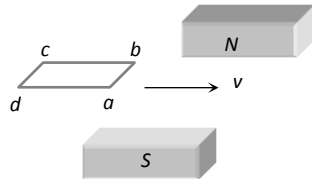

Q9. The north and south poles of two identical magnets approach a coil, containing a condenser, with equal speeds from opposite sides. Then

Rear side
Front side
Observer
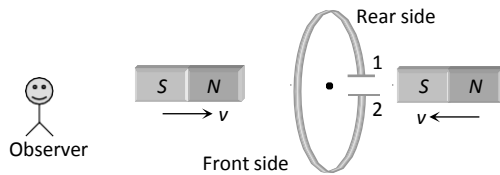
(a) Plate 1 will be negative and plate 2 positive

(b) Plate 1 will be positive and plate 2 negative

(c) Both the plates will be positive

(d) Both the plates will be negative

Q10. A rectangular loop with a sliding connector of length $l = 1.0\ m$ is situated in a uniform magnetic field $B = 2T$ perpendicular to the plane of loop. Resistance of connector is $r = 2\Omega$. Two resistance of 6Ω and 3Ω are connected as shown in figure. The external force required to keep theconnector moving with a constant velocity $v = 2m/s$ is

(a)   6 N (b) 4 N

(c)   2 N (d) 1 N
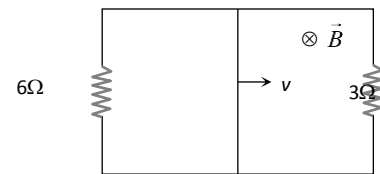
Q11. What is the principle used in the A.C. generator?

2- Marks Questions

Q12. Two identical circular loops of metal wire are lying on a table without touching each other. Loop-*A* carries a current which increases with time. Then what type of force is present between them?

Q13. If a square loop of conducting material is moved with a constant velocity fully inside a uniform magnetic field perpendicular to the field, will the current be induced in it?

3-Marks Questions

Q14. Current in a circuit falls from 5.0A to 0.0A in 0.1s. If an average emf of 200V induced, givean estimate of the self-inductance of the circuit.

Q15. What is mutual induction. Derive an expression for mutual induction between two coils.