DPP

DAILY PRACTICE PRODUCTS

Class : XIIth
Date :

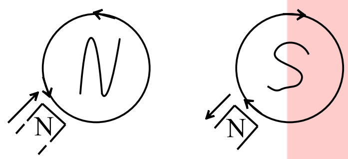
Solutions

Subject : PHYSICS
DPP No. : 3

Topic :- Electro Magentic Induction

1 **(a)**

When a north pole of a bar magnet moves towards the coil, the induced current in the coil flows in a direction such that the coil presents its north pole to the bar magnet as shown in figure (a). Therefore, the induced current flows in the coil in the anticlockwise direction. When a north pole of a bar magnet moves away from the coil, the induced current in the coil flows in a direction such that the coil presents its such pole to the bar magnet as shown in figure (b)



Therefore induced current flows in the coil in the clockwise direction

2 **(a)**

$$e = -\frac{d\phi}{dt} = \frac{-3B_0A_0}{t}$$

3 **(b)**

$$i_s = \frac{P_s}{V_s} = \frac{4.4 \times 10^3}{11 \times 10^3} = 0.4\ A$$

4 **(d)**

Since all the losses are neglected

So $P_{out} = P_{in}$

5 **(c)**

Efficiency $= \frac{\text{Output power}}{\text{Input power}}$

Input power=5000 W

Input voltage=200 V

$\therefore$ primary current, $I_p = \frac{5000}{200} = 25$ A

Output power $= 5000 \times \frac{80}{100} = 4000$ W

Output voltage =250 V

Secondary current, $I_s = \frac{4000}{250} = 16$ A

6 **(c)**

The induced emf is given by

$$|e| = \left(L\frac{di}{dt}\right)$$
$$= 0.4 \times 500 = 200 \text{ V}$$

7 **(d)**

$$\frac{V_p}{V_s} = \frac{i_s}{i_p} \Rightarrow \frac{220}{22000} = \frac{i_s}{5} \Rightarrow i_s = 0.05\ amp$$

8 **(a)**

As the shape of the loop is changing and hence, the flux linked with the loop changes. There will an induced emf hence, induced current in the coil. Applying right hand screw rule we get induced current in anticlockwise direction.

9 **(d)**

$$|e| = L\frac{di}{dt} \Rightarrow 10 = L \times \frac{10}{1} \Rightarrow L = 1H$$

10 **(c)**

$$\phi = Mi \Rightarrow M = \frac{1.2 \times 10^{-2}}{0.01} = 1.2H$$

11 **(d)**

Induced emf, $e = -L\frac{di}{dt} = -L\frac{(-2-2)}{0.05}$

$$8 = L\frac{(4)}{0.05}$$

$$\therefore \quad L = \frac{8 \times 0.05}{4} = 0.1 \text{ H}$$

12 **(b)**

The magnetic flux linked with the primary coil is given by

$\phi = \phi_0 + 4t$

So, voltage across primary

$$V_P = \frac{d\phi}{dt} = \frac{d}{dt}(\phi + 4t)$$
$$= 4 \text{ V} (\text{as } \phi_0 = \text{constant})$$

Also, we have

$$N_P = 50 \text{ and } N_S = 1500$$

From relation,

$$\frac{V_S}{V_P} = \frac{N_S}{N_P}$$

Or $\quad V_S = V_P\frac{N_S}{N_P} = 4\left(\frac{1500}{50}\right) = 120\text{V}$

13 **(d)**

In secondary e.m.f. induces only when current through primary changes

14 **(d)**

$$i = \frac{E - e}{R} \Rightarrow 1.5 = \frac{220 - e}{20} \Rightarrow e = 190\ V$$

16 **(a)**

$$M_{21} = \frac{\mu_0 N_1 N_2 A_2}{l_2}$$

$$\therefore M_{21} = \frac{(4 \times 3.14 \times 10^{-7}) \times 1500 \times 100 \times \{3.14(2 \times 10^{-2})^2\}}{80 \times 10^{-2}}$$

$$M_{21} = 2.96 \times 10^{-4}\text{H}$$

$$\Rightarrow \quad M_{12} = M_{21} = 2.96 \times 10^{-4}\text{H}$$

17 **(c)**

When frequency is high, the galvanometer will not show deflection

18 **(d)**

According to Lenz's law

19 **(c)**

The induced current will be in such a direction so that it opposes the change due to which it is produced

20 **(a)**

$$e = Bvl = 5 \times 10^{-5} \times \frac{360 \times 1000}{3600} \times 20 = 0.1V$$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	A	A	B	D	C	C	D	A	D	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	D	B	D	D	D	A	C	D	C	A