DPP
DAILY PRACTICE PROBLEMS

Class : XIIth **Solutions** **Subject : PHYSICS**
Date : **DPP No. : 9**

Topic :- Electro Magentic Induction

2 **(d)**

Induced emf $e = Bvl \Rightarrow e = Bv(2R) = \frac{2BvL}{\pi}$

3 **(c)**

Induced emf

$$e = B_H lv$$
$$= 5.0 \times 10^{-5} \times 2 \times 1.50$$
$$= 0.15 \times 10^{-3}\text{V} = 0.15 \text{ mV}$$

4 **(a)**

$$|e| = \frac{d\phi}{dt} = B\frac{dA}{dt} = B\frac{d}{dt}(\pi r^2) = 2\pi Br\frac{dr}{dt}$$

5 **(a)**

Initial magnetic flux linked with the loop

$\phi = B_1 A_1 \cos\phi$

$$= 0.1 \times (10 \times 10^{-2})^2 \cos 45°$$
$$= \frac{0.1 \times 10^{-2} \times 1}{\sqrt{2}} = \frac{10^{-3}}{\sqrt{2}}$$

Final magnetic flux linked with the loop,$\phi_2 = 2$

Now, induced emf in the loop ,$e = \frac{-d\phi}{dt}$

$$= \frac{-\left[\frac{10^{-3}}{\sqrt{2}}\right]}{0.7} = 10^{-3}\text{V}$$

$\therefore$ Induced current $= \frac{e}{R} = \frac{10^{-3}}{1} = 1$ mA

6 **(c)**

In uniform magnetic field, change in magnetic flux is zero. Therefore, induced current will be zero.

8 **(c)**

By using $e = \frac{1}{2}Bl^2\omega$

For part AO; $e_{OA} = e_O - e_A = \frac{1}{2}Bl^2\omega$

For part OC; $e_{OC} = e_O - e_C = \frac{1}{2}B(3l)^2\omega$

$\therefore e_A - e_C = 4\,Bl^2\omega$

10 **(b)**

Polarity of emf will be opposite in the two cases while entering and while leaving the coil. Only in option (b) polarity is changing.

11 **(c)**

As inductance L_2 was wound using the similar wire but the direction of winding is reversed, so flux through L_2 is zero.

$\therefore \quad L_2 \propto \phi = 0$

Also, $\quad L_1 = L_3$

Therefore, $\quad L_1 = L_3, L_2 = 0$

15 **(c)**

DC motor is a device which converts electrical energy into mechanical energy. It employs Fleming's left hand rule.

DC generator converts mechanical energy into electrical energy in from of DC. It employs Fleming's right hand rule.

16 **(c)**

The potential difference across the ends of the conductor

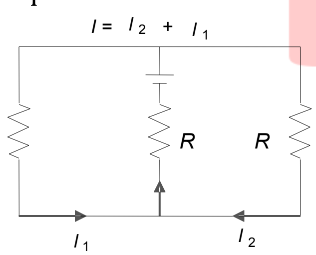
$$V = \frac{1}{2}\omega L^2 B$$

17 **(b)**

A moving conductor is equivalent to battery of emf

$= vBl \qquad$ (motion emf)

Equivalent circuit



$I = I_2 + I_2$

Applying Kirchhoff's law

$I_1R + IR - vBl = 0 \qquad$ ...(i)

$I_2R + IR - vBl = 0 \qquad$ ...(ii)

Adding Eqs. (i) and (ii), we get

$$2IR + IR = 2vBl$$

$$I = \frac{2vBl}{3R}$$

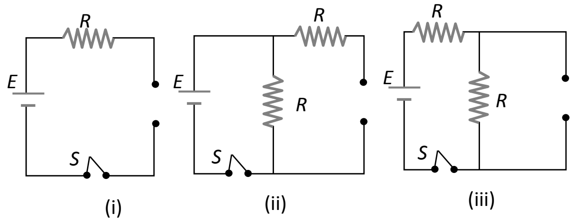
$$I_1 = I_2 = \frac{vBl}{3R}$$

19 **(c)**

Time in which the current will decay to $\frac{1}{e}$ of its steady value is $t = \tau = \frac{L}{R} = \frac{50}{10} = 5\ seconds$

20 **(b)**

At $t = 0$ current through L is zero so it acts as open circuit. The given figures can be redrawn as follow



$i_1 = 0 \quad i_2 = \frac{E}{R} \quad i_3 = \frac{E}{2R}$

Hence $i_2 > i_3 > i_1$

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