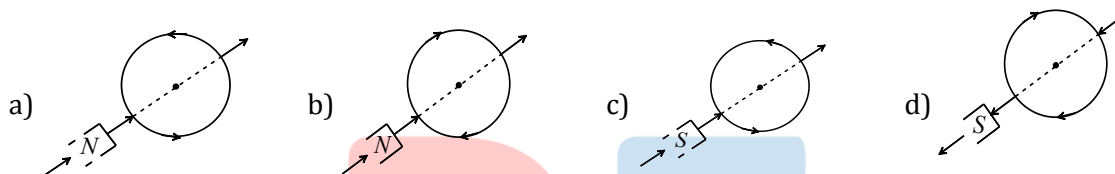## Topic :-Electro Magentic Induction

1. Which of the following figure correctly depicts the Lenz's law. The arrows show the movement of the labelled pole of a bar magnet into a closed circular loop and the arrows on the circle show the direction of the induced current

   a)       b)       c)       d) 

2. A coil having an area $A_0$ is placed in a magnetic field which changes from $B_0$ to $4B_0$ in a time interval $t$. The e.m.f. induced in the coil will be

   a) $\dfrac{3A_0B_0}{t}$      b) $\dfrac{4A_0B_0}{t}$      c) $\dfrac{3B_0}{A_0t}$      d) $\dfrac{4B_0}{A_0t}$

3. A power transformer is used to step up an alternating e.m.f. of $220\ V$ to $11\ kV$ to transmit $4.4\ kW$ of power. If the primary coil has 1000 turns, what is the current rating of the secondary? Assume 100% efficiency for the transformer

   a) $4\ A$      b) $0.4\ A$      c) $0.04\ A$      d) $0.2\ A$

4. The ratio of secondary to primary turns is $9 : 4$. If power input is $P$, what will be the ratio of power output (neglect all losses) to power input
   a) $4 : 9$      b) $9 : 4$      c) $5 : 4$      d) $1 : 1$

5. A transformer has an efficiency of 80%. It is connected to a power input of 5kW at 200 V. If the secondary voltage is 250 V, the primary and secondary currents are respectively
   a) 25 A, 20 A      b) 20 A, 16 A      c) 25 A, 16 A      d) 40 A, 25 A

6. The self induced emf in a coils of 0.4 henry self inductance when current in it is changing at the rate of 50As⁻¹, is
   a) $8 \times 10^{-4}$V      b) $8 \times 10^{-3}$V      c) 200 V      d) 500 V

7. In a step-up transformer the voltage in the primary is $220\ V$ and the current is $5A$. The secondary voltage is found to be $22000V$. The current in the secondary (neglect losses) is

a) 5 $A$      b) 50 $A$      c) 500 $A$      d) 0.05 $A$

8. There is a uniform magnetic field directed perpendicular and into the plane of the paper. An irregular shaped conducting loop is slowly changing into a circular loop in the plane of the paper. Then
   a) Current is induced in the loop in the anticlockwise direction
   b) Current is induced in the loop in the clockwise direction
   c) AC is induced in the loop
   d) No current is induced in the loop

9. If a current of 10 $A$ flows in one second through a coil, and the induced e.m.f. is 10 $V$, then the self-inductance of the coil is

   a) $\frac{2}{5}H$      b) $\frac{4}{5}H$      c) $\frac{5}{4}H$      d) 1 $H$

10. If a charge in current of 0.01 $A$ in one coil produces a change in magnetic flux of $1.2 \times 10^{-2} Wb$ in the other coil, then the mutual inductance of the two coils in henry is

    a) 0      b) 0.5      c) 1.2      d) 3

11. When the current changes from +2 A to -2 A in 0.05 s, an emf of 8 V is induced in a coil. The coefficient of self-induction of the coil is

    a) 0.2 H      b) 0.4 H      c) 0.8 H      d) 0.1 H

12. The primary and secondary coils of a transformer have 50 and 1500 turns respectively. If the magnetic flux $\phi$ linked with the primary coil is given by $\phi = \phi_0 + 4t$, where $\phi$ is in weber, $t$ is time in second and $\phi_0$ is a constant, the output voltage across the secondary coil is

    a) 90 V      b) 120 V      c) 220 V      d) 30V

13. The coefficient of mutual inductance of two coils is 6 $mH$. If the current flowing in one is 2 $ampere$, then the induced e.m.f. in the second coil will be

    a) 3 $mV$      b) 2 $mV$      c) 3 $V$      d) Zero

14. The armature of dc motor has 20Ω resistance. It draws current of 1.5 ampere when run by 220 $volts$ dc supply. The value of back e.m.f. induced in it will be

    a) 150 $V$      b) 170 $V$      c) 180 $V$      d) 190 $V$

15. In an induction coil, the secondary e.m.f. is

    a) Zero during break of the circuit      b) Very high during make of the circuit
    c) Zero during make of the circuit      d) Very high during break of the circuit

16. A short solenoid of length 4 cm, radius 2 cm and 100 turns is placed inside and on the axis of a long solenoid of length 80 cm and 1500 turns. A current of 3 A flows through the short solenoid. The mutual inductance of two solenoids is

a) $2.96 \times 10^{-4}$H      b) $5.3 \times 10^{-5}$H      c) $3.52 \times 10^{-3}$H      d) $8.3 \times 10^{-5}$H

17. When a magnet is pushed in and out of a circular coil $C$ connected to a very senstitive galvanometer $G$ as shown in the adjoining diagram with a frequency $v$, then
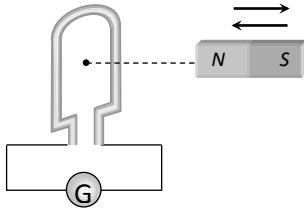


     a) Constant deflection is observed in the galvanometer
     b) Visible small oscillations will be observed in the galvanometer if $v$ is about $50\ Hz$
     c) Oscillations in the deflection will be observed clearly if $v = 1$ or $2\ Hz$
     d) No variation in the deflection will be seen if $v = 1$ or $2\ Hz$

18. The north pole of a long horizontal bar magnet is being brought closer to a vertical conducting plane along the perpendicular direction. The direction of the induced current in the conducting plane will be
     a) Horizontal      b) Vertical      c) Clockwise      d) Anticlockwise

19. Two different loops are concentric and lie in the same plane. The current in the outer loop is clockwise and increasing with time. The induced current in the inner loop then, is
     a) Clockwise
     b) Zero
     c) Counter clockwise
     d) In a direction that depends on the ratio of the loop radii

20.. The wing span of an aeroplane is $20\ metre$. It is flying in a field, where the vertical component of magnetic field of earth is $5 \times 10^{-5} tesla$, with velocity $360\ km/h$. The potential difference produced between the blades will be
     a) $0.10\ V$      b) $0.15\ V$      c) $0.20\ V$      d) $0.30\ V$