Electromagnetic Induction and Alternating Current 50 Important 1 Marks Questions With Answers (Book Back and Creative)
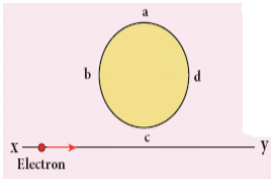
12th Standard

Physics

Total Marks : 50

Multiple Choice Question

50 x 1 = 50

1) An electron moves on a straight line path XY as shown in the figure. The coil abcd is adjacent to the path of the electron. What will be the direction of current, if any, induced in the coil?


(a) The current will reverse its direction as the electron goes past the coil   (b) No current will be induced   (c) abcd

(d) adcb

2) A thin semi-circular conducting ring (PQR) of radius r is falling with its plane vertical in a horizontal magnetic field B, as shown in the figure.
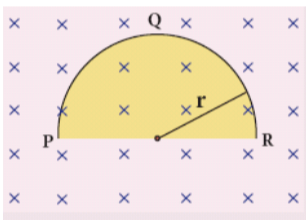
The potential difference developed across the ring when its speed v, is

(a) Zero   (b) $\frac{Bv\pi r^2}{2}$ and P is at higher potential   (c) πrBv and R is at higher potential

(d) 2rBv and R is at higher potential

3) The flux linked with a coil at any instant t is given by $\Phi_B = 10t^2 - 50t + 250$. The induced emf at t = 3s is

(a) −190 V   **(b) −10 V**   (c) 10 V   (d) 190 V

4) When the current changes from +2A to −2A in 0.05 s, an emf of 8 V is induced in a coil. The co-efficient of self-induction of the coil is

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

5) The current i flowing in a coil varies with time as shown in the figure. The variation of induced emf with time would be

(a)   (b)   (c)   (d)
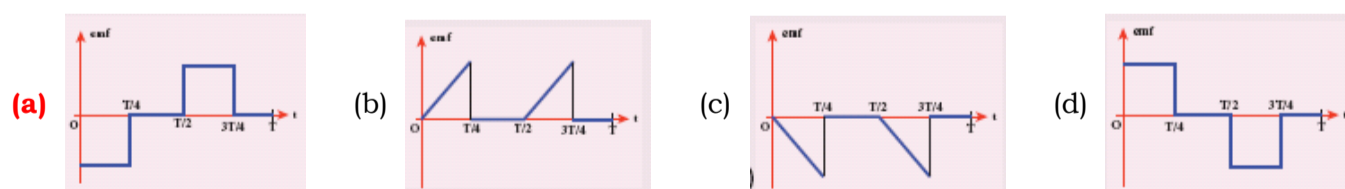
6) A circular coil with a cross-sectional area of 4 cm^2 has 10 turns. It is placed at the centre of a long solenoid that has 15 turns/cm and a cross-sectional area of 10 cm^2. The axis of the coil coincides with the axis of the solenoid. What is their mutual inductance?

(a) 7.54 μH   (b) 8.54 μH   (c) 9.54 μH   (d) 10.54 μH

7) In a transformer, the number of turns in the primary and the secondary are 410 and 1230 respectively. If the current in primary is 6A, then that in the secondary coil is

(a) 2 A   (b) 18 A   (c) 12 A   (d) 1 A

8) A step-down transformer reduces the supply voltage from 220 V to 11 V and increase the current from 6 A to 100 A. Then its efficiency is

(a) 1.2   **(b) 0.83**   (c) 0.12   (d) 0.9

9) In an electrical circuit, R, L, C, and AC voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and current in the circuit is $\frac{\pi}{3}$. Instead, if C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$. The power factor of the circuit is

(a) $1/2$ (b) $1/\sqrt{2}$ **(c) 1**   (d) $\sqrt{3}/2$

10) In a series RL circuit, the resistance and inductive reactance are the same. Then the phase difference between the voltage and current in the circuit is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{6}$ (d) zero

11) In a series resonant RLC circuit, the voltage across 100 Ω resistor is 40 V. The resonant frequency ω is 250 rad/s. If the value of C is 4 μF, then the voltage across L is

(a) 600 V   (b) 4000 V   **(c) 400 V**   (d) 1 V

12) An inductor 20 mH, a capacitor 50 μF and a resistor 40Ω are connected in series across a source of emf V = 10 sin 340 t. The power loss in AC circuit is

(a) 0.76 W   (b) 0.89 W   **(c) 0.46 W**   (d) 0.67 W

13) The instantaneous values of alternating current and voltage in a circuit are $i = \frac{1}{\sqrt{2}}\sin(100\pi t)$ A and v = $\frac{1}{\sqrt{2}}\sin\left(100\pi t + \frac{\pi}{3}\right)V$. The average power in watts consumed in the circuit is

(a) $\frac{1}{4}$ (b) $\frac{\sqrt{3}}{4}$ (c) $\frac{1}{2}$ **(d) $\frac{1}{8}$**

14) In an oscillating LC circuit, the maximum charge on the capacitor is Q. The charge on the capacitor when the energy is stored equally between the electric and magnetic fields is

(a) $\frac{Q}{2}$ (b) $\frac{Q}{\sqrt{3}}$ **(c) $\frac{Q}{\sqrt{2}}$**   (d) Q

15) $\frac{20}{\pi^2} H$ inductor is connected to a capacitor of capacitance C. The value of C in order to impart maximum power at 50 Hz is

(a) 50 μF   (b) 0.5 μF   (c) 500 μF   **(d) 5 μF**

16) The unit henry can also be written as _____.

(a) VS A^{-1} (b) Wb A^{-1} (c) Ωs   **(d) all**

17) An emf of 12V is induced when the current in the coil changes at the rate of 40 A S^{-1}. The coefficient of self-induction of the coil is _____.

(a) 0.3 H   (b) 0.003 H   (c) 30 H   (d) 4.8 H

18) Which of the following cannot be stepped up in a transformer?

(a) input current   (b) input voltage   **(c) input power**   (d) all

19) If a secondary coil has 40 turns, and a primary coil with 20 turns is charged with 50V of potential difference, then potential difference in secondary would be _____.

(a) 50 V   (b) 25 V   (c) 60 V   **(d) 100 V**

20) In Fleming's right hand rule, the forefinger represents the direction of _____.

(a) motion of the conductor   **(b) magnetic field**   (c) induced current   (d) induced emf

21) A phenomenon in which a varying current in one coil induces an emf in the neighbouring coil is _____.

(a) mutual induction   (b) self induction   (c) electrostatic induction   (d) electromagnetic induction

22) In three-phase AC generator the three coils are fastened rigidly together and are displaced from each other by an angle _____.

(a) 90°   (b) 180°   **(c) 120°**   (d) 360°

23) The generator rule is _____.

(a) Fleming's left hand rule   **(b) Fleming's right hand rule**   (c) Maxwell's right hand cork screw rule

(d) Right hand palm rule

24) Eddy currents was first observed by _____.

(a) Foucault   (b) Newton   (c) Faraday   (d) Fleming

25) The necessary magnetic field for a low power a.c generator is produced by _____

(a) electric coil   **(b) permanent magnets**   (c) electromagnets   (d) batteries

26) _____ principle is used in transformer.

(a) mutual induction   **(b) electromagnetic induction**   (c) self induction   (d) eddy currents

27) The efficiency of an ideal transformer is _____.

(a) 0   **(b) 1**   (c) infinite   (d) none

28) For an ideal transformer _____

(a) $E_pI_p = E_sI_s$ (b) $E_pE_s = I_p$ (c) $E_pE_s = I_s$ (d) $I_pI_s = E_sI_s$

29) Flux loss can be minimized using _____ core.

(a) laminated   **(b) shell-type**   (c) perforated   (d) sheet-type

30) When the frequency of an a.c, circuit increases the capacitive reactance offered by capacitor connected in the circuit is _____.

(a) increases   **(b) decreases**   (c) remains the same   (d) becomes zero

31) In LCR series circuit, at resonance is _____

(a) impedance (Z) is maximum   (b) current is minimum   **(c) impedance (Z) is equal to R**   (d) $v_o = \frac{1}{LC}$

32) The instantaneous current in an AC circuit containing a pure inductor is i = I_o sinωt, The instantaneous emf is _____.

(a) $e = E_o\sin\left(\omega t + \frac{\pi}{2}\right)$ (b) $e = E_o\sin\left(\omega t - \frac{\pi}{2}\right)$ (c) e=$E_o$sin(ωt - π)   (d) e = $E_o$sin

33) A power of f 11 kW is in transmitted through 220 V. The current through line wire is _____.

(a) 5 A   (b) 0.5 A   **(c) 50 A**   (d) 500 A

34) The power factor of a choke coil having inductance L and resistance R is _____.

(a) $R^2 + \omega^2 L^2$ (b) $\sqrt{R^2 + \omega^2 L^2}$ **(c) $\frac{R}{\sqrt{R^2+\omega^2L^2}}$**   (d) $\frac{\sqrt{R^2+\omega^2L^2}}{R}$

35) The Q factor of an AC circuit containing a Resistor R_1 inductor L and a capacitor C is _____.

(a) $Q = \frac{1}{\sqrt{LC}}$ (b) $Q = \frac{1}{\sqrt{LC}}$ (c) $Q = R\sqrt{\frac{C}{L}}$ **(d) $Q = \frac{1}{R}\sqrt{\frac{L}{C}}$**

36) Fleming's left hand and right hand rules are used respectively in _____.

(a) D.C Motor and D.C generator   **(b) D.C Motor and A.C generator**   (c) D.C Motor and A.C motor

(d) A.C generator and A.C. motor

37) Mutual inductance of two coils is maximum when the coil are _____.

(a) facing each other   (b) inclined at an angle of 60º   **(c) touching each other**   (d) incline d at an angle of 45º

38) A coil of area of 0.5 m^2 with 10 turns in a plane that is 1 r to an uniform magnetic field of 0.2 Wb/m^2. The flux through the coil is

_____.

(a) zero   **(b) 1 Wb**   (c) 10 wb   (d) 100 wb

39) The electromagnetic induction was discovered by _____.

(a) Henry   (b) Oersted   (c) Lenz   **(d) Faraday**

40) The unit of magnetic induction is _____.

(a) Ohm   (b) Weber   **(c) tesla**   (d) Henry

41) When a bar magnet is introduced with a pole into the coil the galvanometer shows _____.

(a) momentary deflection   (b) permanent deflection   (c) deflection   (d) zero

42) A solenoid of area A length I and, number of turns N. If it is filled with material of permeability μ then its self-inductance is

_____.

(a) $L = \frac{\mu A^2 N}{l}$ (b) $L = \frac{\mu l^2 A}{N}$ **(c) $L = \frac{\mu N^2 A}{l}$**   (d) $L = \frac{N^2 Al}{l}$

43) In a coil emf of 5V is induced when a current in the coil change at the rate 100 A/s. The self-inductance of the coil is

_____.

(a) 0.05 H   (b) 5 H   (c) 50 H   (d) 0.005 H

44) The induced emf is maximum in a coil when the plane of the coil is_____ to B.

(a) at right angles   (b) at acute angles   (c) at obtuse angle   **(d) parallel**

45) The rms value of an AC voltage with peak value of 311 V is _____.

(a) 110 V   (b) 440 V   **(c) 220 V**   (d) 70.7 V

46) In an AC circuit with capacitor only, if the frequency of the signal is zero then the capacitive reactance is _____.

(a) maximum   (b) zero   (c) minimum   **(d) infinity**

47) A 800- turn coil of effective area 0.05 m^2 is kept perpendicular to a magnetic field 5 x 10^{-5}T. When the plane of the coil is rotated by 90º around any of its coplanar axis in 0.1s, the emf induced in the coil will be _____.

(a) 2 V   (b) 0.2 V   (c) 0.002 V   **(d) 0.02 V**

48) If the angular speed of rotation of an armature of AC generator is doubled, the induced emf will be _____.

(a) same   **(b) doubled**   (c) halved   (d) quadrupled

49) The unit of self - inductance is

(a) Wb A^{-1} (b) Ω s   (c) V s A^{-1} **(d) All of these**

50) In an ac circuit voltage and current are given by v= 50 sin 50t volt and I = 100 $\sin(50t + \pi/3)A$. The power dissipated in the circuit will be?

(a) 20 kW   **(b) 1.25 kW**   (c) 5 kw   (d) 5 kw