DPP
DAILY PRACTICE PROBLEMS

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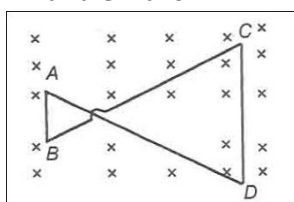Date :   DPP No. : 9

Topic :-Alternating Current

1. A conducting wire frame is placed in a magnetic field, which is directed into the paper, figure. The magnetic field is increasing at a constant rate. The directions of induced current in wires AB and CD are

    a) A to B and C to D b) B to A and C to D
    c) A to B and D to C d) B to A and D to C

2. A pure inductive coil of 30 mH is connected to an AC source of 220 V, 50 Hz. The rms current in the coil is

    a) 50.35 A   b) 23.4 A   c) 30.5 A   d) 12.3 A

3. In an ac circuit, V and I are given by
    $V = 100\sin\,(100\,t)\,volts, I = 100\sin\left(100t + \frac{\pi}{3}\right)mA$. The power dissipated in circuit is

    a) $10^4\,watt$ b) $10\,watt$ c) $2.5\,watt$ d) $5\,watt$

4. Two connectric and coplanar circular coils have radii a and b as shown in figure. Resistance of the inner coil is R. Current in the other coil is increased from O to i, then the total charge circulating the inner coil is
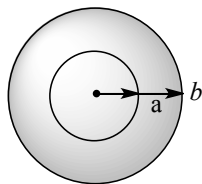
    a) $\dfrac{\mu_0 iab}{2\,R}$ b) $\dfrac{\mu_0 i\,a\,\pi b^2}{2\,a\,b}$ c) $\dfrac{\mu_0\,ib}{2\,\pi\,R}$ d) $\dfrac{\mu_0\,i\,a^2}{2\,Rb}$

5. A circuit area is 0.01 m^2 is kept inside a magnetic field which is normal to its plane. The magnetic field changes from 2 T to 1 T in 1 millisecond. If the resistance of the circuit is 2Ω. The amount of heat evolved is

    a) 0.05 J   b) 50 J   c) 0.50 J   d) 500 J

6. In an AC circuit the emf(e) and the current (i) at any instant are given respectively by

$$e = E_0 \sin \omega t$$
$$i = I_0 \sin(\omega t - \phi)$$

The average power in the circuit over one cycle of AC is

a) $\dfrac{E_0 I_0}{2}$ b) $\dfrac{E_0 I_0}{2} \sin \phi$ c) $\dfrac{E_0 I_0}{2} \cos \phi$ d) $E_0 I_0$

7. A copper rod of mass m slides under gravity on two smooth parallel rails l distance apart and set at an angle θ to the horizontal. At the bottom, the rails are joined by a resistance R, figure. There is a uniform magnetic field B perpendicular to the plane of the rails. The terminal velocity of the rod is
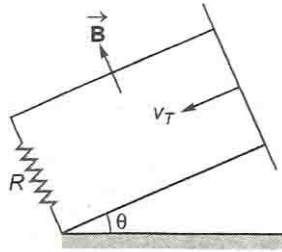
a) $\dfrac{mgR \tan\theta}{B^2 l^2}$ b) $\dfrac{mgR \cot\theta}{B^2 l^2}$ c) $\dfrac{mgR \sin\theta}{B^2 l^2}$ d) $\dfrac{mgR \cos\theta}{B^2 l^2}$

8. Reactance of a capacitor of capacitance $C \mu F$ for ac frequency $\dfrac{400}{\pi} Hz$ is 25Ω. The value C is

a) $50 \mu F$ b) $25 \mu F$ c) $100 \mu F$ d) $\overline{75 \mu F}$

9. A choke coil has
   a) High inductance and low resistance   b) Low inductance and high resistance
   c) High inductance and high resistance   d) Low inductance and low resistance

10. Two coils A and B have coefficient of mutual inductance M = 2H. The magnetic flux passing through coil A changes by 4 Wb in 10 s due to change in current in B. Then
    a) Change in current in B in this time interval is 0.5 A
    b) Change in current in B in this time interval is 8 A
    c) The change in current in B in this time interval is 2 A
    d) A change in current of 1 A in coil A will produce a change in flux passing through B by 4 Wb

11. In an ac circuit the reactance of a coil is $\sqrt{3}$ times its resistance, the phase difference between the, voltage across the coil to the current through the coil will be
   a) $\pi/3$ b) $\pi/2$ c) $\pi/4$ d) $\pi/6$

12. The phase difference between the voltage and the current in an ac circuit is $\pi/4$. If the frequency is $50\ Hz$ then this phase difference will be equivalent to a time of
   a) $0.02\ s$ b) $0.25\ s$ c) $2.5\ ms$ d) $25\ ms$

13. In AC series circuit, the resistance, inductive reactance and capacitive reactance are 3Ω, 10Ω and 14Ω respectively. The impedance of the circuit is
    a) 5Ω b) 4Ω c) 7Ω d) 10Ω

14. The voltage across a pure inductor is represented by the following diagram. Which of the following diagrams will represent the current

a)

b)

c)

d)
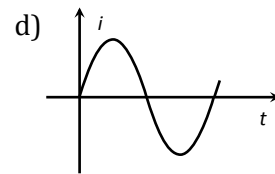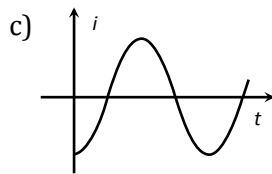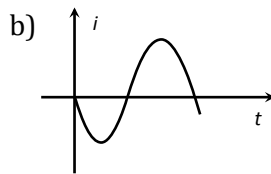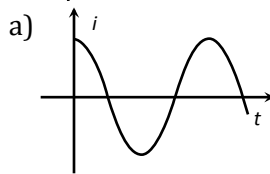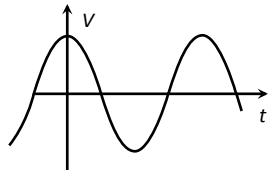
15. Q-factor can be increased by having a coil of
a) Large inductance, small ohmic resistance
b) Large inductance, large ohmic resistance
c) Small inductance, large ohmic resistance
d) Small inductance, small ohmic resistance

16. The current which does not contribute to the power consumed in an AC circuit is called
a) non-ideal current
b) wattles current
c) convectional current
d) inductance current

17. In the circuit shown in figure, a conducting wire HE is moved with a constant speed v towards legt. Th complete circuit is placed in a uniform magnetic field $\vec{B}$ perpendicular to the plane of circuit inwards. The current in $HKDE$ is
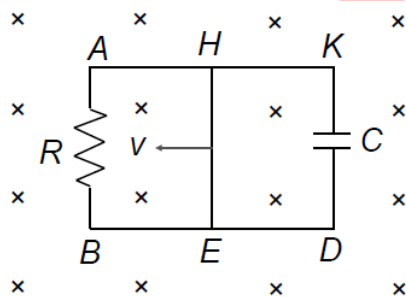
a) Anti-clock-wise   b) Clock-wise   c) Alternating   d) Zero

18. The current passing through a choke coil of 5 H is decreasing at the rate of 2 As^{-1}. The emf developed across the coil is
a) -10 V
b) $+ 10$ V
c) 2.5 V
d) -2.5 V

19. A light bulb is rated $100\ W$ for a $220\ V$ supply. The resistance of the bulb and the peak voltage of the source respectively are
a) 242 Ω and 311 V b) 484 Ω and 311 V c) 484 Ω and 440 V d) 242 Ω and 440 V

20. If number of turns in primary and secondary coils is increased to two times each, the mutual

inductance

a) Becomes 4 times

b) Becomes 2 times

c) Becomes 1 /4 times

d) Remains unchanged