

NEET : CHAPTER WISE TEST-6

SUBJECT :- PHYSICS

CLASS :- 12th

CHAPTER :- ALTERNATING CURRENT

DATE.....

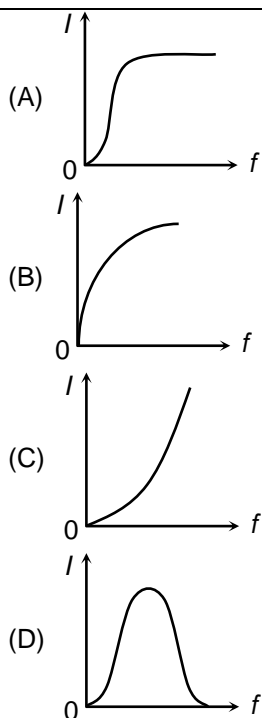
NAME.....

SECTION.....

(SECTION-A)

- A sinusoidal ac current flows through a resistor of resistance R . If the peak current is I_p , then the power dissipated is
 (A) $I_p^2 R \cos \theta$ (B) $\frac{1}{2} I_p^2 R$
 (C) $\frac{4}{\pi} I_p^2 R$ (D) $\frac{1}{\pi} I_p^2 R$
- A generator produces a voltage that is given by $V = 240 \sin 120 t$, where t is in seconds. The frequency and *r.m.s.* voltage are
 (A) 60 Hz and 240 V
 (B) 19 Hz and $120\sqrt{3}$ V
 (C) 19 Hz and $120\sqrt{2}$ V
 (D) 754 Hz and 70 V
- Alternating current can not be measured by dc ammeter because
 (A) ac cannot pass through dc ammeter
 (B) Average value of complete cycle is zero
 (C) ac is virtual
 (D) ac changes its direction
- If instantaneous current is given by $i = 4 \cos (\omega t + \phi)$ amperes, then the *r.m.s.* value of current is
 (A) 4 amperes (B) $2\sqrt{2}$ amperes
 (C) $4\sqrt{2}$ amperes (D) Zero amperes
- If the value of potential in an ac, circuit is 10V, then the peak value of potential is
 (A) $\frac{10}{\sqrt{2}}$ (B) $10\sqrt{2}$
 (C) $20\sqrt{2}$ (D) $\frac{20}{\sqrt{2}}$
- In an ac circuit, the instantaneous values of e.m.f. and current are $e = 200 \sin 314 t$ volt and $i = \sin \left(314 t + \frac{\pi}{3} \right)$ ampere. The average power consumed in watt is
 (A) 200 (B) 100 (C) 50 (D) 25
- An alternating current is given by the equation $i = i_1 \cos \omega t + i_2 \sin \omega t$. The *r.m.s.* current is given by
 (A) $\frac{1}{\sqrt{2}} (i_1 + i_2)$ (B) $\frac{1}{\sqrt{2}} (i_1 + i_2)^2$
 (C) $\frac{1}{\sqrt{2}} (i_1^2 + i_2^2)^{1/2}$ (D) $\frac{1}{2} (i_1^2 + i_2^2)^{1/2}$
- In an ac circuit, the current is given by $i = 5 \sin \left(100 t - \frac{\pi}{2} \right)$ and the ac potential is $V = 200 \sin (100) \text{ volt}$. Then the power consumption is
 (A) 20 watts (B) 40 watts
 (C) 1000 watts (D) 0 watt
- For an ac circuit $V = 15 \sin \alpha t$ and $I = 20 \cos \alpha t$ the average power consumed in this circuit is
 (A) 300 Watt (B) 150 Watt
 (C) 75 Watt (D) zero
- 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
- An alternating current of frequency ' f ' is flowing in a circuit containing a resistance R and a choke L in series. The impedance of this circuit is
 (A) $R + 2\pi fL$ (B) $\sqrt{R^2 + 4\pi^2 f^2 L^2}$
 (C) $\sqrt{R^2 + L^2}$ (D) $\sqrt{R^2 + 2\pi fL}$
- Same current is flowing in two alternating circuits. The first circuit contains only inductance and the other contains only a

- capacitor. If the frequency of the e.m.f. of ac is increased, the effect on the value of the current will be
 (A) Increases in the first circuit and decreases in the other
 (B) Increases in both the circuits
 (C) Decreases in both the circuits
 (D) Decreases in the first circuit and increases in the other
13. The natural frequency of a L - C circuit is equal to
 (A) $\frac{1}{2\pi}\sqrt{LC}$ (B) $\frac{1}{2\pi\sqrt{LC}}$
 (C) $\frac{1}{2\pi}\sqrt{\frac{L}{C}}$ (D) $\frac{1}{2\pi}\sqrt{\frac{C}{L}}$
14. An ac source is connected to a resistive circuits. Which of the following is true
 (A) Current leads the voltage and both are in same phase
 (B) Current lags behind the voltage and both are in same phase
 (C) Current and voltage are in same phase
 (D) Any of the above may be true depending upon the value of resistance
15. If resistance of $100\ \Omega$, inductance of 0.5 henry and capacitance of $10 \times 10^{-6} F$ are connected in series through 50 Hz ac supply, then impedance is
 (A) 1.876 (B) 18.76
 (C) 189.72 (D) 101.3
16. In the non-resonant circuit, what will be the nature of the circuit for frequencies higher than the resonant frequency
 (A) Resistive (B) Capacitive
 (C) Inductive (D) None of the above
17. Power factor is maximum in an LCR circuit when
 (A) $X_L = X_C$ (B) $R = 0$
 (C) $X_L = 0$ (D) $X_C = 0$
18. The power factor of an ac circuit having resistance (R) and inductance (L) connected in series and an angular velocity ω is
 (A) $R/\omega L$
 (B) $R/(R^2 + \omega^2 L^2)^{1/2}$
 (C) $\omega L/R$
 (D) $R/(R^2 - \omega^2 L^2)^{1/2}$
19. In an A.C. circuit the current
 (A) Always leads the voltage
 (B) Always lags behind the voltage
 (C) Is always in phase with the voltage
 (D) May lead or lag behind or be in phase with the voltage
20. One 10 V, 60 W bulb is to be connected to 100 V line. The required induction coil has self inductance of value ($f = 50$ Hz)
 (A) 0.052 H (B) 2.42 H
 (C) 16.2 mH (D) 1.62 mH
21. A telephone wire of length 200 km has a capacitance of $0.014\ \mu F$ per km. If it carries an ac of frequency 5 kHz, what should be the value of an inductor required to be connected in series so that the impedance of the circuit is minimum
 (A) 0.35 mH (B) 35 mH
 (C) 3.5 mH (D) Zero
22. Match the following
 Currents $r.m.s.$ values
 (A) $x_0 \sin \omega t$ (i) x_0
 (B) $x_0 \sin \omega t \cos \omega t$ (ii) $\frac{x_0}{\sqrt{2}}$
 (C) $x_0 \sin \omega t + x_0 \cos \omega t$ (iii) $\frac{x_0}{(2\sqrt{2})}$
 (A) 1. (i), 2. (ii), 3. (iii)
 (B) 1. (ii), 2. (iii), 3. (i)
 (C) 1. (i), 2. (iii), 3. (ii)
 (D) None of these
23. An ac source of variable frequency f is connected to an LCR series circuit. Which one of the graphs in figure. represents the variation of current of current I in the circuit with frequency f



24. Assertion : When capacitive reactance is smaller than the inductive reactance in LCR current, e.m.f. leads the current .
Reason : The phase angle is the angle between the alternating e.m.f. and alternating current of the circuit.
(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.
(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.
(C) If assertion is true but reason is false.
(D) If the assertion and reason both are false.

25. If a current I given by $I_0 \sin \left(\omega t - \frac{\pi}{2} \right)$ flows in an A.C. circuit across which an A.C. potential of $E = E_0 \sin \omega t$ has been applied, then the power consumption P in the circuit will be -

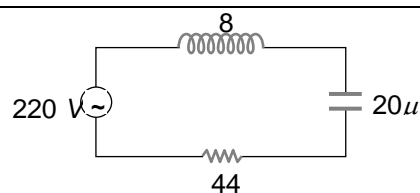
(A) $P = \frac{E_0 I_0}{\sqrt{2}}$ (B) $P = \sqrt{2} E_0 I_0$

(C) $P = \frac{E_0 I_0}{2}$ (D) $P = 0$

26. A coil has reactance of 100Ω when frequency is 50 Hz. If the frequency becomes 150 Hz, then the reactance will be
(A) 100Ω (B) 300Ω
(C) 450Ω (D) 600Ω
27. The output of an AC generator is given by : $E = E_m \sin(\omega t - \pi/4)$ and current is given by $i = i_m \sin(\omega t - 3\pi/4)$. The circuit contains a single element other than the generator. It is :
(A) a capacitor.
(B) a resistor.
(C) an inductor.
(D) not possible to decide due to lack of information.
28. An AC voltage source of variable angular frequency ω and fixed amplitude V connected in series with a capacitance C and an electric bulb of resistance R (inductance zero). When ω is increased :
(A) the bulb glows dimmer
(B) the bulb glows brighter
(C) total impedance of the circuit is unchanged
(D) total impedance of the circuit increases
29. In an LCR series a.c. circuit, the voltage across each of the components. L , C and R is 50 V. The voltage across the LC combination will be :
(A) 50 V (B) $50\sqrt{3}$ s
(C) 100 V (D) 0 V (zero)
30. An LCR series circuit with 100Ω resistance is connected to an AC source of 200 V and angular frequency 300 radians per second. When only the capacitance is removed, the current lags behind the voltage by 60° . When only the inductance is removed, the current leads the voltage by 60° . Then the current and power dissipated in LCR circuit are respectively
(A) 1A, 200 watt. (B) 1A, 400 watt.
(C) 2A, 200 watt. (D) 2A, 400 watt.
31. By what percentage the impedance in an AC series circuit should be increased so

- that the power factor changes from $(1/2)$ to $(1/4)$ (when R is constant) ?
 (A) 200% (B) 100%
 (C) 50% (D) 400%
32. If a choke coil of negligible resistance works on 220 volt source and 5mA current is flowing through it, then the loss of power in choke coil is-
 (A) 0 (B) 11 watt
 (C) 44×10^3 watt (D) 1.1 watt
33. The value of current at half power point is-
 (A) $I_m \sqrt{2}$ (B) $\frac{I_m}{\sqrt{2}}$
 (C) $2 I_m$ (D) $\frac{I_m}{2}$
34. The self inductance of a choke coil is 10 mH. When it is connected with a 10V D.C. source, then the loss of power is 20 watt. When it is connected with 10 volt A.C. source loss of power is 10 watt. The frequency of A.C. source will be-
 (A) 50 Hz (B) 60 Hz
 (C) 80 Hz (D) 100 Hz
35. The self inductance of the motor of an electric fan is 10 H. In order to impart maximum power at 50 Hz, it should be connected to a capacitance of :
 (A) $4\mu\text{F}$ (B) $8\mu\text{F}$
 (C) $1\mu\text{F}$ (D) $2\mu\text{F}$
- (SECTION-B)**
36. In an LCR circuit, capacitance is changed from C to $2C$. For the resonant frequency to remain unchanged, the inductance should be changed from L to :
 (A) $4L$ (B) $2L$ (C) $L/2$ (D) $L/4$
37. A 10 ohm resistance 0.5 mH coil and $10\mu\text{F}$ capacitor are joined in series when a suitable frequency of alternating current source is joined to this combination, the circuit resonates. If the resistance is halved the resonance frequency-
 (A) is halved
 (B) is doubled
 (C) remains unchanged
 (D) is quadrupled
38. In a transformer, number of turns in the primary are 140 and that in the secondary are 280. If current in primary is 4 A, then that in the secondary is : (assume that the transformer is ideal)
 (A) 4 A (B) 2 A
 (C) 6 A (D) 10 A
39. A transformer is used for a 100 watt, 20 volt electric bulb at a place where the A.C. mains potential is 200 volt and the current drawn is 0.6 A. The efficiency of the transformer is nearly
 (A) 48% (B) 68%
 (C) 30% (D) 83%
40. In an ac circuit $I = 100 \sin 200 \pi t$. The time required for the current to achieve its peak value will be
 (A) $\frac{1}{100} \text{ sec}$ (B) $\frac{1}{200} \text{ sec}$
 (C) $\frac{1}{300} \text{ sec}$ (D) $\frac{1}{400} \text{ sec}$
41. The peak value of an alternating e.m.f. E is given by $E = E_0 \cos \omega t$ is 10 volts and its frequency is 50 Hz. At time $t = \frac{1}{600} \text{ sec}$, the instantaneous e.m.f. is
 (A) 10 V (B) $5\sqrt{3} \text{ V}$
 (C) 5 V (D) 1 V
42. In an ac circuit with voltage V and current I , the power dissipated is
 (A) VI
 (B) $\frac{1}{2} VI$
 (C) $\frac{1}{\sqrt{2}} VI$

- (D) Depends on the phase between V and I
43. An ac supply gives 30 V r.m.s. which passes through a $10\ \Omega$ resistance. The power dissipated in it is
 (A) $90\sqrt{2}\text{ W}$ (B) 90 W
 (C) $45\sqrt{2}\text{ W}$ (D) 45 W
44. In a LCR circuit having $L = 8.0\text{ henry}$, $C = 0.5\ \mu\text{F}$ and $R = 100\text{ ohm}$ in series. The resonance frequency in *per second* is
 (A) 600 radian (B) 600 Hz
 (C) 500 radian (D) 500 Hz
45. A 220 V , 50 Hz ac source is connected to an inductance of 0.2 H and a resistance of 20 ohm in series. What is the current in the circuit
 (A) 10 A (B) 5 A
 (C) 33.3 A (D) 3.33 A
46. A 20 volts ac is applied to a circuit consisting of a resistance and a coil with negligible resistance. If the voltage across the resistance is 12 V , the voltage across the coil is
 (A) 16 volts (B) 10 volts
 (C) 8 volts (D) 6 volts
47. A resistance of $300\ \Omega$ and an inductance of $\frac{1}{\pi}$ henry are connected in series to a ac voltage of 20 volts and 200 Hz frequency. The phase angle between the voltage and current is
 (A) $\tan^{-1}\frac{4}{3}$ (B) $\tan^{-1}\frac{3}{4}$
 (C) $\tan^{-1}\frac{3}{2}$ (D) $\tan^{-1}\frac{2}{5}$
48. For the series LCR circuit shown in the figure, what is the resonance frequency and the amplitude of the current at the resonating frequency



- (A) $2500\text{ rad} - \text{s}^{-1}$ and $5\sqrt{2}\text{ A}$
 (B) $2500\text{ rad} - \text{s}^{-1}$ and 5 A
 (C) $2500\text{ rad} - \text{s}^{-1}$ and $\frac{5}{\sqrt{2}}\text{ A}$
 (D) $25\text{ rad} - \text{s}^{-1}$ and $5\sqrt{2}\text{ A}$
49. In a series LCR circuit, resistance $R = 10\ \Omega$ and the impedance $Z = 20\ \Omega$. The phase difference between the current and the voltage is
 (A) 30° (B) 45°
 (C) 60° (D) 90°
50. A coil has $L = 0.04\text{ H}$ and $R = 12\ \Omega$. When it is connected to 220 V , 50 Hz supply the current flowing through the coil, in amperes is
 (A) 10.7 (B) 11.7
 (C) 14.7 (D) 12.7