NEET : CHAPTER WISE TEST-6

SUBJECT :- PHYSICS **DATE.....**

CLASS :- 12th **NAME.....**

CHAPTER :- ALTERNATING CURRENT **SECTION.....**

(SECTION-A)

1. 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) $\frac{1}{\pi}I_p^2 R$

2. 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

3. 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

4. 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

5. If the value of potential in an ac, circuit is 10*V*, then the peak value of potential is

(A) $\frac{10}{\sqrt{2}}$ (B) $10\sqrt{2}$

(C) $20\sqrt{2}$ (D) $\frac{20}{\sqrt{2}}$

6. 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

7. 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) $\frac{1}{\sqrt{2}}(i_i + i_2)^2$

(C) $\frac{1}{\sqrt{2}}(i_1^2 + i_2^2)^{1/2}$ (D) $\frac{1}{2}(i_1^2 + i_2^2)^{1/2}$

8. In an ac circuit, the current is given by $i = 5\sin\left(100\,t - \frac{\pi}{2}\right)$ and the ac potential is $V = 200\sin(100)\,volt.$ Then the power consumption is

(A) 20 *watts* (B) 40 *watts*

(C) 1000 *watts* (D) 0 *watt*

9. For an ac circuit $V = 15\sin\omega t$ and $I = 20\cos\omega t$ the average power consumed in this circuit is

(A) 300 *Watt* (B) 150 *Watt*

(C) 75 *Watt* (D) zero

10. 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

11. 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) $\sqrt{R^2 + 2\pi fL}$

12. 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 Ω , 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*

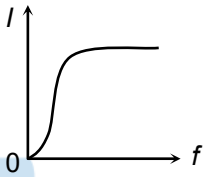
21. A telephone wire of length 200 *km* has a capacitance of 0.014 μF per *km*. If it carries an ac of frequency 5 *kHz*, what should be the value of an inductor required to be connected in series so that the impedance of the circuit is minimum
(A) 0.35 *mH* (B) 35 *mH*
(C) 3.5 *mH* (D) Zero

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*

(A)


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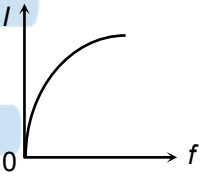
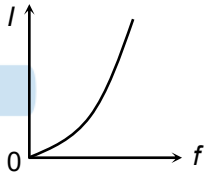
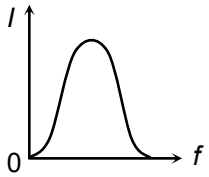


(C)


(D)


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 impedence of the circuit is unchanged

(D) total impedence 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 100 Ω 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 60º. 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 conected 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) 4μF (B) 8μF

(C) 1μF (D) 2μF

(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 10μF 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) $\frac{1}{100}\,sec$ (B) $\frac{1}{200}\,sec$
(C) $\frac{1}{300}\,sec$ (D) $\frac{1}{400}\,sec$

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 $t = \frac{1}{600}\,sec$, the instantaneous e.m.f. is

(A) 10 *V* (B) $5\sqrt{3}\ V$
(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) $90\sqrt{2}\ W$ (B) $90\ W$
(C) $45\sqrt{2}\ W$ (D) $45\ W$

44. In a *LCR* circuit having *L* = 8.0 *henry*, *C* = 0.5 μF and *R* = 100 *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*

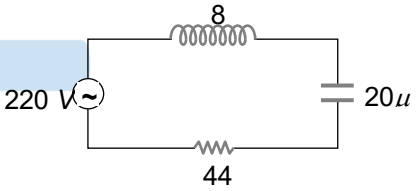
46. A 20 *volts* ac is applied to a circuit consisting of a resistance and a coil with negligible resistance. If the voltage across the resistance is 12 *V*, the voltage across the coil is

(A) 16 *volts* (B) 10 *volts*
(C) 8 *volts* (D) 6 *volts*

47. A resistance of 300 Ω 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) $2500\ rad - s^{-1}$ and $5\sqrt{2}\ A$
(B) $2500\ rad - s^{-1}$ and $5A$
(C) $2500\ rad - s^{-1}$ and $\frac{5}{\sqrt{2}} A$
(D) $25\ rad - s^{-1}$ and $5\sqrt{2}\ A$

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^o (B) 45^o
(C) 60^o (D) 90^o

50. A coil has *L* = 0.04 *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