EXERCISE-I

Alternating Current, Voltage and Power

1. If instantaneous current is given by $i = 4\cos(\omega t + \varphi)$ *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

2. In an ac circuit, peak value of voltage is 423 *volts*. Its effective voltage is
   (A) 400 *volts* (B) 323 *volts*
   (C) 300 *volts* (D) 340 *volts*

3. 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

4. The peak value of an Alternating current is 6 *amp*, then *r.m.s*. value of current will be
   (A) 3 *A* (B) $3\sqrt{3}\,A$
   (C) $3\sqrt{2}\,A$ (D) $2\sqrt{3}\,A$

5. 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 V
   (C) 19 *Hz* and 170 V (D) 754 *Hz* and 70 V

6. If E_0 represents the peak value of the voltage in an ac circuit, the *r.m.s.* value of the voltage will be
   (A) $\frac{E_0}{\pi}$ (B) $\frac{E_0}{2}$
   (C) $\frac{E_0}{\sqrt{\pi}}$ (D) $\frac{E_0}{\sqrt{2}}$

7. The peak value of 220 *volts* of ac mains is
   (A) 155.6 *volts* (B) 220.0 *volts*
   (C) 311.0 *volts* (D) 440 *volts*

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

9. A 40 Ω electric heater is connected to a 200 *V*, 50 *Hz* mains supply. The peak value of electric current flowing in the circuit is approximately
   (A) 2.5 *A* (B) 5.0 *A*
   (C) 7 *A* (D) 10 *A*

10. The frequency of ac mains in India is
   (A) 30 *c/s* or *Hz* (B) 50 *c/s* or *Hz*
   (C) 60 *c/s* or *Hz* (D) 120 *c/s* or *Hz*

11. The *r.m.s*. value of an ac of 50 *Hz* is 10 *amp*. The time taken by the alternating current in reaching from zero to maximum value and the peak value of current will be
   (A) 2×10^{-2} *sec* and 14.14 *amp*
   (B) 1×10^{-2} *sec* and 7.07 *amp*
   (C) 5×10^{-3} *sec* and 7.07 *amp*
   (D) 5×10^{-3} *sec* and 14.14 *amp*

12. The root mean square value of the alternating current is equal to
   (A) Twice the peak value
   (B) Half the peak value
   (C) $\frac{1}{\sqrt{2}}$ times the peak value
   (D) Equal to the peak value

13. 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*

14. If a current I given by $I_0 \sin\left(\omega t - \frac{\pi}{2}\right)$ flows in an ac circuit across which an ac 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) $P = 0$

15. In an ac circuit, the instantaneous values of e.m.f. and current are $e = 200 \sin 314\, t$ *volt* and $i = \sin\left(314t + \frac{\pi}{3}\right)$ *ampere*. The average power consumed in *watt* is

(A) 200 (B) 100

(C) 50 (D) 25

16. An ac generator produced an output voltage $E = 170 \sin 377\, t$ volts, where t is in seconds. The frequency of ac voltage is

(A) 50 *Hz* (B) 110 *Hz*

(C) 60 *Hz* (D) 230 *Hz*

17. In general in an alternating current circuit

(A) The average value of current is zero

(B) The average value of square of the current is zero

(C) Average power dissipation is zero

(D) The phase difference between voltage and current is zero

18. 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) $\frac{1}{2}(i_1^2 + i_2^2)^{1/2}$

19. 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*

20. An electric lamp is connected to 220 *V*, 50 *Hz* supply. Then the peak value of voltage is

(A) 210 V (B) 211 *V*

(C) 311 V (D) 320 *V*

21. In a circuit, the value of the alternating current is measured by hot wire ammeter as 10 *ampere*. Its peak value will be

(A) 10 *A* (B) 20 *A*

(C) 14.14 *A* (D) 7.07 *A*

22. The voltage of domestic ac is 220 *volt*. What does this represent

(A) Mean voltage

(B) Peak voltage

(C) Root mean voltage

(D) Root mean square voltage

23. The *r.m.s.* voltage of domestic electricity supply is 220 *volt* . Electrical appliances should be designed to withstand an instantaneous voltage of

(A) 220 *V* (B) 310 *V*

(C) 330 *V* (D) 440 *V*

24. The process by which ac is converted into dc is known as

(A) Purification

(B) Amplification

(C) Rectification

(D) Current amplification

25. 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

26. 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

27. A bulb is connected first with dc and then ac of same voltage then it will shine brightly with
(A) AC
(B) DC
(C) Brightness will be in ratio 1/1.4
(D) Equally with both

28. 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

29. The frequency of an alternating voltage is 50 *cycles/sec* and its amplitude is $120V$. Then the *r.m.s.* value of voltage is
(A) $101.3V$ (B) $84.8V$
(C) $70.7V$ (D) $56.5V$

30. A resistance of 20 *ohms* is connected to a source of an alternating potential $V = 220\sin(100\pi t)$. The time taken by the current to change from its peak value to *r.m.s* value is
(A) 0.2 *sec* (B) 0.25 *sec*
(C) 25×10^{-3} *sec* (D) 2.5×10^{-3} *sec*

31. Voltage and current in an ac circuit are given by $V = 5\sin\left(100\pi t - \frac{\pi}{6}\right)$ and $I = 4\sin\left(100\pi t + \frac{\pi}{6}\right)$
(A) Voltage leads the current by 30^o
(B) Current leads the voltage by 30^o
(C) Current leads the voltage by 60^o
(D) Voltage leads the current by 60^o

32. If an ac main supply is given to be 220 *V*. What would be the average e.m.f. during a positive half cycle
(A) $198V$ (B) $386V$
(C) $256V$ (D) None of these

33. In an ac circuit, the *r.m.s.* value of current, I_{rms} is related to the peak current, I_0 by the relation
(A) $I_{rms} = \frac{1}{\pi}I_0$ (B) $I_{rms} = \frac{1}{\sqrt{2}}I_0$
(C) $I_{rms} = \sqrt{2}I_0$ (D) $I_{rms} = \pi I_0$

34. An alternating voltage is represented as $E = 20\sin 300t$. The average value of voltage over one cycle will be
(A) Zero (B) 10 *volt*
(C) $20\sqrt{2}$ *volt* (D) $\frac{20}{\sqrt{2}}$ *volt*

35. The ratio of peak value and *r.m.s* value of an alternating current is
(A) 1 (B) $\frac{1}{2}$
(C) $\sqrt{2}$ (D) $1/\sqrt{2}$

AC Circuits

36. A choke coil is preferred to a rheostat in ac circuit as
(A) It consumes almost zero power
(B) It increases current
(C) It increases power
(D) It increases voltage

37. An alternating e.m.f. is applied to purely capacitive circuit. The phase relation between e.m.f. and current flowing in the circuit is

or

In a circuit containing capacitance only
(A) e.m.f. is ahead of current by $\pi/2$
(B) Current is ahead of e.m.f. by $\pi/2$
(C) Current lags behind e.m.f. by π
(D) Current is ahead of e.m.f. by π

38. 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

39. The average power dissipated in a pure inductor of inductance L when an ac current is passing through it, is

(A) $\frac{1}{2}LI^2$ (B) $\frac{1}{4}LI^2$

(C) $2Li^2$ (D) Zero

(Inductance of the coil L and current I)

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

41. A resonant ac circuit contains a capacitor of capacitance 10^{-6} F and an inductor of 10^{-4} H. The frequency of electrical oscillations will be

(A) 10^5 Hz (B) 10 *Hz*

(C) $\frac{10^5}{2\pi}$ Hz (D) $\frac{10}{2\pi}$ Hz

42. Power delivered by the source of the circuit becomes maximum, when

(A) $\omega L = \omega C$ (B) $\omega L = \frac{1}{\omega C}$

(C) $\omega L = -\left(\frac{1}{\omega C}\right)^2$ (D) $\omega L = \sqrt{\omega C}$

43. An alternating voltage is connected in series with a resistance R and an inductance L If the potential drop across the resistance is 200 V and across the inductance is 150 V, then the applied voltage is

(A) 350 V (B) 250 V

(C) 500 V (D) 300 V

44. An inductive circuit contains resistance of 10 Ω and an inductance of 20 H. If an ac voltage of 120 V and frequency 60 Hz is applied to this circuit, the current would be nearly

(A) 0.32 *amp* (B) 0.016 *amp*

(C) 0.48 *amp* (D) 0.80 *amp*

45. 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

46. A capacitor is a perfect insulator for

(A) Alternating currents (B) Direct currents

(C) Both ac and dc (D) None of these

47. In a circuit containing an inductance of zero resistance, the e.m.f. of the applied ac voltage leads the current by

(A) 90° (B) 45°

(C) 30° (D) 0°

48. In a pure inductive circuit or In an ac circuit containing inductance only, the current

(A) Leads the e.m.f. by 90°

(B) Lags behind the e.m.f. by 90°

(C) Sometimes leads and sometime lags behind the e.m.f.

(D) Is in phase with the e.m.f.

49. 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*

50. 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) $\tan^{-1}\frac{2}{5}$

51. The power factor of *LCR* circuit at resonance is
(A) 0.707 (B) 1
(C) Zero (D) 0.5

52. An inductance of 1 *mH* a condenser of 10 μF and a resistance of 50 Ω are connected in series. The reactances of inductor and condensers are same. The reactance of either of them will be
(A) 100 Ω (B) 30 Ω
(C) 3.2 Ω (D) 10 Ω

53. 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) $\frac{1}{2\pi}\sqrt{\frac{C}{L}}$

54. An alternating voltage $E = 200\sqrt{2}\sin(100\,t)$ is connected to a 1 *microfarad* capacitor through an ac ammeter. The reading of the ammeter shall be
(A) 10 *mA* (B) 20 *mA*
(C) 40 *mA* (D) 80 *mA*

55. An ac circuit consists of an inductor of inductance 0.5 *H* and a capacitor of capacitance 8 μF in series. The current in the circuit is maximum when the angular frequency of ac source is
(A) 500 *rad/sec* (B) 2×10^5 *rad/sec*
(C) 4000 *rad/sec* (D) 5000 *rad/sec*

56. The average power dissipation in a pure capacitance in ac circuit is
(A) $\frac{1}{2}CV^2$ (B) CV^2
(C) $\frac{1}{4}CV^2$ (D) Zero

57. In a region of uniform magnetic induction $B = 10^{-2}$ tesla, a circular coil of radius 30 *cm* and resistance π^2 *ohm* is rotated about an axis which is perpendicular to the direction of *B* and which forms a diameter of the coil. If the coil rotates at 200 *rpm* the amplitude of the alternating current induced in the coil is
(A) $4\pi^2$ *mA* (B) 30 *mA*
(C) 6 *mA* (D) 200 *mA*

58. An inductive circuit contains a resistance of 10 *ohm* and an inductance of 2.0 *henry*. If an ac voltage of 120 *volt* and frequency of 60 *Hz* is applied to this circuit, the current in the circuit would be nearly
(A) 0.32 *amp* (B) 0.16 *amp*
(C) 048 *amp* (D) 0.80 *amp*

59. 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*

60. In *LCR* circuit, the capacitance is changed from *C* to 4*C*. For the same resonant frequency, the inductance should be changed from *L* to
(A) 2*L* (B) *L* / 2
(C) *L* / 4 (D) 4 *L*

61. A 120 *volt* ac source is connected across a pure inductor of inductance 0.70 henry. If the frequency of the source is 60 *Hz*, the current passing through the inductor is
(A) 4.55 *amps* (B) 0.355 *amps*
(C) 0.455 amps (D) 3.55 amps

62. The impedance of a circuit consists of 3 *ohm* resistance and 4 *ohm* reactance. The power factor of the circuit is
(A) 0.4 (B) 0.6
(C) 0.8 (D) 1.0

63. *L*, *C* and *R* denote inductance, capacitance and resistance respectively. Pick out the combination which does not have the dimensions of frequency
(A) $\frac{1}{RC}$ (B) $\frac{R}{L}$
(C) $\frac{1}{\sqrt{LC}}$ (D) $\frac{C}{L}$

64. The power factor of a good choke coil is
(A) Nearly zero (B) Exactly zero
(C) Nearly one (D) Exactly one

65. If resistance of 100 Ω , inductance of 0.5 *henry* and capacitance of $10\times10^{-6}\,F$ are connected in series through 50 *Hz* ac supply, then impedance is

(A) 1.876 (B) 18.76
(C) 189.72 (D) 101.3

66. An alternating current source of frequency 100 *Hz* is joined to a combination of a resistance, a capacitance and a coil in series. The potential difference across the coil, the resistance and the capacitor is 46, 8 and 40 *volt* respectively. The electromotive force of alternating current source in *volt* is

(A) 94 (B) 14
(C) 10 (D) 76

67. A 10 *ohm* resistance, 5 *mH* coil and 10 *μF* capacitor are joined in series. When a suitable frequency 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) In quadrupled

68. *L*, *C* and *R* represent physical quantities inductance, capacitance and resistance respectively. The combination representing dimension of frequency is

(A) *LC* (B) $(LC)^{-1/2}$
(C) $\left(\frac{L}{C}\right)^{-1/2}$ (D) $\frac{C}{L}$

69. In a series circuit *R* = 300 Ω, *L* = 0.9 *H*, *C* = 2.0 *μF* and *ω* = 1000 *rad/sec*. The impedance of the circuit is

(A) 1300 Ω (B) 900 Ω
(C) 500 Ω (D) 400 Ω

70. In a *L-R* circuit, the value of *L* is $\left(\frac{0.4}{\pi}\right)$ henry and the value of *R* is 30 *ohm*. If in the circuit, an alternating *e.m.f.* of 200 *volt* at 50 cycles per sec is connected, the impedance of the circuit and current will be

(A) $11.4\,\Omega, 17.5\,A$ (B) $30.7\,\Omega, 6.5\,A$
(C) $40.4\,\Omega, 5\,A$ (D) $50\,\Omega, 4\,A$

71. The reactance of a coil when used in the domestic ac power supply (220 *volt*, 50 *cycles*) is 100 *ohm*. The self inductance of the coil is nearly

(A) 3.2 *henry* (B) 0.32 *henry*
(C) 2.2 *henry* (D) 0.22 *henry*

72. In a series *LCR* circuit, operated with an ac of angular frequency ω, the total impedance is

(A) $[R^2 + (L\omega - C\omega)^2]^{1/2}$

(B) $\left[R^2 + \left(L\omega - \frac{1}{C\omega}\right)^2\right]^{1/2}$

(C) $\left[R^2 + \left(L\omega - \frac{1}{C\omega}\right)^2\right]^{-1/2}$

(D) $\left[(R\omega)^2 + \left(L\omega - \frac{1}{C\omega}\right)^2\right]^{1/2}$

73. The reactance of a $25\,\mu F$ capacitor at the ac frequency of 4000 *Hz* is

(A) $\frac{5}{\pi}$ *ohm* (B) $\sqrt{\frac{5}{\pi}}$ *ohm*
(C) 10 *ohm* (D) $\sqrt{10}$ *ohm*

74. The frequency for which a $5\,\mu F$ capacitor has a reactance of $\frac{1}{1000}$ *ohm* is given by

(A) $\frac{100}{\pi}$ MHz (B) $\frac{1000}{\pi}$ Hz
(C) $\frac{1}{1000}$ Hz (D) 1000 *Hz*

75. An e.m.f. $E = 4\cos(1000t)$ *volt* is applied to an LR-circuit of inductance 3 *mH* and resistance 4 *ohms*. The amplitude of current in the circuit is

(A) $\frac{4}{\sqrt{7}}$ A (B) 1.0 *A*
(C) $\frac{4}{7}$ A (D) 0.8 *A*

76. In an ac circuit, a resistance of R *ohm* is connected in series with an inductance *L*. If phase angle between voltage and current be 45°, the value of inductive reactance will be

(a) $\frac{R}{4}$

(b) $\frac{R}{2}$

(C) *R*

(D) Cannot be found with the given data

77. A coil of inductance *L* has an inductive reactance of X_L in an AC circuit in which the effective current is *I*. The coil is made from a super-conducting material and has no resistance. The rate at which power is dissipated in the coil is

(A) 0 (B) IX_L

(C) I^2X_L (D) IX_L^2

78. The phase difference between the current and voltage of *LCR* circuit in series combination at resonance is

(A) 0 (B) $\pi/2$

(C) π (D) $-\pi$

79. In a series resonant circuit, the ac voltage across resistance *R*, inductance *L* and capacitance *C* are 5 *V*, 10 *V* and 10 *V* respectively. The ac voltage applied to the circuit will be

(A) 20 *V* (B) 10 *V*

(C) 5 *V* (D) 25 *V*

80. When 100 *volt* dc is applied across a coil, a current of 1 *amp* flows through it. When 100 volt ac at 50 cycle s^{-1} is applied to the same coil, only 0.5 ampere current flows. The impedance of the coil is

(A) 100Ω (B) 200Ω

(C) 300Ω (D) 400Ω

81. The coefficient of induction of a choke coil is 0.1*H* and resistance is 12Ω. If it is connected to an alternating current source of frequency 60 *Hz*, then power factor will be

(A) 0.32 (B) 0.30

(C) 0.28 (D) 0.24

82. For series *LCR* circuit, wrong statement is

(A) Applied e.m.f. and potential difference across resistance are in same phase

(B) Applied e.m.f. and potential difference at inductor coil have phase difference of $\pi/2$

(C) Potential difference at capacitor and inductor have phase difference of $\pi/2$

(D) Potential difference across resistance and capacitor have phase difference of $\pi/2$

83. In a purely resistive *ac* circuit, the current

(A) Lags behind the e.m.f. in phase

(B) Is in phase with the e.m.f.

(C) Leads the e.m.f. in phase

(D) Leads the e.m.f. in half the cycle and lags behind it in the other half

84. If an 8Ω resistance and 6Ω reactance are present in an ac series circuit then the impedance of the circuit will be

(A) 20 *ohm* (B) 5 *ohm*

(C) 10 *ohm* (D) $14\sqrt{2}$ *ohm*

85. A 12 *ohm* resistor and a 0.21 henry inductor are connected in series to an ac source operating at 20 *volts*, 50 cycle/second. The phase angle between the current and the source voltage is

(A) 30° (B) 40°

(C) 80° (D) 90°

86. What will be the phase difference between virtual voltage and virtual current, when the current in the circuit is wattless

(A) 90° (B) 45°

(C) 180° (D) 60°

87. The resonant frequency of a circuit is *f*. If the capacitance is made 4 times the initial values, then the resonant frequency will become

(A) $f/2$ (B) $2f$

(C) f (D) $f/4$

88. 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

89. In an ac circuit, the potential difference across an inductance and resistance joined in series are respectively 16 *V* and 20 *V*. The total potential difference across the circuit is
(A) 20.0 *V* (B) 25.6 *V*
(C) 31.9 *V* (D) 53.5 *V*

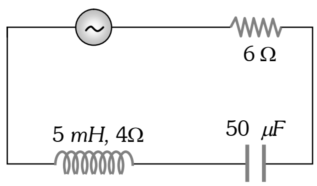
90. A 220 *V*, 50 *Hz* ac source is connected to an inductance of 0.2 *H* and a resistance of 20 *ohm* in series. What is the current in the circuit
(A) 10 *A* (B) 5 *A*
(C) 33.3 *A* (D) 3.33 *A*

91. An *LCR* circuit contains $R = 50\ \Omega$, $L = 1\ mH$ and $C = 0.1\ \mu F$. The impedance of the circuit will be minimum for a frequency of
(A) $\frac{10^5}{2\pi}s^{-1}$ (B) $\frac{10^6}{2\pi}s^{-1}$
(C) $2\pi\times10^5 s^{-1}$ (D) $2\pi\times10^6 s^{-1}$

92. 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

93. A series ac circuit consist of an inductor and a capacitor. The inductance and capacitance is respectively 1 *henry* and 25μF. If the current is maximum in circuit then angular frequency will be
(A) 200 (B) 100
(C) 50 (D) 200/2 π

94. In the circuit shown below, the ac source has voltage $V = 20\cos(\omega t)$ volts with ω= 2000 *rad/sec*. the amplitude of the current will be nearest to
(A) 2A
(B) 3.3A
(C) $2/\sqrt{5}$A
(D) $\sqrt{5}$A



95. The value of the current through an inductance of 1H and of negligible resistance, when connected through an ac source of 200 *V* and 50 *Hz*, is
(A) 0.637 *A* (B) 1.637 *A*
(C) 2.637*A* (D) 3.637 *A*

96. The quality factor of *LCR* circuit having resistance (*R*) and inductance (*L*) at resonance frequency (ω) is given by
(A) $\frac{\omega L}{R}$ (B) $\frac{R}{\omega L}$
(C) $\left(\frac{\omega L}{R}\right)^{1/2}$ (D) $\left(\frac{\omega L}{R}\right)^2$

97. Power factor is maximum in an *LCR* circuit when
(A) $X_L = X_C$ (B) $R = 0$
(C) $X_L = 0$ (D) $X_C = 0$

98. 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) $\pi/6$

99. The capacity of a pure capacitor is 1 *farad*. In dc circuits, its effective resistance will be
(A) Zero (B) Infinite
(C) 1 *ohm* (D) 1/2 *ohm*

100. In an ac circuit, the current lags behind the voltage by $\pi/3$. The components in the circuit are
(A) *R* and *L* (B) *R* and *C*
(C) *L* and *C* (D) Only *R*

101. The reactance of a coil when used in the domestic ac power supply (220 *volts*, 50 cycles per second) is 50 *ohms*. The inductance of the coil is nearly
(A) 2.2 *henry* (B) 0.22 *henry*
(C) 1.6 *henry* (D) 0.16 *henry*

102. A resistance of 40 *ohm* and an inductance of 95.5 *millihenry* are connected in series in a 50 *cycles/second* ac circuit. The impedance of this combination is very nearly
(A) 30 *ohm* (B) 40 *ohm*
(C) 50 *ohm* (D) 60 *ohm*

103. For high frequency, a capacitor offers
(A) More reactance (B) Less reactance
(C) Zero reactance (D) Infinite reactance

104. The coil of choke in a circuit

(A) Increases the current

(B) Decreases the current

(C) Does not change the current

(D) Has high resistance to dc circuit

105. In a circuit, the current lags behind the voltage by a phase difference of $\pi / 2$. The circuit contains which of the following

(A) Only *R* (B) Only *L*

(C) Only *C* (D) *R* and *C*

106. The inductive reactance of an inductor of $\frac{1}{\pi}$ *henry* at 50 *Hz* frequency is

(A) $\frac{50}{\pi}$ *ohm* (B) $\frac{\pi}{50}$ *ohm*

(C) 100 *ohm* (D) 50 *ohm*

107. An oscillator circuit consists of an inductance of 0.5*mH* and a capacitor of $20\,\mu F$. The resonant frequency of the circuit is nearly

(A) 15.92 *Hz* (B) 159.2 *Hz*

(C) 1592 *Hz* (D) 15910 *Hz*

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

(A) $50\mu F$ (B) $25\mu F$

(C) $100\mu F$ (D) $75\mu F$

109. 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) $R / (R^2 - \omega^2 L^2)^{1/2}$

110. A circuit has a resistance of 11Ω, an inductive reactance of 25Ω and a capacitative resistance of 18Ω. It is connected to an ac source of 260*V* and 50*Hz*. The current through the circuit (in amperes) is

(A) 11 (B) 15

(C) 18 (D) 20

111. A 0.7 *henry* inductor is connected across a 120*V* – 60 *Hz* ac source. The current in the inductor will be very nearly

(A) 4.55 *amp* (B) 0.355 *amp*

(C) 0.455 *amp* (D) 3.55 *amp*

112. There is a 5Ω resistance in an ac, circuit. Inductance of 0.1*H* is connected with it in series. If equation of ac e.m.f. is $5 \sin 50t$ then the phase difference between current and e.m.f. is

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{6}$

(C) $\frac{\pi}{4}$ (D) 0

113. An inductor of inductance *L* and resistor of resistance *R* are joined in series and connected by a source of frequency ω. Power dissipated in the circuit is

(A) $\frac{(R^2 + \omega^2 L^2)}{V}$ (B) $\frac{V^2 R}{(R^2 + \omega^2 L^2)}$

(C) $\frac{V}{(R^2 + \omega^2 L^2)}$ (D) $\frac{\sqrt{R^2 + \omega^2 L^2}}{V^2}$

114. In a ac circuit of capacitance the current from potential is

(A) Forward

(B) Backward

(C) Both are in the same phase

(D) None of these

115. A coil of 200Ω resistance and 1.0 *H* inductance is connected to an ac source of frequency $200/2\pi$ Hz. Phase angle between potential and current will be

(A) 30^o (B) 90^o

(C) 45^o (D) 0^o

116. In a *LCR* circuit the pd between the terminals of the inductance is 60 *V*, between the terminals of the capacitor is 30*V* and that between the terminals of resistance is 40*V*. the supply voltage will be equal to ……

(A) 50 *V* (B) 70 *V*

(C) 130 *V* (D) 10 *V*

117. Radio frequency choke uses core of

(A) Air (B) Iron

(C) Air and iron (D) None of these

118. In a *LCR* circuit capacitance is changed from *C* to 2*C*. For the resonant frequency to remain unchanged, the inductance should be change from *L* to

(A) 4*L* (B) 2*L*

(C) *L*/2 (D) *L*/4

119. In an *LCR* series ac 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) $50\sqrt{2}$ V

(C) 100*V* (D) 0 *V* (zero)

120. 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