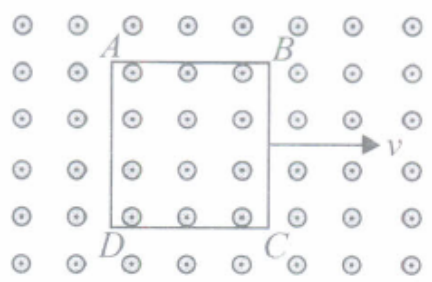
Ravi Maths Tuition Centre

Time : 1 Mins **ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENTS 1** **Marks : 1347**

1. 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 x 10^5 rad/sec c) 4000 rad/sec d) 5000 rad/sec
2. A series LCR circuit containing a resistance of 120 Ω has angular resonance frequency 4 x 10^5 rad s^{-1}. At resonance the voltages across resistance and inductance are 60 V and 40 V respectively. The angular frequency at which current in the circuit lags the voltage by 45° is
   a) 16 x 10^5 rad s^{-1} b) 8 x 10^5 rad s^{-1} c) 4 x 10^5 rad s^{-1} d) 2 x 10^5 rad s^{-1}
3. In an AC circuit with voltage V and current i the power dissipated is_____
   a) Depends on the phase between V and i b) $\frac{1}{\sqrt{2}}Vi$ c) $\frac{1}{2}Vi$ d) Vi
4. At resonance frequency the impedance in series LCR circuit is
   a) maximum b) minimum c) zero d) infinity
5. A metallic square loop ABCD is moving in its own plane with velocity v in a uniform magnetic field perpendicular to its plane as shown in D figure. An electric field is induced



   a) in AD, but not in BC b) in Be, but not in AD c) neither in AD nor in BC
   d) in both AD and BC
6. A circular disc of radius 0.2 m is placed in a uniform magnetic field of induction ($\frac{1}{\pi}$)Wb m^{-2} in such a way that its axis makes an angle of 60° with $\vec{B}$. The magnetic flux linked with the disc is:
   a) 0.02 Wb b) 0.06 Wb c) 0.08 Wb d) 0.01 Wb
7. Two cities are 150 km apart. Electric power is sent from one city to another city through copper wires. The fallof potential per km is 8 volt and the average resistance per km is 0.5Ω. The power loss in the wire is:
   a) 19.2 W b) 19.2 kW c) 19.2 J d) 12.2 kW
8. An LCR series circuit is under resonance. If I_m is current amplitude, Vm is voltage amplitude, R is the resistance, Z is the impedance, X_L is the inductive reactance and X_c is the capacitive reactance, then

a) $I_m = \frac{Z}{V_m}$ b) $I_m = \frac{V_m}{X_L}$ c) $I_m = \frac{V_m}{X_C}$ d) $I_m = \frac{V_m}{R}$

9. Assertion: It is more difficult to push a magnet into a coil with more loops.
   Reason: Emf induced in the current loop resists the motion of the magnet.
   a) If both assertion and reason are true and reason is the correct explanation of assertion.
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion.
   c) If assertion is true but reason is false. d) If both assertion and reason are false.
10. In an AC generator, a coil with N turns all of the same area A and total resistance R, rotates with frequency ω in a magnetic field B. The maximum value of emf generated in the coil will be :
    a) NABRω b) NAB c) NABR d) NABω
11. 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
12. The resonant frequency of a series LCR circuit with L = 2.0 H, C = 32μF and R = 10Ω is
    a) 20 Hz b) 30 Hz c) 40 Hz d) 50 Hz
13. In series LCR circuit, the phase angle between supply voltage and current is
    a) $tan\phi = \frac{X_L - X_C}{R}$ b) $tan\phi = \frac{R}{X_L - X_C}$ c) $tan\phi = \frac{R}{X_L + X_C}$ d) $tan\phi = \frac{X_L + X_C}{R}$
14. The magnetic flux through a coil perpendicular to its plane and directed into paper is varying according to the relation ϕ = ($2t^2$ + 4t + 6) mWh. The emf induced in the loop at t = 4 s is
    a) 0.12 V b) 2.4 V c) 0.02 V d) 1.2 V
15. An a.c. generator consists of a coil of 100 turns and cross-sectional area of 3 m^2, rotating at a constant angular speed of 60 radian/see in a uniform magnetic field of 0.04 T. The resistance of the coil is 500 ohm. What is the maximum power dissipation in the coil?
    a) 518.4 W b) 1036 W c) 259.2 W d) Zero
16. Assertion: The self-inductance of a long solenoid is proportional to the area of cross-section and length of the solenoid.
    Reason: Self inductance of a solenoid is independent of the number of turns per unit length.
    a) If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.
17. In an a.c circuit the e.m.f. (e) and the current (i) at any instant are given respectively by
    $\varepsilon = E_0 \sin \omega t; i = I_0 \sin(\omega t - \phi)$
    The average power in the circuit over one cycle of a.c. is_____
    a) $\frac{E_0 I_0}{2}$ b) $\frac{E_0 I_0}{2} \sin \phi$ c) $\frac{E_0 I_0}{2} \cos \phi$ d) $E_0 I_0$
18. An ac source is of $\frac{200}{\sqrt{2}}$ V,50 Hz. The value of voltage after $\frac{1}{600}$ s from the start is
    a) 200 V b) $\frac{200}{\sqrt{2}}$ V c) 100 V d) 50 V

19. An infinitely long cylinder is kept parallel to a uniform magnetic field B directed along positive z-axis, The direction of induced current on the surface of cylinder as seen from the z-axis will be

    a) clockwise of the positive z-axis b) anticlockwise of the positive z-axis c) zero

    d) along the magnetic field

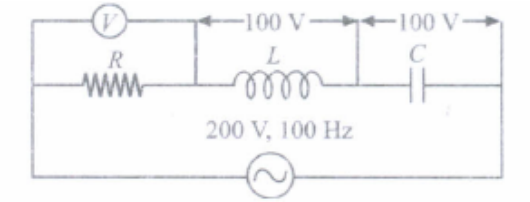
20. A 44 mH inductor is connected to 220 V, 50 Hz ac supply. The rms value of the current in the circuit is

    a) 12.8 A b) 13.6 A c) 15.9 A d) 19.5 A

21. In a coil current falls from 5 A to 0 A in 0.2 s. If an average emf of 150 V is induced, then the self inductance of the coil is

    a) 4 H b) 2 H c) 3 H d) 6 H

22. In the circuit shown in figure, what will be the reading of the voltmeter?



    a) 300 V b) 900 V c) 200 V d) 400 V

23. If the current is halved in a coil, then the energy stored is how much times the previous value?

    a) 1/2 b) 1/4 c) 2 d) 4

24. A magnetic field B is confined to a region r $\leq$ a and points out of the paper (the z-axis), r = 0 being the centre of the circular region. A charged ring (charge = q) of radius b(b > a) and mass m lies in the x-y plane with its centre at the origin. The ring is free to rotate and is at rest. The magnetic field is brought to zero in time M. The angular velocity ro of the ring after the field vanishes, is

    a) $\frac{qBa^2}{2mb}$ b) $\frac{qBa}{2mb^2}$ c) $\frac{2mb^2}{qBa^2}$ d) $\frac{qBa^2}{2mb^2}$

25. A coil has an area of 0.05 m^2 and it has 800 turns. It is placed perpendicularly in a magnetic field of strength 4 x 10^{-5} Wb/m^2, it is rotated through 90° in 0.1 sec. The average e.m.f. induced in the coil is :

    a) 0.056 V b) 0.046 V c) 0.026 d) 0.016 V

26. 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

27. A step-up transformer operates on a 230 V line and supplies current of 2 A to a load. The ratio of the primary and secondary winding is 1: 25. The current in the primary coil is____

    a) 15 A b) 50 A c) 25 A d) 12.5 A

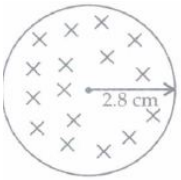
28. Alternating current of peak value $\left(\frac{2}{\pi}\right)$ ampere flows through the primary coil of the transformer. The coefficient of mutual inductance between primary and secondary coil is 1 henry. The peak e.rn.f induced in secondary coil is (Frequency of AC = 50 Hz)

    a) 100 V b) 200 V c) 300 V d) 400 V

29. **Assertion:** A step-up transformer changes a lowvoltage into a high voltage.
Reason : This violate the law of conservation of energy.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertionand reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

30. A long solenoid has 500 turns. When a current of 2 ampere is passed through it, the resulting magnetic flux linked with each turn of the solenoid is 4×10^{-3} Wb. The self-inductance of the solenoid is _____.
a) 2.5 henry b) 2.0 henry c) 1.0 henry d) 40 henry

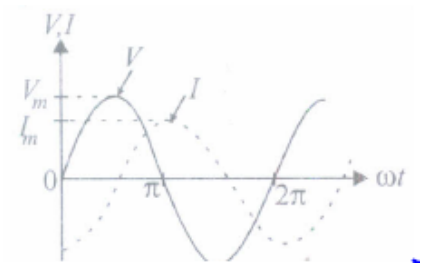
31. The magnetic field of a cylindrical magnet that has a pole-face radius 2.8 cm can be varied sinusoidally between minimum value 16.8 T and maximum value 17.2 T at a frequency of $\frac{60}{\pi}$ Hz. Cross section of the magnetic field created by the magnet is shown. At a radial distance of 2 cm from the axis, find the amplitude of the electric field (in mN C^{-1}) induced by the magnetic field variation.

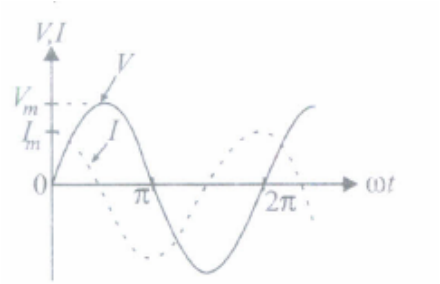


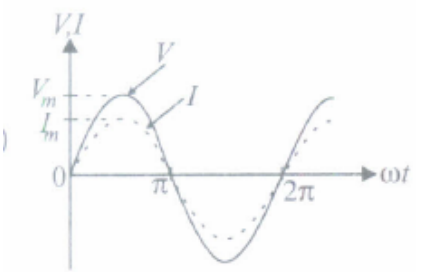
a) 240 mN C^{-1} b) 180 mN C^{-1} c) 110 mN C^{-1} d) 290 mN C^{-1}

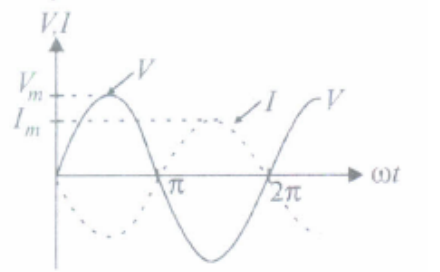
32. **Assertion:** In a purely inductive or capacitive circuit, the current is referred to as wattless current.
Reason: No power is dissipated in a purely inductive or capacitive circuit even though a current is flowing in the circuit.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertionand reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

33. The phase relationship between current and voltage in a pure resistive circuit is best represented by

a) 

b) 

c) 

d) 

34. Which of the following does not use the application of eddy current?
a) Electric power meters b) Induction furnace c) LED lights d) Magnetic brakes in trains

35. Assertion: The back emf in a de motor is maximum when the motor has just been switched on.
Reason: When motor is switched on it has maximum speed.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

36. **Assertion:** Average value of ac over a complete cycle is always zero.
Reason: Average value of ac is always defined over half cycle.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertionand reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

37. A rectangular, a square, a circular and an elliptical loop, all in the (x -y) plane, are moving out of a uniform magnetic field with a constant velocity, $\vec{V} = v\hat{i}$ .The magnetic field is directed along the negative z-axis direction. The induced emf, during the passage of these loops, out of the field region, will not remain constant for _____.
a) the circular and the elliptical loops. b) only the elliptical loop. c) any ofthe four loops.
d) the rectangular, circular and elliptical loops.

38. The relation between an ac voltage source and time in SI units is V = 120 sin(100 πt)cos(100 πt) V. The value of peak voltage and frequency will be respectively
a) 120 V and 100 Hz b) $\frac{120}{\sqrt{2}}$ V and 100 Hz c) 60 V and 200 Hz d) 60 V and 100 Hz

39. A coil of self-inductance L is connected in series with a bulb B and an A C source. Brightness of the bulb decreases when____
a) number of turns in the coil is reduced
b) a capacitance of reactance $X_C = X_L$ is included in the sarre circuit
c) an iron rod is inserted in the coil d) Frequency of the A C source is decrensed

40. Two coils of self inductances 2 mH and 8 mH are placed so close together that the effective flux in one coil is completely linked with the other. The mutual inductance between these coils is _____.
a) 6 mH b) 4 mH c) 16 mH d) 10 mH

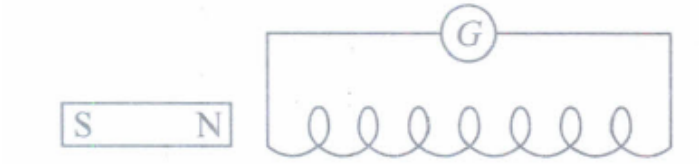
41. A solenoid has an inductance of 10 henry and a resistance of 2 ohm. It is connected to a 10 volt battery. How long will it take for the magnetic energy to reach 1/4 of its maximum value?
a) 2.142 s b) 3.465 s c) 0.693 s d) 4.345 s

42. A 100 Ω resistor is connected to a 220 V, 50 Hz ac supply. The rms value of current in the circuit is
a) 1.56 A b) 1.56 mA c) 2.2 A d) 2.2 mA

43. In a coil of area 10 cm^2 and 10 turns with a magnetic field directed perpendicular to the plane and is changing at the rate of 10^8 gauss/second. The resistance of the coil is 20 ohm. The current in the coil will be :
a) 5 amp b) 0.5 amp c) 0.05 amp d) 5 x 10^8 amp

44. Lenz's law is a consequence of the law of conservation of
a) charge b) energy c) induced emf d) induced current

45. The average e.m.f. induced in a coil in which the current changes from 2 ampere to 4 ampere in 0.05 second is 8 volt. What is the self-inductance of the coil?
    a) 0.1 H b) 0.2 H c) 0.4 H d) 0.8 H
46. A 40 mF capacitor is connected to a 200 V, 50 Hz ac supply. The rms value of the current in the circuit is, nearly _____ .
    a) 25.1 A b) 1.7 A c) 2.05 A d) 2.5 A
47. A coil of area 0.4 m^2 has 100 turns. A magnetic field of 0.04 Wb m^{-2} is acting normal to the coil surface. If this magnetic field is reduced to zero in 0.01 s, then the induced emf in the coil is
    a) 160 V b) 250 V c) 270 V d) 320 V
48. In an a.c. circuit the e.m.f. (e) and the current (I) at any instant are given respectively by $e = E_0 \sin \omega t$, $I = I_0 \sin(\omega t - \varphi)$. The average power in the circuit over one cycle of a.c. is :
    a) $E_0 I_0$ b) $E_0 I_0/2$ c) $(E_0 I_0/2) \sin\varphi$ d) $(E_0 I_0/2) \cos\varphi$
49. The self-inductance of a coil is 5 henry, a current of 1 amp change to 2 amp within 5 second through the coil. The value of induced e.m.f. will be :
    a) 10 Volt b) 0.10 Volt c) 1.0 Volt d) 100 Volt
50. If V= 100sin(100t) V and I = 100 sin $\left(100t + \frac{\pi}{3}\right)$ mA are the instantaneous values of voltage and current, then the rms values of voltage and current are respectively
    a) 70.7 V, 70.7 mA b) 70.7 V, 70.7 A c) 141.4 V, 141.4 mA d) 100 V, 100 mA
51. In the figure, galvanometer G gives maximum deflection when

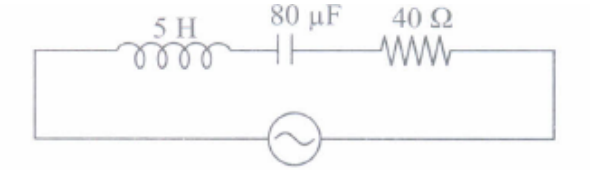


    a) magnet is pushed into the coil b) magnet is rotated into the coil
    c) magnet is stationary at the centre of the coil d) number of turns in the coil is reduced
52. Assertion: Mutual inductance of a pair of coils depend on their separation as well as their relative orientation.
    Reason: Mutual inductance depend upon the length of the coil only.
    a) If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.
53. A conducting circular loop is placed in a uniform magnetic field of 0.04 T with its plane perpendicular to the magnetic field. The radius of the loop starts shrinking at 2 mm/s. The induced emf in the loop when the radius is 2 cm is _____.
    a) 4.8 $\pi\mu V$ b) 0.8 $\pi\mu V$ c) 1.6 $\pi\mu V$ d) 3.2 $\pi\mu V$
54. An inductor 20 mH, a capacitor 100 μF and a resistor 50 Ω are connected in series across a source of emf, V = 10 sin 314 t. The power loss in the circuit is :
    a) 0.79 W b) 0.43 W c) 2.74 W d) 1.13 W
55. The natural frequency of a L-C circuit is equal to :
    a) $1/2\pi\sqrt{LC}$ b) $1/2\pi\sqrt{LC}$ c) $1/2\pi\sqrt{L/C}$ d) $1/2\pi\sqrt{C/L}$
56. The peak voltage of an ac supply is 440 V, then its rms voltage is

a) 31.11 V b) 311.1 V c) 41.11 V d) 411.1 V

57. The equivalent inductance of two inductors is 2.4 H when connected in parallel and 10 H when connected in series. What is the value of inductances of the individual inductors?
    a) 8 H, 2 H b) 6 H, 4 H c) 5 H, 5 H d) 7 H, 3 H

58. Figure shows a series LCR circuit connected to a variable frequency 230 V source.

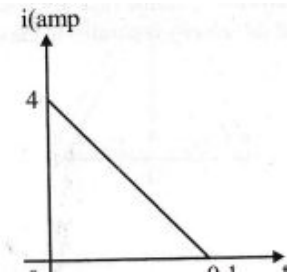


    The source frequency which drives the circuit in resonance is
    a) 4 Hz b) 5 Hz c) 6 Hz d) 8 Hz

59. A 5μF capacitor is connected to a 200 V, 100 Hz ac source. The capacitive reactance is
    a) 212 Ω b) 312 Ω c) 318 Ω d) 412 Ω

60. Power dissipated in an LCR series circuit connected to an ac source of emf ε is
    a) $\frac{\varepsilon^2\sqrt{R^2+\left(wL-\frac{1}{wC}\right)^2}}{R}$ b) $\frac{\varepsilon^2\left[R^2+\left(wL-\frac{1}{wC}\right)^2\right]}{R}$ c) $\frac{\varepsilon^2 R}{\sqrt{R^2+\left(wL-\frac{1}{wC}\right)^2}}$ d) $\frac{\varepsilon^2 R}{\left[R^2+\left(wL-\frac{1}{wC}\right)^2\right]}$

61. In a coil of resistance 10 W, the induced current developed by changing magnetic flux through it, is shown in figure as a function of time. The magnitude of change in flux through the coil in Weber is



    a) 8 b) 2 c) 6 d) 4

62. A wire loop is rotated in a magnetic field. The frequency of change of direction of the induced e.m.f is _____.
    a) twice per revolution b) four times per revolution c) six times per revolution
    d) once per revolution

63. When the number of turns and the length of the solenoid are doubled keeping the area of crosssection same, the inductance:
    a) Remains the same b) Is halved c) Is doubled d) Becomes four times

64. **Assertion:** The power in an ac circuit is minimum if the circuit has only a resistor.
    Reason : Power of a circuit is independent of the phase angle.
    a) If both assertion and reason are true and reason is the correct explanation of assertion.
    b) If both assertionand reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.

65. Two different coils have self-inductance L_1 = 8 mH, L_2 = 2 mH. The current in one coil is increased at a constant rate. The current in the second coil is also increased at the same rate. At a certain instant of time, the power given to the two coils is the same. At that time the

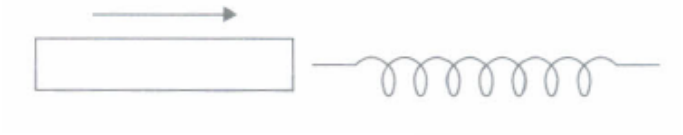
current, the induced voltage and the energy stored in the first coil are i_1, V_1 and W_1 respectively. Corresponding values for the second coil at the same instant are i_2, V_2, and W2 respectively. Then,

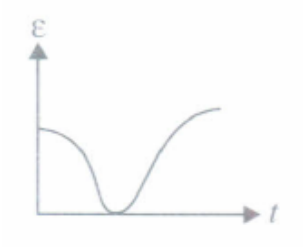
a) $\frac{W_2}{W_1} = 8$ b) $\frac{W_2}{W_1} = \frac{1}{8}$ c) $\frac{W_2}{W_1} = 4$ d) $\frac{W_2}{W_1} = \frac{1}{4}$

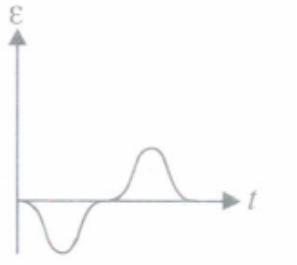
66. The current passing through a choke coil of 5 henry is decreasing at the rate of 2 ampere/sec. The e.m.f. developing across the coil is :

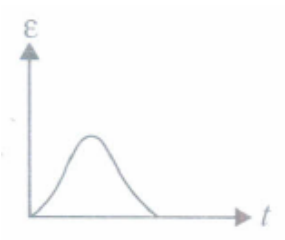
a) 10 V b) -10 V c) 2.5 V d) -2.5 V

67. The variation of induced emf (ε) with time (t) in a coil if a short bar magnet is moved along its axis with. a constant velocity is best represented as



a) 

b) 

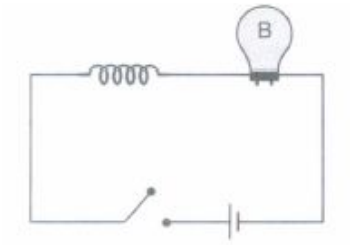
c) 

d) 

68. An inductor 200 mH, capacitor 500 μF and resistor 10 Ω are connected in series with a 100 V variable frequency ac source. What is the frequency at which the power factor of the circuit is unity?

a) 10.22 Hz b) 12.4 Hz c) 19.2 Hz d) 15.9 Hz

69. In the following circuit, the bulb will become suddenly bright if :



a) Contact is made or broken b) Contact is made c) Contact is broken

d) Won't become bright at all

70. The line that draws power supply to your house from street has

a) 220 $\sqrt{2}$ V average voltage b) 220 V average voltage.

c) voltage and current out of phase by

d) voltage and current possibly differing in phase ϕ such that $|\phi| < \frac{\pi}{2}$

71. A magnetic field of 2 x 10^{-2} T acts at right angles to a coil of area 100 cm^2 with 50 turns. The average emf induced in the coil is 0.1 V, when it is removed from the field in time t. The value of t is :

a) 0.1 sec b) 0.01 sec c) 1 sec d) 20 sec

72. A coil having 500 square loops each of side 10 cm is placed normal to a magnetic flux which increases at the rate of 1.0 tesla/second. The induced e.m.f. in volts is
    a) 0.1 b) 0.5 c) 1 d) 5
73. **Assertion:** In series LCR resonance circuit, the impedance is equal to the ohmic resistance.
    Reason : At resonance, the inductive reactance exceeds the capacitive reactance.
    a) If both assertion and reason are true and reason is the correct explanation of assertion.
    b) If both assertionand reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false
74. In the circuit of figure, the bulb will become suddenly bright, if _____ .
    a) contact is made or broken b) contact is made c) contact is broken
    d) None of the above
75. A uniform magnetic field B points vertically up and is slowly changed in magnitude, but not in direction. The rate of change of the magnetic field is α . A conducting ring of radius r and resistance R is held perpendicular to the magnetic field, and is totally inside it. The induced current in the ring is
    a) zero b) $\frac{2\pi rB}{R}$ c) $\frac{r\alpha}{R}$ d) $\frac{\pi r^2\alpha}{R}$
76. The Q factor of a series LCR circuit with L = 2 H, C = 32μF and R = 10Ω is
    a) 15 b) 20 c) 25 d) 30
77. The core of a transformer is laminated because___
    a) the weight of the transformer may be reduced b) rusting of the core may be prevented
    c) ratio of voltage in primary and secondary may be increased
    d) energy losses due to eddy currents may be minimised
78. In the case of an inductor
    a) voltage lags the current by $\frac{\pi}{2}$ b) voltage leads the current by $\frac{\pi}{2}$
    c) voltage leads the current by $\frac{\pi}{3}$ d) voltage leads the current by $\frac{\pi}{4}$
79. 200 V ac source is fed to series LCR circuit having X_L = 50 Ω, X_c = 50 Ω and R = 25 Ω. Potential drop across the inductor is
    a) 100 V b) 200 V c) 400 V d) 10 V
80. In an ac circuit of capacitance, the current from potential is :
    a) Forward b) Backward c) Both are in the same phase d) None of these
81. Which of the following combinations should be selected for better tuning of an LCR circuit used for communication?
    a) R = 20 Ω, L = 1.5 H, C = 35 μF b) R = 25 Ω, L = 2.5 H, C = 45 μF
    c) R = 15 Ω, L = 3.5 H, C = 30 μF d) R = 25 Ω, L = 1.5 H, C = 45 μF
82. Which of the following statements is not correct?
    a)
    Whenever the amount of magnetic flux linked with a circuit changes, an emf is induced in the circuit.
    b) The induced emf lasts so long as the change in magnetic flux continues.
    c) The direction of induced emf is given by Lenz's law.
    d) Lenz's law is a consequence of the law of conservation of momentum.

83. **Assertion:** The inductive reactance limits amplitude of the current in a purely inductive circuit.
Reason: The inductive reactance is independent of the frequency of the current.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertionand reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false d) If both assertion and reason are false

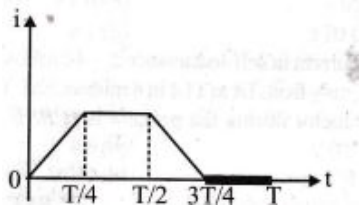
84. The energy stored in an inductor of self inductance L henry carrying a current of I ampere is
a) $\frac{1}{2}L^2I$ b) $\frac{1}{2}LI^2$ c) LI^2 d) L^2I

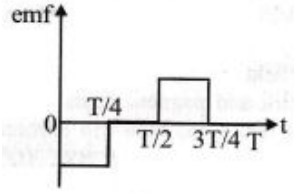
85. The dimensions of magnetic flux are:
a) $[MLT^{-2}A^{-2}]$ b) $[ML^2T^{-2}A^{-2}]$ c) $[ML^2T^{-2}A^{-1}]$ d) $[ML^2T^{-2}A^{-2}]$

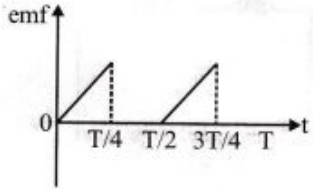
86. An inductor of 30 mH is connected to a 220 V, 100 Hz ac source. The inductive reactance is :
a) 10.58 Ω b) 12.64 Ω c) 18.85 Ω d) 22.67 Ω

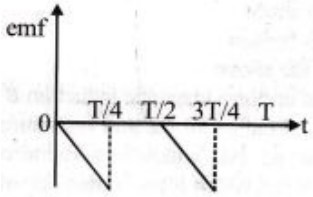
87. A metallic rod of mass per unit length 0.5 kg/m is lying horizontally on a smooth inclined plane which makes an angle of 30° with the horizontal. The rod is not allowed to slide down by flowing a current through it when a magnetic field of induction 0.25 T is acting on it in the vertical direction. The current flowing in the rod to keep is stationary is :
a) 7.14 A b) 5.98 A c) 14.76 A d) 11.32

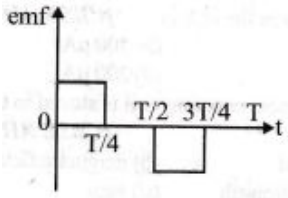
88. The current i in a coil varies with time as shown in the figure, The variation of induced emf with time would be _____.



a)


b)


c)


d)


89. There is a uniform magnetic field directed perpendicular and into the plane of the paper. An irregular shaped conducting loop is slowly changing into a circular loop in the plane of the paper. Then
a) current is induced in the loop in the anti-clockwise direction
b) current is induced in the loop in the clockwise direction. c) ac is induced in the loop.
d) no current is induced in the loop.

90. An inductor may store energy in _____.
a) its electric field b) its coils c) it magnetic field d) Both in electric and magnetic fields

91. As the frequency of an ac circuit increases, the current first increases and then decreases. What combination of circuit elements is most likely to comprise the circuit?
    a) Resistor and inductor b) Resistor and capacitor c) Resistor, inductor and capacitor
    d) None of these

92. **Assertion:** An ideal transformer does not vary the power.
    Reason: A transformer is used to step-up or stepdown ac voltages.
    a) If both assertion and reason are true and reason is the correct explanation of assertion.
    b) If both assertionand reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.

93. For a series LCR circuit, the power loss at resonance is:
    a) $V^2/\omega L$-$1/\omega C$ b) $I^2C\omega$ c) I^2R d) $V^2/\omega C$

94. A transistor-oscillator using a resonant circuit with an inductor L (of negligible resistance) and a capacitor C in series produce oscillations of frequency f. If L is doubled and C is changed to 4 C, the frequency will be _____
    a) 8 f b) $f/2\sqrt{2}$ c) f / 2 d) f / 4

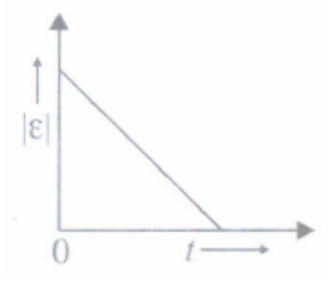
95. A step down transformer converts transmission line voltage from 11000 V to 220 V The primary of the transformer has 6000 turns and efficiency of the transformer is 60 %. If the output power' is 9 kW, then the input power will be.
    a) 11kW b) 12kW c) 14kW d) 15kW

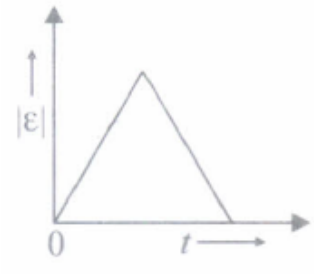
96. A coil of mean area 500 cm^2 and having 1000 turns is held perpendicular to a uniform field of 0.4 gauss. The coil is turned through 180^0 $\frac{1}{10}$ in second. The average induced emf is
    a) 0.02 V b) 0.04 V c) 1.4 V d) 0.08 V

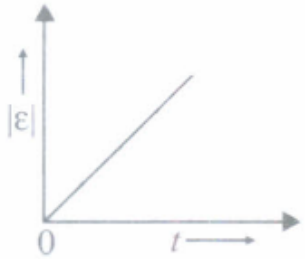
97. What is the mechanical equivalent of spring constant k in LC oscillating circuit
    a) $\frac{1}{L}$ b) $\frac{1}{C}$ c) $\frac{L}{C}$ d) $\frac{1}{LC}$

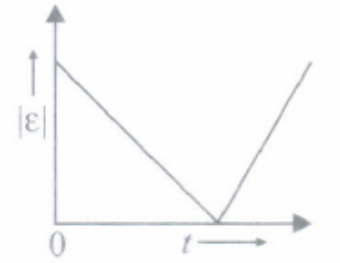
98. In a series resonant circuit, having L, C and R as its elements, the resonant current is i. The power dissipated in the circuit at resonance is____
    a) $\frac{i^2R}{\left(\omega L-\frac{1}{\omega C}\right)}$ b) Zero c) $i^2\omega L$ d) i^2R

99. A long solenoid S has n turns per metre, withdiameter a. At the centre of this coil, we place a smaller coil of N turns and diameter b (b < a). If the current in the solenoid increases linearly with time, then the emf will be induced in the smaller coil. Which of the following is the correct graph showing $|\varepsilon|$ verses t if current varies as a function of mt^2 + C?

a) 

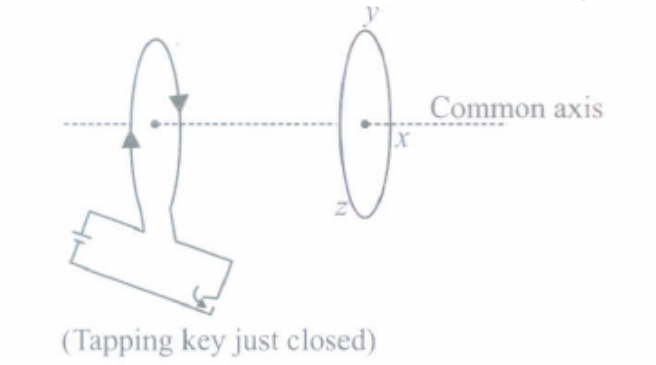
b) 

c) 

d) 

100. When a voltage measuring device is connected to ac mains, the meter shows the steady input voltage of 220 V ThIs means
a) input voltage cannot be ac voltage, but a dc voltage. b) maximum input voltage is 220 V
c) the meter reads not v but v^2 and is calibrated to read $\sqrt{V^2}$.
d) the pointer of the meter is stuck by some mechanical defect.

101. The direction of induced current in the right loop in the situation shown by the given figure is



a) along the common axis b) along *xzy* c) along *xyz* d) none of these

102. The self inductance L of a solenoid of length l and area of cross-section A, with a fixed number of turns N increases as
a) l and A increase. b) l decreases and A increases. c) l increases and A decreases.
d) both l and A decrease.

103. A metallic rod of 1 m length is rotated with a frequency of 50 revolution per second, with one end hinged at the centre and the other end at the circumference of a circular metallic ring of radius 1 m about an axis passing through the centre and perpendicular to the plane of the ring. A constant uniform magnetic field of 1 T parallel to the axis is present everywhere. The emf between the centre and the metallic ring is
a) 157 V b) 117 V c) 127 V d) 137 V

104. A coil of inductive reactance 31 W has a resistance of 8 W. It is placed in series with a condenser of capacitative reactance 25 W. The combination is connected to an a.c. source of 110 volt. The power factor of the circuit is____
a) 0.64 b) 0.80 c) 0.33 d) 0.56

105. A 0.2 kΩ resistor and 15 μF capacitor are connected in series to a 220 V, 50 Hz ac source. The impedance of the circuit is
a) 250Ω b) 268Ω c) 29.15Ω d) 291.5Ω

106. In a region of uniform magnetic induction. B = 10^{-2} T, a circular coil of radius 30 cm and resistance p^2 ohm is rotated about an axis which is perpendicular to the direction of Band 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) $4p^2$ μA b) 300 μA c) 6 μA d) 200 μA

107. In a series LCR circuit, the phase difference between the voltage and the current is 45°. Then the power factor will be
a) 0.607 b) 0.707 c) 0.808 d) 1

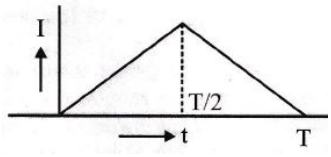
108. The average power dissipated in a pure inductor of inductance L when an ac current is passing through it, is
a) 1/2 LI^2 b) 1/4 LI^2 c) 2 LI^2 d) Zero

109. For high frequency, a capacitor offers:
a) More reactance b) Less reactance c) Zero reactance d) Infinite reactance

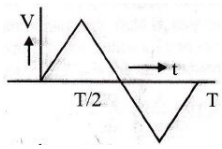
110. A current of 1 A through a coil of inductance of 200 mH is increasing at a rate of 0.5A S^{-1}. The energy stored in the inductor per second is
a) 0.5 J S^{-1} b) 5.0 J S^{-1} c) 0.1 J S^{-1} d) 2.0 J S^{-1}

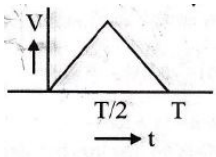
111. In a transformer the transformation ratio is 0.3. If 220 V ac is fed to the primary, then the voltage across the secondary is
a) 44 V b) 55 V c) 60 V d) 66 V

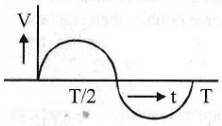
112. The current (f) in the inductance is varying with time according to the plot shown in figure.

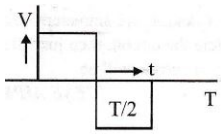


Which one of the following is the correct variation of voltage with time in the coil?

a) 

b) 

c) 

d) 

113. A 100 μH coil carries a current of 1 A. Energy stored in its magnetic field is _____.
a) 0.5 J b) 1 A c) 0.05 J d) 0.1 J

114. **Assertion:** The capacitive reactance limits the amplitude of the current in a purely capacitive circuit.
Reason: Capacitive reactance is proportional to the frequency and the capacitance
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertionand reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

115. An ideal inductor is in turn put across 220 V, 50 Hz and 220 V, 100 Hz supplies. The current flowing through it in the two cases will be
a) equal b) different c) zero d) infinite

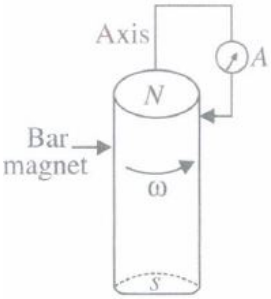
116. A 60 W load is connected to the secondary of an ideal transformer whose primary draws line voltage. If a current of 0.54 A flows in the load, the current in the primary coil is :
a) 0.27 mA b) 2.7 A c) 0.27 A d) 10 A

117. Assertion: Sensitive electrical instruments should not be placed in the vicinity of an electromagnet.
Reason: Electromagnet can damage the instruments.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

118. A conducting loop is placed in a uniform magnetic field with its plane perpendicular to the field. An emf is induced in the loop if
a) it is rotated about its axis. b) it is rotated about a diameter. c) it is not moved.
d) it is given translational motion in the field

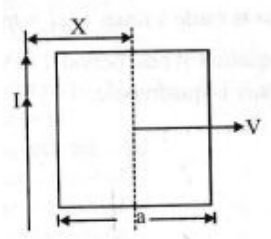
119. A solenoid has 2000 turns wound over a length of 0.30 metre. The area of its cross-section is 1.2×10^{-3} m^2. Around its central section, a coil of 300 turns is wound. If an initial current of 2 A in the solenoid is reversed in 0.25 sec, then the e.m.f. induced in the coil is :
a) 6×10^{-4} V b) 4.8×10^{-3} V c) 6×10^{-2} V d) 48 m V

120. A cylindrical bar magnet is rotated about its axis as shown in figure. A wire is connected from the axis and is made to touch the cylindrical surface through a contact. Then



a) a direct current flows in the ammeter A b) no current flows through the ammeter A.
c) an alternating sinusoidal current flows through the ammeter A with a time period, T= $\frac{2\pi}{\varpi}$
d) a time varying non-sinusoidal current flows through the ammeter A.

121. A conducting square frame of side 'a' and a long straight wire carrying current 1 are located in the same plane as shown in the figure. The frame moves to the right with a constant velocity 'V'. The emf induced in the frame will be proportional to _____.



a) $\frac{1}{(2x-a)^2}$ b) $\frac{1}{(2x+a)^2}$ c) $\frac{1}{(2x-a)(2x+a)}$ d) $\frac{1}{x^2}$

122. An ac source of voltage V = Vm sinoir is connected across the resistance R as shown in figure. The phase relation between current and voltage for this circuit is

a) both are in phase b) both are out of phase by 90° c) both are out of phase by 120°
d) both are out of phase by 180°

123. The equivalent quantity of mass in electricity is
a) current b) self inductance c) potential d) charge

124. Find the inductance of a unit length of two long parallel wires, each of radius a, whose centers are a distance d apart and carry equal currents in opposite directions. Neglect the flux within the wire.
a) $\frac{\mu_0}{2\pi}1n\left(\frac{d-a}{a}\right)$ b) $\frac{\mu_0}{\pi}1n\left(\frac{d-a}{a}\right)$ c) $\frac{3\mu_0}{\pi}1n\left(\frac{d-a}{a}\right)$ d) $\frac{\mu_0}{3\pi}1n\left(\frac{d-a}{a}\right)$

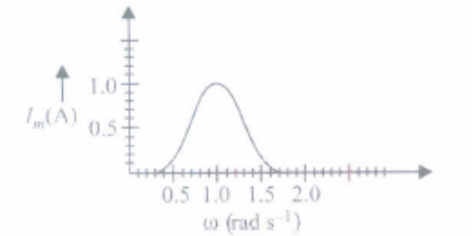
125. Eddy currents are produced when _____ .
a) a metal is kept in varying magnetic field b) a metal is kept in steady magnetic field
c) a circular coil is placed in a magnetic field d) current is passed through a circular coil

126. Assertion: Inductance coils are made of copper.
Reason: Induced current is more in wire having less resistance.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

127. Assertion: An important application of electromagnetic induction is ac generator.
Reason: The direction of current changes periodically and therefore the current is called alternating current.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

128. If the rms current in a 50 Hz ac circuit is 5 A, the value of the current 1/300 seconds after its value becomes zero is
a) $5\sqrt{2}A$ b) $5\sqrt{\frac{3}{2}}A$ c) $\frac{5}{6}A$ d) $\frac{5}{\sqrt{2}}A$

129. In a series LCR circuit, the plot of I_m vs (j) is shown in the figure. The bandwidth of this plot will be



a) zero b) 0.1 rad s^{-1} c) 0.2 rad s^{-1} d) 0.4 rad s^{-1}

130. A small town with a demand of 800 kW of electric power at 220 V is situated 15 km away from an electric plant generating power at 440 V The resistance of the two wire line carrying power is 0.5 Ω per km. The town gets power from the line through a 4000-220 V step down transformer at a substation in the town. The line power loss in the form of heat is :
a) 400 kW b) 600 kW c) 300 kW d) 800 W

131. The north pole of a bar magnet is rapidly introduced into a solenoid at one end (say A). Which of the following statements correctly depicts the phenomenon taking place?
a) No induced emf is developed. b) The end A of the solenoid behaves like a south pole.
c) The end A of the solenoid behaves like north pole.
d) The end A of the solenoid acquires positive potential.

132. A square loop of side 12 ern and resistance 0.60.Q is placed vertically in the east-west plane. A uniform magnetic field of 0.10 T is set up across the plane in north-east direction. The magnetic field is decreased to zero in 0.6 s at a steady rate. The magnitude of current during this time interval is
a) 1.42 x 10^{-3} A b) 2.67 x 10^{-3} A c) 3.41 x 10^{-3} A d) 4.21 x 10^{-3} A

133. If N is the number of turns in a coil, the value of self-inductance varies a _____.
a) N^0 b) N c) N^2 d) N^{-2}

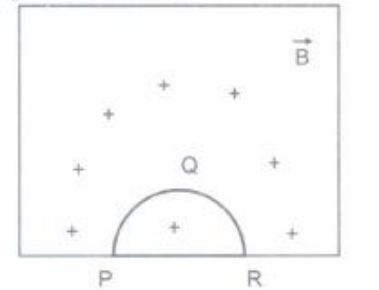
134. Assertion: An ac generator is based on the self inductance of the coil.
Reason: Self inductance involves two coils.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

135. A voltage of peak value 283 V and varying frequency is applied to series LCR combination in which R = 3Ω , L = 25 mH and C = 400 μ F. Then the frequency (in Hz) of the source at which maximum power is dissipated in the above is
a) 51.5 b) 50.7 c) 51.1 d) 50.3

136. The primary and secondary coil of a transformer have 50 and 1500 turns respectively. If the magnetic flux flinked with the primary coil is given by $\phi = \phi_0 + 4t$, where f is in webers, t is time in seconds and f_0 is a constant, the output voltage across the secondary coil is _____
a) 120 volts b) 220 volts c) 30 volts d) 90 volts

137. The magnetic flux linked with a coil of N turns of area of cross section A held with its plane parallel to the field B is
a) $\frac{NAB}{2}$ b) NAB c) $\frac{NAB}{4}$ d) zero

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



a) Zero b) Bvπr^2/2 and P is at higher potential c) πrBv and R is at higher potential
d) 2rBv and R is at higher potential

139. A coil of resistance 400 W is placed in a magnetic field. If the magnetic flux f, (wb) linked with the coil varies with time t (sec) as $f = 50t^2 + 4$. The current in the coil at t = 2 sec is :
a) 0.5 A b) 0.1 A c) 2 A d) 1 A

140. In the question number 3, the net power consumed over a full cycle is
a) 586 W b) 242 W c) 48.4 W d) 484 W

141. **Assertion:** A laminated core is used in transformers to increase eddy currents.
Reason : The efficiency of a transformer increases with increase in eddy currents.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertionand reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

142. Two conducting circular loops of radii R_1 and R_2 are placed in the same plane with their centres coinciding. If $R_1 > R_2$ the mutual inductance M between them will be directly proportional to
a) $\frac{R_1}{R_2}$ b) $\frac{R_2}{R_1}$ c) $\frac{R_1^2}{R_2}$ d) $\frac{R_2^2}{R_1}$

143. A condenser of capacity C is charged to a potential difference of V_1. The plates of the condenser are then connected to an ideal inductor of inductance L. The current through the inductor when the potential difference across the condenser reduces to V_2 is
a) $\left(\frac{C(V_1-V_2)^2}{L}\right)^{1/2}$ b) $\frac{C(V_1^2-V_2^2)}{L}$ c) $\frac{C(V_1^2+V_2^2)}{L}$ d) $\left(\frac{C(V_1^2-V_2^2)}{L}\right)^{1/2}$

144. Transformer is used to
a) convert ac to dc voltage b) convert dc to ac voltage c) obtain desired dc power
d) obtain desired ac voltage and current

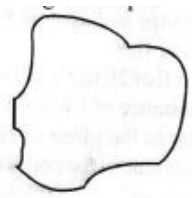
145. What is the self-inductance of a coil which produces 5V when the current changes from 3A to 2A in one millisecond?
a) 5000 H b) 5 mH c) 50 H d) 5 H

146. Induction furnace make use of
a) self induction b) mutual induction c) eddy current d) none of these

147. A wheel with 20 metallic spokes each of length 0.8 m long is rotated with a speed of 120 revolution per minute in a plane normal to the horizontal component of earth magnetic field H at a place. If $H = 0.4 \times 10^{-4}$ T at the place, then induced emf between the axle and the rim of the wheel is
a) 2.3×10^{-4} V b) 3.1×10^{-4} V c) 2.9×10^{-4} V d) 1.61×10^{-4} V

148. In the question number II, the peak voltage of the source is
a) 305 V b) 310 V c) 311 V d) 315 V

149. As a result of change in the magnetic flux linked to the closed loop shown in the Fig., an e.m.f. V volt is induced in the loop. The work done (oules) in taking a charge e coulomb once along the loop is _____.



a) QV b) 2QV c) QV/2 d) Zero

150. When a wire loop is rotated in a magnetic field, the direction of induced emf changes in every
a) one revolution b) $\frac{1}{2}$revolution c) $\frac{1}{4}$revolution d) 2 revolution

151. Identify the wrong statement.
a) Eddy currents are produced in a steady magnetic field.
b) Eddy currents can be minimized by using laminated core.
c) Induction furnace uses eddy current to produce heat.
d) Eddy current can be used to produce braking force in moving trains.

152. A 2 m long metallic rod rotates with an angular frequency of 200 rad s^{-1} about an axis normal to the rod passing through its one end. The other end of the rod is in contact with a circular metallic ring. A constant magnetic field of 0.5 T parallel to the axis exists everywhere. The emf developed between the centre and the ring is
a) 100 V b) 200 V c) 300 V d) 400 V

153. In the question number 44, the phase difference between the voltage across the source and current is
a) 80.2° b) 31° c) 50.2° d) 38.2°

154. A circuit consists of a resistance of 10 Ω and a capacitance of 0.1 μF If an alternating emf of 100 V, 50 Hz is applied, the current in the circuit is
a) 3.14mA b) 6.28mA c) 1.51mA d) 7.36mA

155. Assertion: Eddy currents heat up the core and dissipate electrical energy in the form of heat.
Reason: Eddy currents are always undesirable.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

156. A circular coil of radius 6 em and 20 turns rotates about its vertical diameter with an angular speed of 40 rad S^{-1} in a uniform horizontal magnetic field of magnitude 2 x 10^{-2} T. If the coil form a closed loop of resistance 8 Ω , then the average power loss due to joule heating is
a) 2.07 x 10^{-3} W b) 1.23 x 10^{-3} W c) 3.14 x 10^{-3} W d) 1.80 x 10^{-3} W

157. 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

158. A boy peddles a stationary bicycle the pedals of the bicycle are attached to a 200 turn coil of area 0.10 m^2. The coil rotates at half a revolution per second and it is placed in a uniform magnetic field of 0.02 T perpendicular to the axis of rotation of the coil. The maximum voltage generated in the coil is :
a) 3.24 V b) 4.12 V c) 1.26 V d) 2.16 V

159. In which of the following circuits the maximum power dissipation is observed?
a) Pure capacitive circuit b) Pure inductive circuit c) Pure resistive circuit
d) None of these

160. Assertion : An electric motor converts electrical energy to mechanical energy.
Reason: The working of the motor is based on mutual induction.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

161. To reduce the resonant frequency in an LCR series circuit with a generator
a) the generator frequency should be reduced.
b) another capacitor should be added in parallel to the first.
c) the iron core of the inductor should be removed.
d) dielectric ill the capacitor should be removed.

162. A square of side x m lies in the x-y plane in a region, where "r"e the magnetic field is given by $\vec{B} = Bb_0(3\hat{i} + 4\hat{j} + 5\hat{k})$T, where Bo is constant. The magnitude of flux passing through the square is:
a) $5B_0$ X^2 Wb b) $3B_0$ X^2 Wb c) $2B_0$ X^2 Wb d) B_0 X^2 Wb

163. A small square loop of wire of side 1 is placed inside a large square loop of wire of side L (>> I). The loops are coplanar and their centres coincide. What is the mutual inductance of the system?
a) $2\sqrt{2}\frac{\mu_0}{\pi}\frac{l^2}{L}$ b) $8\sqrt{2}\frac{\mu_0}{\pi}\frac{l^2}{L}$ c) $2\sqrt{2}\frac{\mu_0}{2\pi}\frac{l^2}{L}$ d) $2\sqrt{2}\frac{\mu_0 L^2}{2\pi l}$

164. A copper ring is held horizontally and a bar magnet is dropped through the ring with its length along the axis of the ring. The acceleration of the falling magnet while it is passing through the ring is :
a) Equal to that due to gravity b) Less than that due to gravity
c) More than that due to gravity
d) Depends on the diameter of the ring and the length of the magnet

165. A resistance ' R ' draws power ' P ' when connected to an A C source. If an inductance is now placed in series with the resistance, such that the impedance of the circuit beoomes ' Z ' the power drawn will be _____ .
a) $P\sqrt{\frac{R}{Z}}$ b) $P\left(\frac{R}{Z}\right)$ c) P d) $p\left(\frac{R}{Z}\right)^2$

166. The time constant C-R circuit is_____
a) 1/CR b) C/R c) CR d) R/C

167. 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,

168. In a circuit L, C and R are connected in series with an alternating voltage source of frequency f. The current leads the voltage by 45°.The value of C is
a) 1/2πf(2πfL+R) b) 1/πf(2πfL+R) c) 1/2πf(2πfL-R) d) 1/πf(2πfL-R)

169. 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 $\frac{1}{4}$ times d) remains unchanged

170. When an ac voltage of 220 V is applied to the capacitor C, then
a) the maximum voltage between plates is 220 V.
b) the current is in phase with the applied voltage
c) the charge on the plate is not in phase with the applied voltage.
d) power delivered to the capacitor per cycle is zero.

171. A series LCR circuit has R = 5 Ω, L = 40 mH and C = 1 μF, the bandwidth of the circuit is :
a) 10 Hz b) 20 Hz c) 30 Hz d) 40 Hz

172. An alternating voltage (in volts) given by V =200 $\sqrt{2}$sin(100t) is connected to 1 μF capacitor through an ideal ac ammeter in series. The reading of the ammeter and the average power consumed in the circuit shall be
a) 20 mA, 0 b) 20 mA, 4 W c) 20$\sqrt{2}$ A,8W d) 20$\sqrt{2}$ mA, 4$\sqrt{2}$ W

173. In an A.C. circuit containing only capacitance, the current:
a) leads the voltage by 180° b) lags the voltage by 90° c) leads the voltage by 90°
d) remains in phase with the voltage

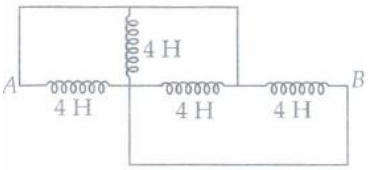
174. A 2 m long solenoid with diameter 2 cm and 2000 turns has a secondary coil of 1000 turns wound closely near its midpoint. The mutual inductance between the two coils is:
a) 2.4 x 10^{-4} H b) 3.9 x 10^{-4} H c) 1.28 x 10^{-3} H d) 3.14 x 10^{-3} H

175. The rms value of current in an ac circuit is 25 A, then peak current is
a) 35.36 mA b) 35.36 A c) 3.536 A d) 49.38 A

176. An L C R series circuit is connected to a source of alternating current. At resonance, the applied voltage and the current flowing through the circuit will have a phase difference of_____
a) π b) $\frac{\pi}{2}$ c) $\frac{\pi}{4}$ d) Zero

177. **Assertion:** Resonance is exhibited by a circuit only if both L and C are present in the circuit.
Reason: Only then the voltage across Land Ccancel each other, both being out of phase.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertionand reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

178. The equivalent inductance between A and B is



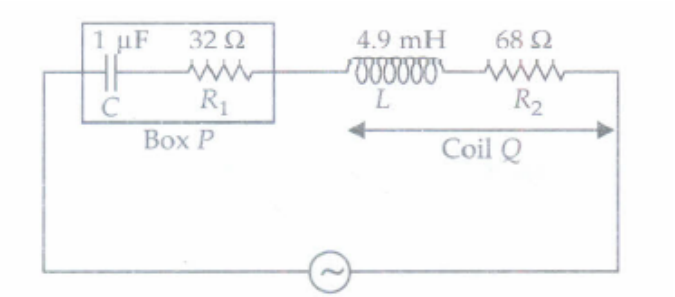
a) 1 H b) 4 H c) 0.8 H d) 16 H

179. In the question number 96, the number of turns in the secondary is
a) 20 b) 80 c) 120 d) 160

180. For an ideal step-down transformer, the quantity which is constant for both the coils is
a) current in the coils b) voltage across the coils c) resistance of coils
d) power in the coils

181. If a capacitor of 8 μF is connected to a 220 V, 100 Hz ac source and the current passing through it is 65 mA, then the rms voltage across it is
a) 129.4 V b) 12.94 V c) 1.294 V d) 15 V

182. A box P and a coil Ω are connected in series with an ac source of variable frequency. The emf of source is constant at 10 V.Box P contains a capacitance of $1\mu F$ in series with a resistance of 32 Ω. Coil Q has a self inductance 4.9 mH and a resistance 68 Ω in series. The frequency is adjusted so that the maximum current flows in P and Q. At this frequency the voltage across P and Q respectively



a) 9.76 V, 8.92 V b) 6.29 V, 7.96 V c) 7.70 V, 10.92 V d) 7.70 V, 9.76 V

183. In a pure capacitive circuit if the frequency of ac source is doubled, then its capacitive reactance will be

a) remains same b) doubled c) halved d) zero

184. In a uniform magnetic field B a wire in the form of a semicircle of radius r rotates about the diameter of the circle with angular frequency ω. The axis of rotation is perpendicular to the field. If the total resistance of the circuit is R, the mean power generated per period of rotation is

a) $\frac{B\pi r^2}{2R}$ b) $\frac{(B\pi r^2\omega)^2}{8R}$ c) $\frac{(B\pi r\omega)^2}{2R}$ d) $\frac{(B\pi r\omega^2)^2}{8R}$

185. The rms value of potential difference V shown in the figure is

a) $\frac{V_0}{\sqrt{2}}$ b) $\frac{V_0}{2}$ c) $\frac{V_0}{\sqrt{3}}$ d) V_0

186. In an inductor of self-inductance L = 2 mH. current changes with time according to relation $\hat{i}$ = t^2 - e^{-1}. At what time emf is zero?

a) 4s b) 3s c) 2s d) 1s

187. In an experiment, 200 V AC is applied at the ends of an LCR circuit. The circuit consists of an inductive reactance.

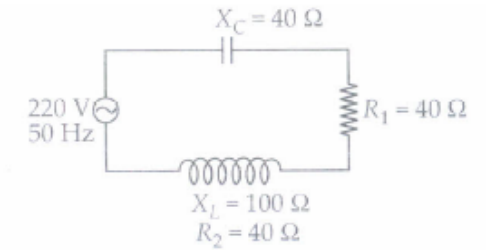
$(X_\nu) = 50$ W, capacitive reactance

$(X_C) = 50$ W and ohmic resistance

(R)=10 W. The impedance of the circuit is____

a) 10 W b) 20 W c) 30 W d) 40 W

188. The power factor of the circuit as shown in figure is



a) 0.2 b) 0.4 c) 0.8 d) 0.6

189. **Assertion:** The only element that dissipates energy in an ac circuit is the resistive element.
Reason: There are no power lossesassociated with pure capacitances and pure inductances in an ac circuit.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertionand reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

190. A rectangular loop of sides 6 cm and 2 ern with a small cut is moving out of a region of uniform magnetic field of magnitude 0.4 T directed normal to the loop. The voltage developed across the cut if velocity of loop is 2 cm s^{-1} in a direction normal to the longer side is
a) 3.8 x 10^{-4} V b) 4.8 x 10^{-4} V c) 2.2 x 10^{-2} V d) 3.2 x 10^{-2} V

191. In electromagnetic induction, the induced e.m.f. in a coil is independent of
a) Change in the flux b) Time c) Resistance of the circuit d) None of the above

192. An LC circuit contains a 20 mH inductor and a 50 μF capacitor with an initial charge of 10 mC. The resistance of the circuit is negligible. Let the instant at which the circuit which is closed be t = 0. At what time the energy stored is completely magnetic?
a) t = 0 b) t = 1.54 ms c) t = 3.14 ms d) t = 6.28 ms

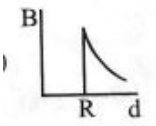
193. A transformer is used to light a 100 W and 110 V lamp from a 220 V mains. If the main current is 0.5 amp, the efficiency of the transformer is approximately_____
a) 50% b) 90% c) 10% d) 30%

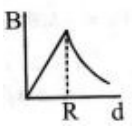
194. The working of a generator is based upon
a) magnetic effect of current b) heating effect of current c) chemical effect of current
d) electromagnetic induction

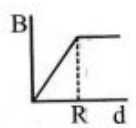
195. A long circular tube of length 10m and radius 0.3 m carries a current I along its curved surface as shown. A wire-loop of resistance 0.005 ohm and of radius 0.1 m is placed inside the tube with its axis coinciding with the axis of the tube.

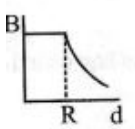
The current varies as I = $I_0\cos(300t)$ where I_0 is constant. If the magnetic moment of the loop is $N\mu_0 I_0\sin(300t)$, then N is
a) 3 b) 4 c) 5 d) 6

196. A cylindrical conductor of radius R is carrying a constant current. The plot of the magnitude of the magnetic field, B with the distance d from the centre of the conductor is correctly represented by the figure: _____.

a) 

b) 

c) 

d) 

197. By a change of current from 5 A to 10A in 0.1 s, the self induced emf is 10V. The change in the energy of the magnetic field of a coil will be
a) 5 J b) 6 J c) 7.5 J d) 9 J

198. A copper rod of length *l* rotates about its end with angular velocity ro in a uniform magnetic field B. The emf developed between the ends of the rod if the field is normal to the plane of rotation is

a) $B\omega l^2$ b) $\frac{1}{2}B\omega l^2$ c) $2B\omega l^2$ d) $\frac{1}{4}B\omega l^2$

199. A series R-C combination is connected to an AC voltage of angular frequency ω = 500 radian/s. If the impedance of the R-C circuit is $R\sqrt{1.25}$, the time constant (in millisecond) of the circuit is
a) 2 b) 3 c) 4 d) 5

200. The physical quantity which is measured in the unit of Wb A^{-1} is
a) self inductance b) mutual inductance c) magnetic flux d) both (a) and (b)

201. The magnetic flux through a circuit of resistance -R changes by an amount Df in a time Dt. Then the total quantity of electric charge e that passes any point in the circuit during the time Dt is represented by _____.
a) $Q = R \cdot \frac{\Delta\phi}{\Delta t}$ b) $Q = \frac{1}{R} \cdot \frac{\Delta\phi}{\Delta t}$ c) $Q = \frac{\Delta\phi}{R}$ d) $Q = \frac{\Delta\phi}{\Delta t}$

202. An air cored solenoid with length 20 cm, area of cross section 20 cm^2 and number of turns 400 carries a current 2 A. The current is suddenly switched off within 10^{-3} s. The average back emf induced across the ends of the open switch in the circuit is (ignore the variation in magnetic field near the ends of the solenoid)
a) 2 V b) 4 V c) 3 V d) 5 V

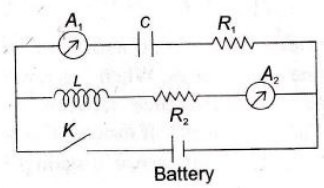
203. Two coils have self-inductance L_1 = 4 mH and L_2 = 1 mH respectively. The currents in the two coils are increased at the same rate. At a certain instant of time both coils are given the same power. If I_1 and I_2 are the currents in the two coils at that instant of time respectively, then the value of $\frac{I_1}{I_2}$ is
a) $\frac{1}{8}$ b) $\frac{1}{4}$ c) $\frac{1}{2}$ d) 1

204. An alternating voltage E = 200 $\sqrt{2}$ sin 100t 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

205. The instantaneous values of alternating curfent and voltages in a circuit are given as
$i = \frac{1}{\sqrt{2}}\sin(100\pi t)$ ampere
$e = \frac{1}{\sqrt{2}}\sin(100\pi t + \pi/3)$ volt
The average power in Watts consumed in the circuit is____
a) 1/4 b) $\frac{\sqrt{3}}{4}$ c) 1/2 d) 1/8

206. A power transmission line feeds input power at 2400 V to a step down transformer with its primary windings having 4000 turns. What should be the number of turns in the secondary windings in order to get output power at 240 V?
a) 400 b) 420 c) 424 d) 436

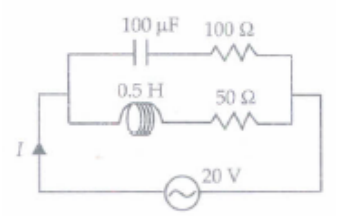
207. In a circuit inductance L and capacitance C are connected as shown in figure. A_1 and A_2 are ammeters. When key K is pressed to complete the circuit, then just after closing key (K), the reading of current will be _____ .



a) zero in both A_1 and A_2 b) maximum in both A_1 and A_2 c) zero in A_1 and maximum in A_2 d) maximum in A_1 and zero in A_2

208. In the question number 30, the net power absorbed by the circuit in one complete cycle is
a) 5 W b) 10 W c) 15 W d) zero

209. In the given circuit, the ACsource has *w* = 100 rad/s. Considering the inductor and capacitor to be ideal, the correct choice is



a) the current through the circuit, I is 0.3 A b) the current through the circuit, I is $0.3\sqrt{2}$ A
c) the voltage across 100 Ω resistor = 10 V. d) the voltage across 50 Ω resistor = 10 V.

210. Choke coil is used to control:
a) ac b) dc c) Both ac and de d) Neither ac nor dc

211. The mutual inductance M_{12} of a coil 1 with respect to coil 2
a) increases when they are brought nearer.
b) depends on the current passing through the coils.
c) increases when one of them is rotated about an axis. d) both (a) and (b) are correct.

212. A solenoid of length 30 cm with 10 turns per centimetre and area of cross-section 40 cm^2 completely surrounds another co-axial solenoid of same length, area of cross-section 20 cm^2 with 40 turns per centimetre. The mutual inductance of the system is
a) 10 H b) 8 H c) 3 mH d) 30 mH

213. The self inductance of a coil having 400 turns is 10 m/I. The magnetic flux through the cross section of the coil corresponding to current 2 mA is :
a) 4×10^{-5} Wb b) 2×10^{-3} Wb c) 3×10^{-5} Wb d) 8×10^{-3} Wb

214. A circuit area 0.01 m^2 is kept inside a magnetic field which is normal to its plane. The magnetic field changes from 2 tesla to 1 tesla in 1 millisecond. If the resistance of the circuit is 2 Ω. The rate of heat evolved is
a) 5 J/s. b) 50 J/s c) 0.05 J/s d) 0.5 J/s

215. A metal conductor of length 1 m rotates vertically about one of its ends with an angular velocity 5 rad S^{-1}. If the horizontal component of earth's magnetic field is 0.2×10^{-4} T, then the emf developed between the ends of the conductor is
a) 5 μV b) 5 mV c) 50 μV d) 50 mV

216. An alternating current generator has an internal 5. resistance Rg and an internal reactance X_g- It is used to supply power to a passive load consisting of a resistance Rg and a reactance X_L For maximum power to be delivered from the generator to the load, the value of X_L is equal to
a) zero b) Xg c) -Xg d) Rg

217. An ac voltage is applied to a resistance R and an inductor L in series. If R and the inductive reactance are both equal to 3 W, the phase difference between the applied voltage and the current in the circuit is____

a) $\pi/6$ b) $\pi/4$ c) $\pi/2$ d) zero

218. In a series L-R circuit (L = 35 mH and R = 11 Ω), a variable emf source (V = Vo sin rot) of Vrms = 220 V and frequency 50 Hz is applied. The current amplitude in the circuit is
a) 10 A b) 20 A c) 30 A d) 40 A

219. The magnetic potential energy stored in a certain inductor is 25 mJ, when the current in the inductor is 60 mA. This inductor is of inductance.
a) 1.389H b) 138.88H c) 0.138H d) 13.89H

220. A current of 2.5 A flows through a coil of inductance 5 H. The magnetic flux linked with the coil is _____.
a) 2 wb b) 0.5 wb c) 12.5 wb d) Zero

221. 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 the current in the circuit is $\frac{\pi}{3}$. If instead, C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$. The power factor of the circuit is
a) $\frac{1}{2}$ b) $\frac{1}{\sqrt{2}}$ c) 1 d) $\frac{\sqrt{3}}{2}$

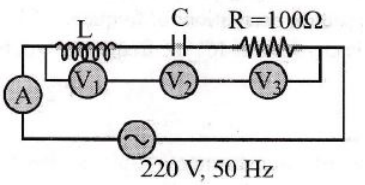
222. A circular loop of radius 0.3 cm lies parallel to a much bigger circular loop of radius 20 cm. The centre of the small loop is on the axis of the bigger loop. The distance between their centres is 15 cm. If a current of 2.0 A flows through the smaller loop, then the flux linked with bigger loop is
a) 6.6 x 10^{-9} weber b) 9.1 x 10^{-11} weber c) 6 x 10^{-11} weber d) 3.3 x 10^{-11} weber

223. A choke coil should have:
a) high resistance and low inductance b) high resistance and high inductance
c) low resistance and high inductance d) low resistance and low inductance

224. A rod of length l rotates with a uniform angular velocity co about an axis passing through its middle point but normal to its length in a uniform magnetic field of induction B with its direction parallel to the axis of rotation. The induced emf between the two ends of the rod is
a) $\frac{Bl^2\omega}{2}$ b) zero c) $\left(\frac{Bl^2\omega}{8}\right)$ d) $2Bl^2\omega$

225. The loss of energy in the form of heat in the iron core of a transformer is
a) iron loss b) copper loss c) mechanical loss d) none of these

226. In the given circuit the reading of voltmeter V_1 and V_2 are 300 volts each. The reading of the voltmeter V_3 and ammeter A are respectively____



a) 150V, 2.2A b) 220V, 2.0A c) 220V, 2.2A d) 100V, 2.0A

227. The quality factor of LCR circuit having resistance (R) and inductance (L) at resonance frequency (ω) is given by:
a) ωL/R b) R/ωL c) $(\omega L/R)^{1/2}$ d) $(\omega L/R)^2$

228. A metal plate can be heated by

a) passing either a direct or alternating current through the plate.

b) placing in a time varying magnetic field.

c) placing in a space varying magnetic field, but does not vary with time.

d) both (a) and (b) are correct.

229. An LC circuit contains a 40 mH inductor and a 25 μF capacitor. The resistance of the circuit is negligible. The time is measured from the instant the circuit is closed. The energy stored in the circuit is completely magnetic at times (in milliseconds)
a) 0,3.14,6.28 b) 0,1.57,4.71 c) 1.57,4.71,7.85 d) 1.57,3.14,4.71

230. Quality factor and power factor both have the dimensions of
a) time b) frequency c) work d) angle

231. A rectangular coil of 20 turns and area of crosssection 25 sq ern has a resistance of 100 ohm. If a magnetic field which is perpendicular to the plane of the coil changes at the rate of 1000 Tesla per second, the current in the coil is :
a) 1.0 ampere b) 50 ampere c) 0.5 ampere d) 5.0 ampere

232. A thin ring of radius R meter has charge q coulomb uniformly spread on it. The ring rotates about its axis with a constant frequency of f revolutions/so The value of magnetic induction in Wb/m^2 at the centre of the ring is :
a) $\mu_0 qf/2\pi R$ b) $\mu_0 q/2\pi fR$ c) $\mu_0 q/2fR$ d) $\mu_0 qf/2R$

233. **Assertion :** A transformer cannot work on de supply.
Reason : dc changes neither in magnitude nor in direction.
a) If both assertion and reason are true and reason is the correct explanation of assertion.

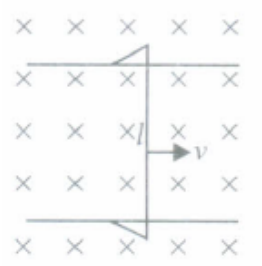
b) If both assertionand reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false

234. The coefficient of mutual inductance of two coils depends on
a) medium between the coils b) distance between the two coils

c) orientation of the two coils d) all of these

235. The figure shows a wire sliding on two parallel conducting rails placed at a separation *l*. A magnetic field B exists in a direction perpendicular to the plane of the rails. The force required to keep the wire moving at a constant velocity *v* will be



a) *evB* b) $\frac{\mu_0 Bv}{4\pi l}$ c) *Blv* d) zero

236. When the number of turns in a coil is doubled without any change in the length of the coil, its self inductance becomes:
a) Four times b) Doubled c) Halved d) Unchanged

237. A resistor of 500 Ω and an inductance of 0.5 H are in series with an ac source which is given by V = $100\sqrt{2}$ sin(1000t). The power factor of the combination is

a) $\frac{1}{\sqrt{2}}$ b) $\frac{1}{\sqrt{3}}$ c) 0.5 d) 0.6

238. A 10 Y battery connected to 5 Ω resistance coil having inductance 10 H through a switch drives a constant current in the circuit. The switch is suddenly opened and the time taken to open it is 2 ms. The average emf induced across the coil is :
a) 4 x 10^4V b) 2 x 10^4V c) 2 x 10^2V d) 1 x 10^4V

239. A rectangular coil of 100 turns and size 0.1 m x 0.05 m is placed perpendicular to a magnetic field of 0.1 T. If the field drops to 0.05 T in 0.05 second, the magnitude of the e.m.f induced in the coil is
a) 2 b) 3 c) 0.5 d) 6

240. In LCR-circuit if resistance increases, quality factor
a) increases finitely b) decreases finitely c) remains constant d) none of these

241. The phase difference between the current and voltage of LCR circuit in series combination at resonance is
a) 0^0 b) π/2 c) π d) -π

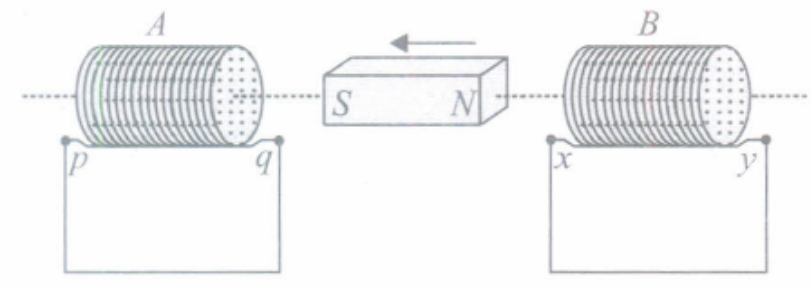
242. A 220 volts input is supplied to a transformer. The output circuit draws a current of 2.0 ampere at 440 volts. If the efficiency of the transformer is 80 %, the current drawn by the primary windings of the transformer is_____
a) 3.6 ampere b) 2.8 ampere c) 2.5 ampere d) 5.0 ampere

243. A conducting metal circular-wire-loop of radius r is placed perpendicular to a magnetic field which varies with time as B = $B_o e^{\frac{t}{\tau}}$ where B_o and τ are constants, at time t = 0. If the resistance of the loop is R then the heat generated in the loop after a long time ($t \rightarrow \infty$) is
a) $\frac{\pi^2 r^4 B_0^4}{2\tau R}$ b) $\frac{\pi^2 r^4 B_0^2}{2\tau R}$ c) $\frac{\pi^2 r^4 B_0^4 R}{\tau}$ d) $\frac{\pi^2 r^4 B_0^2}{\tau R}$

244. A transformer has 100 turns in the primary coil and carries 8 A current. If input power is 1 kW, the number of turns in secondary coil to have 500 V output will be
a) 100 b) 200 c) 400 d) 300

245. The magnetic flux linked with a coil, in webers, is given by the equations $\varphi=3t^2+4t+9$. Then the magnitude of induced e.m.f. at t = 2 second will be:
a) 2 volt b) 4 volt c) 8 volt d) 16 volt

246. The direction of induced current in the coils A and B in the situation shown in the figure is



a) p to q in coil A and x to y in coil B b) q to p in coil A and x to y in coil B
c) P to q in coil A and y to x in coil B d) q to p in coil A and y to x in ceil B

247. An electron is accelerated through a potential difference of 10,000 V. Its de Broglie wavelength is,(nearly) : (m_c = 9 x 10^{31}kg)
a) 12.2 x 10^{-12}m b) 12.2 x 10^{-14} m c) 12.2nm d) 12.2 x 10^{-13} m

248. Assertion: When two coils are wound on each other, the mutual induction between the coils is maximum.
Reason: Mutual induction is independent of the orientation of the coils.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

249. An LCR series ac circuit is at resonance with 10 V each across L, C and R. If the resistance is halved, the respective voltages across L, C and R are
a) 10 V,10 V and 5 V b) 10 V,10 V and 10 V c) 20 V, 20 V and 5 V
d) 20 V, 20 V and 10 V

250. Two solenoids of equal number of turns have their lengths and the radii in the same ratio 1 : 2. The ratio of their self inductances will be
a) 1:2 b) 2:1 c) 1:1 d) 1:4

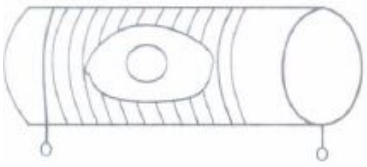
251. The current in self-inductance L = 40 mH is to be increased uniformly from 1 A to 11 A in 4 milliseconds. The emf induced in inductor during the process is _____.
a) 100 V b) 0.4 V c) 4 V d) 440 V

252. In a step up transformer the turn ratio is 1 : 2. A Leclanche cell (emf = 1.5 V) is connected across the primary. The voltage across the secondary is :
a) 3 V b) 1.5 V c) 0.75 V d) zero

253. In an alternating current circuit consisting of elements in series, the current increases on increasing the frequency of supply. Which of the following elements are likely to constitute the circuit?
a) Only resistor b) Resistor and inductor c) Resistor and capacitor d) Only inductor

254. An LC circuit contains a 20 mH inductor and a 25 μF capacitor with an initial charge of 5 mC. The total energy stored in the circuit initially is :
a) 5 J b) 0.5 J c) 50 J d) 500 J

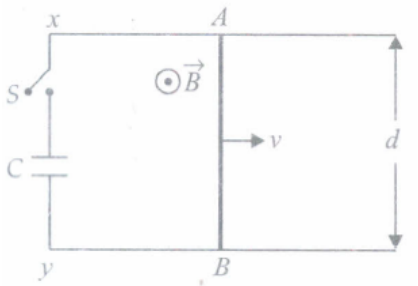
255. A circular coil with a cross-sectional area of 4 cm^2 has 10 turns. It is placed at the centre of a long solenoid that has 15 turns/cm and a cross-sectional area of 10 cm^2 , as shown in the figure. The axis of the coil coincides with the axis of the solenoid. What is their mutual inductance?



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

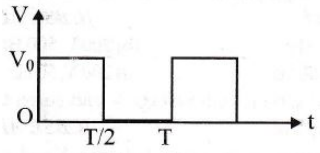
256. An alternating voltage given by V = 140 sin 314t is connected across a pure resistor of 50 Ω, the rms current through the resistor is
a) 1.98 A b) 5.63 A c) 8.43 A d) 2.39 A

257. A sliding rod AB of resistance R is shown in the figure. Here magnetic field B is constant and is out of the paper. Parallel wires have no resistance and the rod is moving with constant velocity v. The current in the sliding rod AB when switch S is closed at time t = 0 is



a) $\frac{vBd}{R}e^{-t/C}$ b) $\frac{vBd}{R}e^{-t/RC}$ c) $\frac{vBd}{R}e^{RtC}$ d) $\frac{vBd}{R}e^{t/RC}$

258. The r.m.s. value of potential difference V shown in the figure is___



a) V_0 b) $V_0\sqrt{2}$ c) $V_0/2$ d) $V_0\sqrt{3}$

259. The primary of a transformer when connected to a de battery of 10 volt draws a current of 1 m. The number of turns of the primary and secondary windings are 50 and 100 respectively. The voltage in the secondary and the current drawn by the circuit in the secondary are respectively____

a) 20 V and 0.5 m A b) 20 V and 2.0 mA c) 10V and 0.5 mA

d) Zero and therefore no current

260. A circular coil of radius 8 cm, 400 turns and resistance 2 Ω is placed with its plane perpendicular to the horizontal component of the earth's magnetic field. It is rotated about its vertical diameter through 1800 in 0.30 s. Horizontal component of earth magnetic field at the place is 3 x 10^{-5} T. The magnitude of current induced in the coil is approximately

a) $4x10^{-2}$A b) $8x10^{-4}$A c) $8x10^{-2}$A d) $1.92x10^{-3}$A

261. A transformer works on the principle of

a) self induction b) electrical inertia c) mutual induction

d) magnetic effect of the electrical current

262. Mutual inductance of two coils can be increased by:

a) decreasing the number of turns in the coils b) increasing the number of turns in the coils

c) winding the coils on wooden cores d) none of these

263. The voltage over a cycle varies as

$V = V_0 \sin\omega t$ for $0 \leq t \leq \frac{\pi}{\omega}$

$= -V_o \sin\omega t$ for $\frac{\pi}{\omega} \leq t \leq \frac{2\pi}{\omega}$

The average value of the voltage for one cycle is

a) $\frac{V_0}{\sqrt{2}}$ b) $\frac{V_0}{2}$ c) Zero d) $\frac{2V_0}{\pi}$

264. If the number of turns per unit length of a coil of solenoid is doubled, the self-inductance of the solenoid will _____.

a) remain unchanged b) be halved c) be doubled d) become four times

265. **Assertion:** When a current flows in the coil of a transformer then its core becomes hot.

Reason : The core of transformer is made of softiron.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertionand reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

266. A fully charged capacitor C with initial charge Q_0 is connected to a coil of self inductance L at t = 0. The time at which the energy is stored equally between the electric and the magnetic field is
a) $\frac{\pi}{4}\sqrt{LC}$ b) $2\pi\sqrt{LC}$ c) $\frac{1}{\sqrt{LC}}$ d) $\sqrt{LC}$

267. **Assertion:** A given transformer can be used to stepup or step-down the voltage.
Reason : The output voltage depends upon the ratio of the number of turns of the two coils of the transformer
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertionand reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false

268. Quantity that remains unchanged in a transformer is
a) voltage b) current c) frequency d) none of these

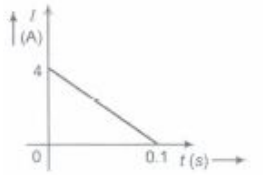
269. In an ac circuit an alternating voltage $\varepsilon = 200\sqrt{2}\sin 100$ t volts is connected to a capacitor of capacity $1\mu\mathrm{F}$. The r.m.s. value of the current in the circuit is___
a) $10\mu\mathrm{A}$ b) $100\mu\mathrm{A}$ c) $200\mu\mathrm{A}$ d) $20\mu\mathrm{A}$

270. A circular coil expands radially in a region of magnetic field and no electromotive force is produced in the coil. This is because
a) the magnetic field is constant.
b) the magnetic field is in the same plane as the circular coil and it may or may not vary.
c)
the magnetic field has a perpendicular (to the plane of the coil) component whose magnitude is decreasing suitably.
d) both (b) and (c)

271. A circuit containing a 20 Ω resistor and 0.1 μF capacitor in series is connected to 230 V ac supply of angular frequency 100 rad s^{-1}. The impedance of the circuit is
a) $10^5\Omega$ b) $10^4\Omega$ c) $10^6\Omega$ d) $10^{10}\Omega$

272. The average e.m.f. induced in a coil in which a current changes from 0 to 2 A in 0.05 s is 8 V. The self inductance of the coil is :
a) 0.1 H b) 0.2 H c) 0.4 H d) 0.8 H

273. In a coil of resistance 10Ω the induced current developed by changing magnetic flux through it, is shown in figure as a function of time. The magnitude of change in flux through the coil in Weber is :



a) 2 b) 6 c) 4 d) 8

274. A circular copper disc 10 cm in diameter rotates at 1800 revolution per minute about an axis through its centre and at right angles to disc. A uniform field of induction B of 1 Wb m^{-2} is perpendicular to disc. What potential difference is developed between the axis of the disc and

the rim?

a) 0.023 V b) 0.23 V c) 23 V d) 230 V

275. A pair of adjacent coils has a mutual inductance of 2.5 H. If the current in one coil changes from 0 to 40 A in 0.8 s, then the change in flux linked with the other coil is

a) 100 Wb b) 120 Wb c) 200 Wb d) 250 Wb

276. A jet plane is travelling west at the speed of 1600 km h^{-1}. The voltage difference developed between the ends of the wing having a span of 20 m, if the earth's magnetic field at the location has a magnitude of 5 x 10^{-4} T and the dip angle is 30° is :

a) 4.1 V b) 2.2 V c) 3.2 V d) 3.8 V

277. A coil of inductance 300 mH and resistance 2 Ω is connected to a source of voltage 2 V. The current reaches half of its steady state value in :

a) 0.05 s b) 0.1 s c) 0.15 s d) 0.2 s

278. In an AC circuit, the rms value of current, i_{rms} is related to the peak current, i_0 by the relation_____

a) $i_{\mathrm{rms}} = \sqrt{2} i_0$ b) $i_{\mathrm{rms}} = \pi i_0$ c) $i_{\mathrm{rms}} = \frac{i_0}{\pi}$ d) $i_{\mathrm{rms}} = \frac{1}{\sqrt{2}} i_0$

279. **Assertion:** An alternating current does not show any magnetic effect.
Reason : Alternating current does not vary with time.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertionand reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false

280. Two coils A and B are separated by a certain distance. If a current of 4 A flows through A, a magnetic flux of 10^{-3} Wb passes through B (no current through B). If no current passes through A and a current of 2 A passes through B, then the flux through A is

a) 5x10^{-3}Wb b) 4x10^{-4}Wb c) 5x10^{-4}Wb d) 2x10^{-3}Wb

281. 1MW power is to be delivered from a power station to a town 10 km away. One uses a pair of Cu wires of radius 0.5 em for this purpose. Calculate the fraction of ohmic losses to power transmitted if a step-up transformer is used to boost the voltage to 11000 V, power transmitted, then a step-down transformer is used to bring voltage to 220 V.
(ρCu=1.7x10^{-8} SI unit)

a) 1.8% b) 1.5% c) 3.6% d) 7.2%

282. The output of a step-down transformer is measured to be 24 V when connected to a 12 watt light bulb. The value of the peak current is

a) $\sqrt{2}A$ b) 2 A c) $2\sqrt{2}A$ d) $\frac{1}{\sqrt{2}}A$

283. Assertion: The direction of induced emf is always such as to oppose the change that causes it.
Reason: Conservation of energy applies to know the direction of induced emf.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

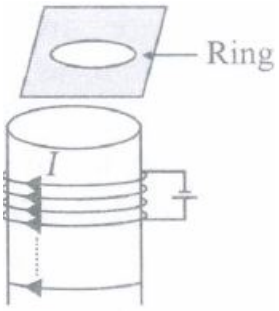
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

284. Faraday's laws are consequence of conservation of:

a) Energy b) Energy and magnetic field c) Charge d) Magnetic field

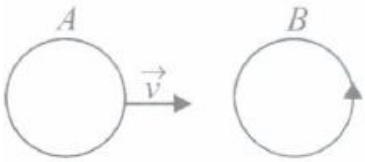
285. A metal ring kept (supported by a card board) on the top of a fixed solenoid carry a current I as shown in figure. The centre of the ring coincides with the axis of the solenoid. If the current in the solenoid is switched off, then



a) magnetic flux linked with the metal ring increases.
b) current induced in the metal ring in clockwise direction.
c) metal ring will not remain on the cardboard d) both (a) and (b) are correct

286. A series LCR circuit is comected to an ac voltage source. When L is removed from the circuit, the phase difference between current and voltage is $\frac{\pi}{3}$ between current and woltage. The power factor of the circuit is_____
a) -1.0 b) zero c) 0.5 d) 1.0

287. There are two coils A and B as shown in the figure. A current starts flowing in B as shown, when A is moved towards B and stops when A stops moving. The current in A is counterclockwise. B is kept stationary when A moves. We can infer that



a) there is a constant current in the clockwise direction of A.
b) there is a varying current in A. c) there is no current in A.
d) there is a constant current in the counterclockwise direction in A.

288. In an ac circuit, V and I are given by V = 150sin(150t) V and 1= 150sin $\left(150t + \frac{\pi}{3}\right)$ A The power dissipated in the circuit is
a) 106 W b) 150 W c) 5625 W d) zero

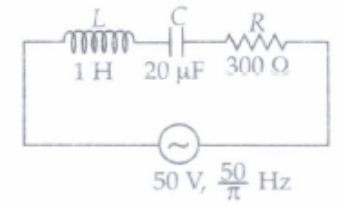
289. The north pole of a long bar magnet was pushed slowly into a short solenoid connected to a galvanometer. The magnet was held stationary for a few seconds with the north pole in the middle of the solenoid and then withdrawn rapidly. The maximum deflection of the galvanometer was observed when the magnet was
a) moving towards the solenoid b) moving towards the solenoid
c) at rest inside the solenoid d) moving out of the solenoid

290. A transformer having efficiency of 90 % is working on 200 V and 3 kW power supply. If the current in the secondary coil is 6 A, the woltage across the secondary coil and the current in the primary coil respectively are _____ .
a) 300 V, 15 A b) 450 V, 15 A c) 450 V, 13.5A d) 600 V, 15 A

291. A sinusoidal voltage of peak value 293 V and frequency 50 Hz is applied to a series LCR circuit in which R = 6 Ω, L = 25 mH and C = 750 μF.The impedance of the circuit is
a) 7.0Ω b) 8.9Ω c) 9.9Ω d) 10.0Ω

292. A conductor of length 0.4 m is moving with a speed of 7 m/s perpendiculars to a magnetic field of intensity 0.9 Wb/ m^2. The induced emf across the conductor is _____.
a) 1.26 V b) 2.52 V c) 5.04 V d) 25.2 V

293. In the series LCR circuit shown the impedance is



a) 200 Ω b) 100 Ω c) 300 Ω d) 500 Ω

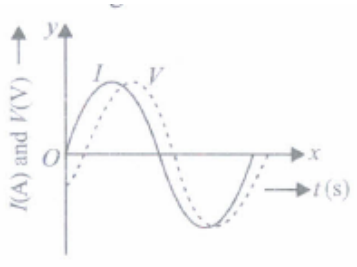
294. An electrical device draws 2 kW power from ac mains voltage 223 V(rms). The current differs lag in phase by ϕ = $\tan^{-1}\left(-\frac{3}{4}\right)$ as compared to voltage. The resistance R in the circuit is
a) 15 Ω b) 20 Ω c) 25 Ω d) 30 Ω

295. In the question number 40, if velocity is normal in the shorter side then the voltage developed is
a) 2.3 x 10^{-4} V b) 2.4 x 10^{-2} V c) 4.8 x 10^{-2} V d) 1.6 x 10^{-4} V

296. The total charge induced in a conducting loop when it is moved in magnetic field depends on _____.
a) the rate of change of magnetic flux b) initial magnetic flux
c) the total change in magnetic flux d) final magnetic flux

297. A pure resistive circuit element X when connected to an ac supply of peak voltage 200 V gives a peak current of 5 A which is in phase with the voltage. A second circuit element Y, when connected to the same ac supply also gives the same value of peak current but the current lags behind by 90°. If the series combination of X and Y is connected to the same supply, what will be the rms value of current?
a) $\frac{10}{\sqrt{2}}A$ b) $\frac{10}{\sqrt{2}}A$ c) $\frac{5}{2}A$ d) 5A

298. When an ac source of voltage V = V_0 sin100t is connected across a circuit, the phase difference between the voltage V and current I in the circuit is observed to be $\pi/4$, as shown in figure. If the circuit consists possibly only of RC or RL or LC in series, find possible values of two elements.



a) $R = 1k\Omega, C = 10\mu F$ b) $R = 1k\Omega, C = 1\mu F$ c) $R = 1k\Omega, L = 10mH$
d) $R = 10k\Omega, L = 10mH$

299. A 100mH coil carries a current of 1A. Energy stored in its magnetic field is
a) 0.5 J b) 0.05 J c) 1 J d) 0.1 J

300. The self inductance of a long solenoid cannot be increased by
a) increasing its area of cross section b) decreasing its length
c) increasing the current through it d) increasing the number of turns in it

301. Phase difference between voltage and current in a capacitor in an ac circuit is
a) π b) $\pi/2$ c) 0 d) $\pi/3$

302. The self inductance of an inductor coil having 100 turns is 20 mH. The magnetic flux through the cross-section of the coil corresponding to a current of 4 mA is:
a) 2 x 10^{-5} Wb b) 4 x 10^{-7} Wb c) 8 x 10^{-7} Wb d) 8 x 10^{-5} Wb

303. A coil of 40 henry inductance is connected in series with a resistance of 8 ohm and the combination is joined to the terminals of a 2 volt battery. The time constant of the circuit is___
a) 20 Seconds b) 5 Seconds c) 1 / 5 Seconds d) 40 Seconds

304. Two identical coaxial coils P and Q carrying equal amount of current in the same direction are brought nearer. The current in
a) P increases while in Q decreases b) Q increases while in P decreases
c) both P and Q increases d) both P and Q decreases

305. A closed iron ring is held horizontally and a bar magnet is dropped through the ring with its length along the axis of the ring. The acceleration of the falling magnet is
a) equal to g b) less than g c) more than g
d) depends on the diameter of the ring and length of magnet

306. Energy in a current carrying coil is stored in the form of _____.
a) electric field b) magnetic field c) dielectric strength d) heat

307. A series resonant LCR circuit has a quality factor (Q-factor) = 0.4. If R = 2 kΩ, C = 0.1 μF, then the value of inductance is :
a) 0.1 H b) 0.064 H c) 2 H d) 5 H

308. A 60 μF capacitor is connected to a 110 V (rms), 60 Hz ac supply. The rms value of current in the circuit is
a) 1.49 A b) 14.9 A c) 2.49 A d) 24.9 A

309. 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

310. Alternating voltage (V) is represented by the equation, where V_m is the peak voltage
a) V(t) = $V_m e^{\omega t}$ b) V(t) = $V_m sin\omega t$ c) V(t) = $V_m cot\omega t$ d) V(t) = $V_m tan\omega t$

311. When the rate of change of current is unity, the induced emf is equal to
a) thickness of coil b) number of turns in coil c) coefficient of self inductance
d) total flux linked with coil

312. The primary winding of transformer has 500 turns whereas its secondary has 5000 turns. The primary is connected to an A C supply of 20 V-50 Hz. The secondary will have an output of_____
a) $2\ \mathrm{V}, 5\ \mathrm{Hz}$ b) $200\ \mathrm{V}, 500\ \mathrm{Hz}$ c) $2\ \mathrm{V}, 50\ \mathrm{Hz}$ d) $200\ \mathrm{V}, 50\ \mathrm{Hz}$

313. A charged 30 μ Fcapacitor is connected to a 27 mH inductor. The angular frequency of free oscillations of the circuit is :
a) 1.1 x 10^3 rads^{-1} b) 2.1 x 10^3 rads^{-1} c) 3.1 x 10^3 rad s^{-1} d) 4.1 x 10^3 rad s^{-1}

314. A long solenoid with 10 turns per cm has a small loop of area 3 cm^2 placed inside, normal to the axis of the solenoid. If the current carried by the solenoid changes steadily from 2 A to 4 A in 0.2 s, what is the induced voltage in the loop, while the current is changing?
a) 4.2×10^{-8} V b) 2.8×10^{-8} V c) 7.3×10^{-6} V d) 3.8×10^{-6} V

315. An alternating supply of 220 V is applied across a circuit with resistance 22 Ω and impedance 44 Ω. The power dissipated in the circuit is
a) 1100W b) 550W c) 2200W d) (2200/3)W

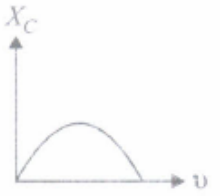
316. A capacitor has capacity C and reactance X. If capacitance and frequency become double, then reactance will be_____
(where ω is the angular resonance frequency).
a) 4 X b) X / 2 c) X / 4 d) 2 X

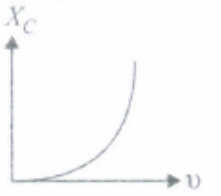
317. Two coils have a mutual inductance of 0.005H. The current changes in the first coil according to equation $i = i_0 \sin \omega t$, i_0 = 10 A and w = 100π rad/s. The maximum value of emf in the second coil is _____.
a) 2π b) 5π c) π d) 4π

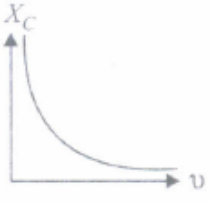
318. Assertion: In the phenomenon of mutual induction, self induction of each of the coil persists.
Reason: Self induction arises when strength of current in one coil changes. In mutual induction, current is changing in both the individual coils.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

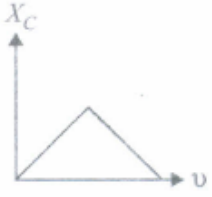
319. A varying current in a coil changes from 10 A to zero in 0.5s. If the average emf induced in the coil is 220 V, the self-inductance of the coil is _____.
a) 5 H b) 6 H c) 11 H d) 12 H

320. Which of the following graphs represents the correct variation of capacitive reactance Xc with frequency υ?

a) 

b) 

c) 

d) 

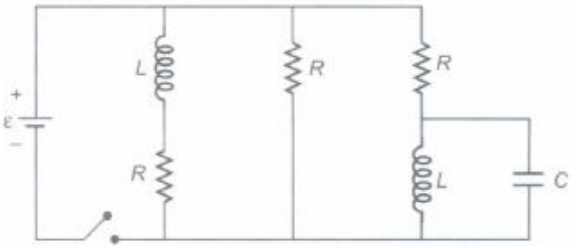
321. An inductor of reactance 1 Ω and a resistor of 2 Ω are connected in series to the terminals of a 6 V (rms) ac source. The power dissipated in the circuit is
a) 8 W b) 12 W c) 14.4 W d) 18 W

322. A series LCR-circuit with R = 20 Ω, L = 1.5 Hand C = 35 μF is connected to a variable frequency 200 V ac supply. When the frequency of the supply equals the natural frequency of the circuit, the average power transferred to the circuit in one complete cycle is
a) 200W b) 2000W c) 100W d) 4000W

323. The current drawn by the primary of a transformer, which steps down 200 V to 20 V to operate a device of resistance 20 Ω is (Assume the efficiency of the transformer to be 80 %)
a) 0.125 A b) 0.225 A c) 0.325 A d) 0.425 A

324. An e.m.f. of 5 volt is produced by a self inductance, when the current changes at a steady rate from 3A to 2A in 1millisecond. The value of self inductance is:
a) Zero b) 5 H c) 5000 H d) 5 mH

325. Figure shows a circuit that contains three identical resistors with resistance R = 9.0 Ω each, two identical inductors with inductance L = 2.0 mH each, and an ideal battery with emf e = 18 V. The current'i' through the battery just after the switch closed is, ...:



a) 2 mA b) 0.2 A c) 2 A d) 4 A

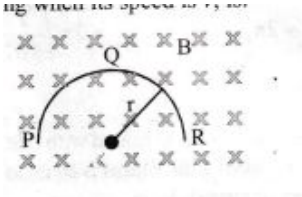
326. The natural frequency (ωo) of oscillations in LC circuit is given by
a) $\frac{1}{2\pi}\frac{1}{\sqrt{LC}}$ b) $\frac{1}{\pi}\frac{1}{\sqrt{2LC}}$ c) $\frac{1}{\sqrt{LC}}$ d) $\sqrt{LC}$

327. What is the value of inductance L for which the current is a maximum in a series LCR circuit with C = 10 μF and ω= 1000/s?
a) 10 mH b) 100 mH c) 1 mH d) cannot be calculated unless R is known

328. A series LCR circuit with R = 22 Ω, L = 1.5 H and C = 40 μF is connected to a variable frequency 220 V ac supply. When the frequency of the supply equals the natural frequency of the circuit, what is the average power transferred to the circuit in one complete cycle?
a) 2000W b) 2200W c) 2400W d) 2500W

329. 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

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

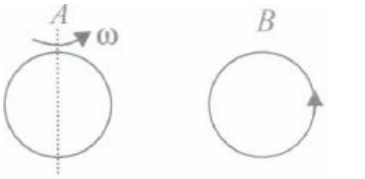


a) Zero b) $Bv\pi r^2/2$ and P is at higher potential c) PrBv and R is at higher potential
d) 2rBv and R is at higher potential

331. A transformer is used to light 140 W, 24 V lamp from a 240 V ac mains. If the main current is 0.7 A, the efficiency of the transformer is
a) 63.8% b) 74% c) 83.3% d) 48%

332. A coil has resistance 30ohm and inductive reactance 20 ohm at 50 Hz frequency. If an ac source of 200 volt, 100 Hz, is connected across the coil, the current in the coil will be____
a) 4.0 A b) 8.0 A c) $\frac{20}{\sqrt{13}}$ A d) 2.0 A

333. Same as problem 4 except the coil A is made to rotate about a vertical axis. No current flows in B if A is at rest. The current in coil A, when the current in B (at t = 0) is counterclockwise and the coil A is as shown at this instant, t = 0, is



a) constant current clockwise. b) varying current clockwise.
c) varying current counterclockwise. d) constant current counterclockwise.

334. A 100 μF capacitor in series with a 40 Ω resistor is connected to a 100 V, 60 Hz supply. The maximum current in the circuit is
a) 2.65A b) 2.75A c) 2.85A d) 2.95A

335. The unit of inductance is equivalent to
a) $\frac{volt \times ampere}{second}$ b) $\frac{second}{volt \times second}$ c) $\frac{volt}{ampere \times second}$ d) $\frac{volt \times second}{ampere}$

336. A particle of mass m, charge Q and kinetic energy T enters a transverse uniform magnetic field of induction B. After 3 seconds the kinetic energy of the particle will be :
a) 4 T b) 3 T c) 2 T d) T

337. 1.5 μF capacitor is charged of 60 V. The charging battery is then disconnected and a 15 mH coil is connected in series with the capacitor so that LC oscillations occur. Assuming that the circuit contains no resistance, the maximum current in this coil shall be close to :
a) 0.8 A b) 0.6 A c) 1.4 A d) 1.2 A

338. A solenoid is connected to a battery so that a steady current flows through it. If an iron core is inserted into the solenoid, the current will
a) increase b) decrease c) remains same d) first increase then decrease

339. Direction of current induced in a wire moving in a magnetic field is found using
a) Fleming's left hand rule b) Fleming's right hand rule c) Ampere's rule
d) Right hand clasp rule

340. A current carrying infinitely long wire is kept along the diameter of a circular wire loop, without touching it. The correct statement(s) is (are)
a) the emf induced in the loop is finite if the current is constant
b) the emf induced in the loop is zero if the current is constant
c) the emf induced in the loop is zero if the current decreases at a steady state
d) both (b) and (c).

341. For an LCR circuit, the power transferred from the driving source to the driven oscillator is P $=I^2 Z \cos \phi$. Then
a) the power factor $\cos \phi \leq 0$, $P \geq 0$.
b) the driving force can give no energy to the oscillator (P = 0) in some cases.
c) the driving force cannot syphon out (P < 0) the energy out of oscillator. d) all of these.

342. Assertion: The presence of large magnetic flux through a coil maintains a current in the coil if the circuit is continuous.
Reason: Magnetic flux is essential to maintain an induced current in the coil.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

343. A cylindrical bar magnet is kept along the axis of a circular coil. If the magnet is rotated about its axis, then:
a) A current will be induced in a coil b) No current will be induced in a coil
c) Only an e.m.f. will be induced in the coil
d) An e.m.f. and a current both will be induced in the coil

344. A short solenoid of radius a, number of turns per unit length nl' and length L is kept coaxially inside a very long solenoid of radius b, number of turns per unit length n_2. What is the mutual inductance of the system?
a) $\mu_0 \pi b^2 n_1 n_2 L$ b) $\mu_0 \pi a^2 n_1 n_2 L^2$ c) $\mu_0 \pi a^2 n_1 n_2 L$ d) $\mu_0 \pi b^2 n_1 n_2 L^2$

345. A circuit draws a power of 550 W from a source of 220 V, 50 Hz. The power factor of the circuit is 0.8 and the current lags in phase behind the potential difference. To make the power factor of the circuit as 1.0, what capacitance will have to be connected with it?
a) $\frac{1}{42\pi} \times 10^{-2}$F b) $\frac{1}{41\pi} \times 10^{-2}$F c) $\frac{1}{5\pi} \times 10^{-2}$F d) $\frac{1}{84\pi} \times 10^{-2}$F

346. A loop, made of straight edges has six corners at A(0, 0, 0), B(L, 0, 0), C(L, L, 0), D(0, L, 0), E(0, L, L) and F(0, 0, L). A magnetic field $\vec{B} = B_0 \left(\hat{i} + \hat{k} \right) T$ is present in the region. The flux passing through the loop ABCDEFA (in that order) is
a) B_0L^2Wb b) $2B_0L^2$Wb c) $\sqrt{2}\ B_0L^2$Wb d) $4B_0L^2$Wb

347. A rectangular coil of 20 tums and area of cross-section 25 sq cm has a resistance of 100W. If a magnetic field which is perpendicular to the plane of coil changes at a rate of 1000 T/s, the current in the coil is _____.
a) 1 A b) 50 A c) 0.5 A d) 5 A

348. Two inductors of inductance L each are connected in series with opposite magnetic fluxes. The resultant inductance is (Ignore mutual inductance)
a) zero b) L c) 2L d) 3L

349. A coil of 40 henry inductance is connected in series with a resistance of 8 ohm and the combination is joined to the terminals of a 2 volt battery. The time constant of the circuit is :
a) 1/5seconds b) 40 seconds c) 20 seconds d) 5 seconds

350. A light bulb is rated at 100W for a 220 V ac supply. The resistance of the bulb is
a) 284 Ω b) 384 Ω c) 484 Ω d) 584 Ω

351. In a series LCR circuit having L = 30 mH, R = 8 Ω and the resonant frequency is 50 Hz. The quality factor of the circuit is
a) 0.118 b) 11.8 c) 118 d) 1.18

352. In the question number 42, the time lag between the current maximum and the voltage maximum is
a) 15.5ms b) 155ms c) 1.55ms d) 1.55s

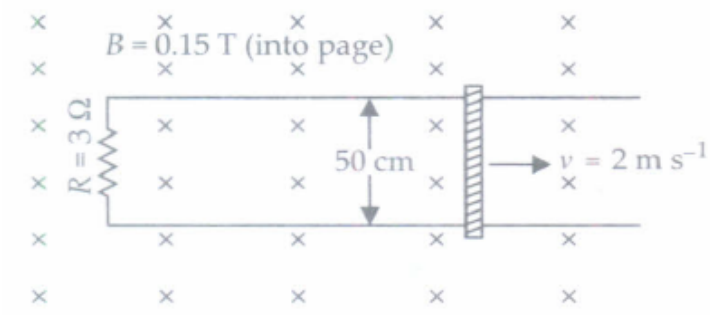
353. Assertion: When the current in a coil changes, it induces a back emf in the same coil.
Reason: Emf is a measure of the inertia of the coil against the change of current through it.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b)
If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

354. As shown in the figure, a metal rod makes contact with a partial circuit and completes the circuit. The circuit area is perpendicular to a magnetic field with B = 0.15 T. If the resistance of the total circuit is 3 Ω, the force needed to move the rod as indicated with a constant speed of 2 m s^{-1} will be equal to



a) 3.75 x 10^{-3} N b) 2.75 x 10^{-3}N c) 6.57 x 10^{-4} N d) 4.36 x 10^{-4}N

355. An inductor 20 mH, a capacitor 50 μF and a resistor 40 Ω are connected in series across a source of emf V = 10 sin 340 t. The power loss in A.C. circuit is :
a) 0.51 W b) 0.67 W c) 0.76 W d) 0.89 W

356. In a series LCR circuit the voltage across an inductor, capacitor and resistor are 20 V, 20 V and 40 V respectively. The phase difference between the applied voltage and the current in the circuit is
a) 30° b) 45° c) 60° d) 0°

357. A conductor is moving with the velocity v in the magnetic field and induced current is 1. If the velocity of conductor becomes double, the induced current will be
a) 0.5 I b) 1.5 I c) 2 I d) 2.5 I

358. A 30 μIF capacitor is connected to a 150 V, 60 Hz ac supply. The rms value of current in the circuit is
a) 17 A b) 1.7 A c) 1.7 mA d) 2.7 A

359. If the self inductance of 500 turns coil is 125 mH, then the self inductance of the similar coil of 800 turns is
a) 48.8 mH b) 200 mH c) 290 mH d) 320 mH

360. 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+2πfL b) $\sqrt{R^2 + 4\pi f^2 L^2}$ c) $\sqrt{R^2 + L^2}$ d) $\sqrt{R^2 + 2\pi fL}$

361. 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 capacitor of capacitance:
a) 4 μF b) 8 μF c) 1 μF d) 2 μF

362. When the plane of the armature of an a.c. generator is parallel to the field, in which it is rotating

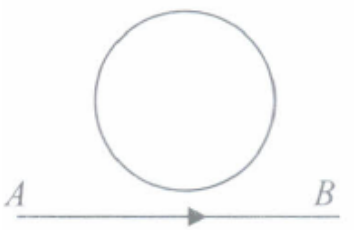
a) both the flux linked and induced emf in the coil are zero.

b) the flux linked with it is zero, while induced emf is maximum.

c) flux linked is maximum while induced emf is zero.

d) both the flux and emf have their respective maximum values.

363. In the given figure current from A to B in the straight wire is decreasing. The direction of induced current in the loop is



a) clockwise b) anticlockwise c) changing d) nothing can be said