PHYSICS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

ELECTROMAGNETIC INDUCTION

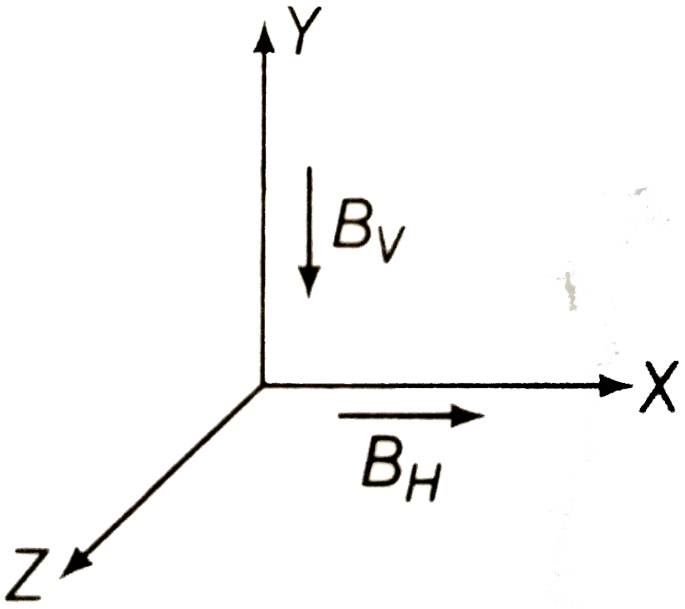
Example

1. At a given place horizontal and vertical components of the earth's magnetic field B_H and B_V are along X and Y-axes, respectively, as

shown in the figure. What is the total flux of the earth's magnetic field associated with an area S, if the area S is in the

(i) XY-plane

(ii) YZ-plane



A. $0, B_H S$

B. $B_H S, O$

C. $1, B_H S$

D. $0.5, B_H S$

Answer: C

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2. A coil consists of 200 turns of wire having a total reistance of 2.0Ω. Each turn is a square of side $18cm$, and a uniform magnetic field directed perpendicular to the plane of the coil is turned on. If the field changes linearly from 0 to $0.5T$ in $0.80s$,

what is the magnitude of induced emf and current in the coil while the field is changing?

A. 5.25 V

B. 3.2 V

C. 6.5 V

D. 4.05 V

Answer: D

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3. Two different wire loops are concentric and lie in the same plane. The current in the outer loop is clockwise and increasing with time. The induced current in the inner loop then is

A. clockwise

B. zero

C. counter clockwise

D. in a direction that depends on the ratio of the loop radii

Answer: C

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4. A coil has a self inductance of 10 mH. What is the maximum magnitude of the induced e.m.f. in the coil when a current of I $= 0.1 \sin 200t$ ampere is sent through it ?

A. 1.2 V

B. 0.6 V

C. 0.2 V

D. 2.3 V

Answer: C

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5. what is the self - inductance of a solenoid of length 40 cm , area of cross - section $20cm^2$ and total number of turns 800 .

A. $4.01 \times 10^{-3} H$

B. $4.9 \times 10^{-3} H$

C. $5.2 \times 10^{-3} H$

D. $6.1 \times 10^{-3} H$

Answer: A

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6. Two coils have mutual inductance of 1.5 henry. If current in primary circuit is raised to 5 ampere in one millisecond after closing the circuit, what is the e.m.f. Induced in the secondary ?

A. 30 kV

B. 60 kV

C. 90 V

D. 45 V

Answer: A

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7. A straight solenoid has 50 turns per cm in primary and total 200 turns in the secondary. The area of cross section of the solenoids is $4cm^2$. Calculate the mutual inductance. Primary is tightly kept in side the secondary.

A. $5 \times 10^{-4} H$

B. $2 \times 10^{-4} H$

C. $3 \times 10^{-5} H$

D. $1.5 \times 10^{-3} H$

Answer: A

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8. A 100Ω resistor is connected to a 220 V, 50 Hz ac supply.

(a) What is the rms value of current in the circuit?

(b) What is the net power consumed over a full cycle?

A. 2.2 A

B. 0.125

C. 4.2 A

D. 2.7 A

Answer: A

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9. a) The peak voltage of an AC supply is 300 V. What is the rms voltage?

b) The rms value of current in an AC circuit is 10A. What is the peak current?

A. 212.1 V, 14.14 A

B. 220.3 V, 15.15 A

C. 16 V, 12.3 A

D. 14.3 V, 16.2 A

Answer: A::B

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10. An electrical heating element which has an AC resistance of 60 Ω is connected across a 240 V AC supply. Calculate the current drawn from the supply and power consumed by heatint element.

A. 4.0 A, 960 W

B. 2.9 A, 440 W

C. 10 A, 50 W

D. 4A, 490 W

Answer: A

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11. If an inductor of 200 V, having 200 mH inductance with 50 Hz frequency is connected with an AC source, then calculate electric current through the circuit.

A. 4.32 A

B. 5.47 A

C. 2.38 A

D. 6.37 A

Answer: D

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12. A capacitor having the capacitance 2.5 μF is operating at 50 Hz frequency at a voltage of 230 V. then calculate the current flowing through the circuit.

A. 181 mA

B. 135 mA

C. 191 mA

D. 125 mA

Answer: A

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13. A choke coil having a resistance of 10Ω and inductance of 0.5 H is connected in series with a capacitor of 2.5 μF. The whole circuit has been connected to 230 V, 50 Hz supply. Calculate the value of current flowing through the circuit.

A. 0.487 A

B. 0.308 A

C. 0.206 A

D. None of these

Answer: C

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14. Find the resonating frequency of the circuit having negligible resistance and inductance of 0.15 H is connected in series with the capacitor of 2.5 μF.

A. 250 Hz

B. 260 Hz

C. 240 Hz

D. None of these

Answer: B

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15. A power transmission line feeds input power at 2300 V to a step down trnasformer with it primary windings having 4000 turns. What should be the number of turns in the seconday windings in order to get output power at 230 V?

A. 300

B. 250

C. 400

D. 450

Answer: C

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16. In a transformer, number of turns in the primary coil are 140 and that in the secondry coil are 280. If current i primary ciol is 4A, then that in the secondary coil is

A. 4A

B. 2A

C. 6A

D. 10A

Answer: B

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Example 1

1. A square of side L meters lies in the x-y plane in a region, where the magnetic field is give by $B = B_0\left(2\hat{i} + 3\hat{j} + 4\hat{k}\right)$T, where B_0 is constant.

The magnitude of flux passing through the square is

A. $2B_0L^2Wb$

B. $3B_0L^2Wb$

C. $4B_0L^2Wb$

D. $\sqrt{29}B_0L^2Wb$

Answer: C

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2. A loop made of straight edegs has six corners at $A(0, 0, 0)$, $B(L, O, 0)C(L, L, 0)$, $D(0, L, 0)E(0, L, L)$ and $F(0, 0, L)$. Where L is in meter. A magnetic field $B = B_0\left(\hat{i} + \hat{k}\right)T$ is present in the region. The flux passing through the loop $ABCDEFA$ (in that order) is

A. B_0L^2Wb

B. $2B_0L^2Wb$

C. $\sqrt{2}B_0L^2Wb$

D. $4B_0L^2Wb$

Answer: B

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3. A circular coil of diameter 21 cm is placed in a magnetic field of induction 10^{-4}T. the magnitude of flux linked with coil when the plane of coil makes an angle 30° with the field is

A. $1.44 \times 10^{-6} Wb$

B. $1.732 \times 10^{-6} Wb$

C. $3.1 \times 10^{-6} Wb$

D. $4.2 \times 10^{-6} Wb$

Answer: B

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4. A circular disc of radius $0.2m$ is placed in a uniform magnetic fied of induction $\frac{1}{\pi}\left(\frac{Wb}{m^2}\right)$ in such a way that its axis makes an angle of 60° with The magnetic flux linked with the disc is

A. 0.02 Wb

B. 0.06 Wb

C. 0.08 Wb

D. 0.01 Wb

Answer: A

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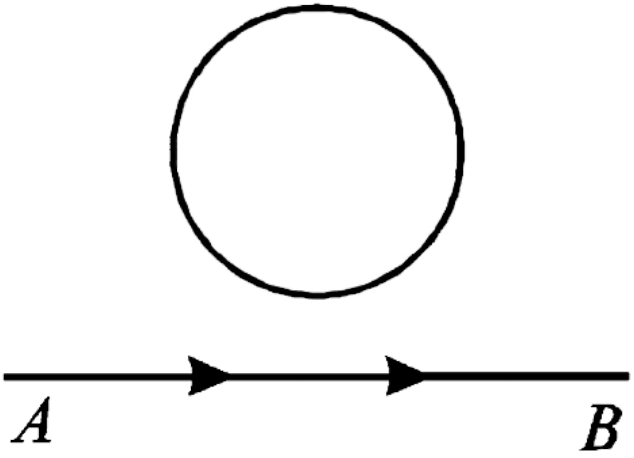
5. A current from A to B is increasing in magnitude. What is the direction of induced current. If any,in the loop as shown in the figure?



A. No current in induced

B. Clockwise current

C. Anti-clockwise current

D. Alternating current

Answer: B

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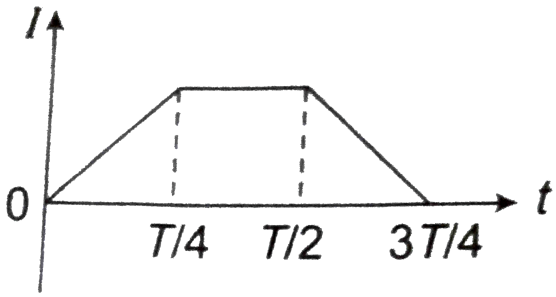
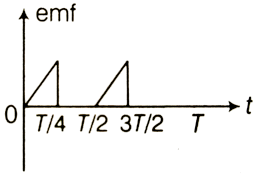
6. The current i in a coil varies with time as shown in the figure. The variation of induced emf with time

would be



A.



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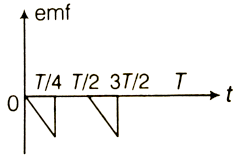
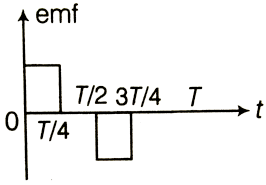
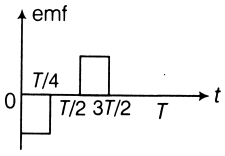


C.



D. 

Answer: C

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7. A circular ring of diameter 20cm has a resistance 0.01Ω How much charge will flow through the ring if it is rotated from positon perpendicular to the uniform magnetic field of B=2T to a position parallel to field?

A. 63 C

B. 0.63 C

C. 6.3 C

D. 0.063 C

Answer: C

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8. Lenz's law is consequence of the law of conservation of

A. law of conservation of charge

B. law of conservation of current

C. law of conservation of energy

D. None of these

Answer: C

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9. A coil of 1000 turns is wound on a book and this book is lying on the table. The vertical component of the earth's magnetic field is 0.6×10^{-4}T and the area of the coil is $0.05m^2$. The book is turned over once about a horizontal axis is 0.1 s. this average emf induced in the coil is

A. 0.03 V

B. 0.06 V

C. zero

D. 0.6 V

Answer: B

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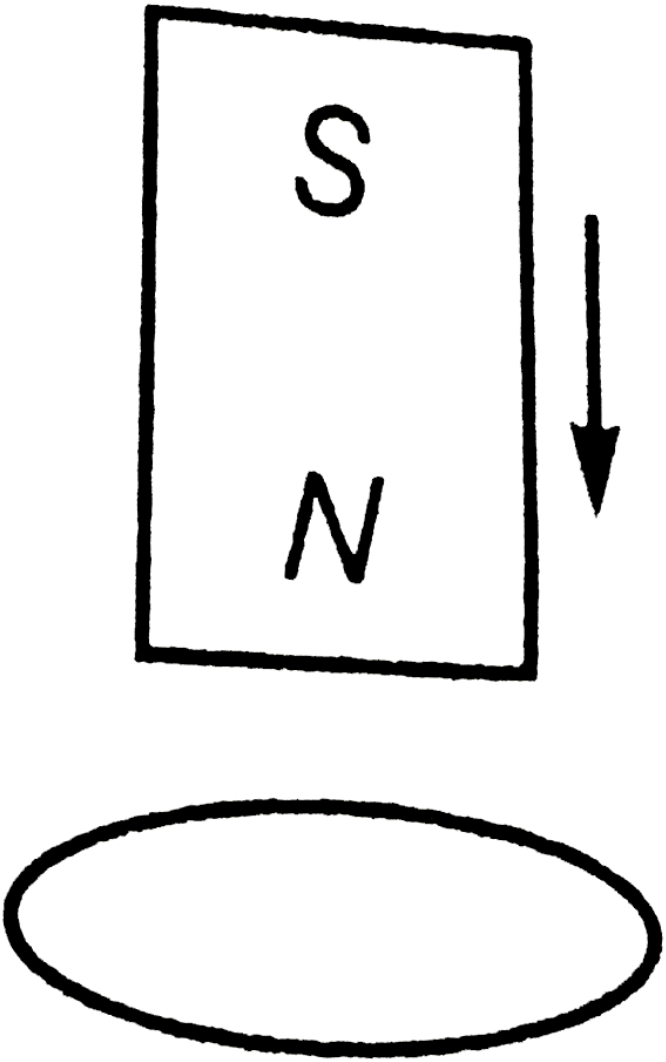
10. The North pole of a magnet is falling on a metallic ring as shown in the figure. The direction of induced current, if looked from upside in the ring

will be



A. clockwise or anti-clockwise depending on metal of the ring

B. no induced current

C. Anti-clockwise current

D. clockwiser

Answer: C

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11. An aeroplane having a wing space of 35m flies due north with the speed of $90ms^{-1}$ given

$B = 4 \times 10^{-5} T$. The potential difference between the tips of the wings will be

A. 0.013 V

B. 1.26 V

C. 12.6 V

D. 0.126 V

Answer: D

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12. If a copper ring is moved quickly towards south pole of a powerful stationary bar magnet, then

A. current flows through the copper ring

B. voltage in the magnet increases

C. current flows in the magnet

D. copper ring will get magnetised

Answer: A

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13. A rectangular coil of 300 turns has an average area of average area of $25cm \times 10cm$ the cooil rotates with a speed of $50cps$ in a uniform magnetic field of strength $4 \times 10^{-2}T$ about an axis perpendicular of the field. The peak value of the induced e.m.f. is (in volt)`

A. 300π

B. 3000π

C. 3π

D. 30π

Answer: D

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14. A magnetic field of $2 \times 10^{-2} T$ 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 s

B. 1 s

C. 0.01 s

D. 20s

Answer: A

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15. A cylindrical bar magnet is kept along the axis of a circular coil. If the magnent is rotated about its axis, then

A. is zero

B. is clockwise from magnet side

C. may be clockwise or anti-clockwise

D. is anti-clockwise from manetic side

Answer: A

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16. Two rail tracks, insulated from each other and the ground, are connected to milli voltmeter. What is the reading of the milli voltmeter when a train passes at a speed of 180 km/hr along the track ? Given that – the horizontal component of earth's magnetic field B_H is $0.2 \times 10-4Wb/m^2$ and rails are separated by 1 metre.

A. $10^{-2}mV$

B. $10mV$

C. 10^2mV

D. 1mV

Answer: D

17. A copper ring having a cut such as not to from a complete loop 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. g

B. less than g

C. more than g

D. zero

Answer: A

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18. The charge, which will flow through a 200 Ω galvanometer connected to a 400 Ω circular coil of 1000 turns wound on a wooden stick 20 mm in diameter, if a magnetic field $B = 0.012T$ parallel to the axis of the stick decreased suddenly to zero is

A. $6.3\mu C$

B. $63\mu C$

C. $0.63\mu C$

D. $630\mu C$

Answer: A

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19. The current flowing in two coaxial coils in the same direction. On increasing the distance the two, the electric current will

A. increase in both

B. decrease in both

C. remain unaltered

D. increases in one and decreases in the second

Answer: A

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20. A very small circular loop of radius a is initially (at t = 0) coplanar and concentric with a much larger fixed circular loop of radius b. A constant current I flows in the larger loop. The smaller loop is rotated with a constant angular speed ω about the

common diameter. The emf induced in the smaller loop as a function of time t is

A. $\frac{\pi a^2 \mu_0 l}{2b} \omega \cos \omega t$

B. $\frac{\pi a^2 \mu_0 l}{2b} \omega \sin \omega^2 t^2$

C. $\frac{\pi a^2 \mu_0 l}{2b} \omega \sin \omega t$

D. $\frac{\pi a^2 \mu_0 l}{2b} \omega \sin^2 \omega t$

Answer: C

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21. The wing span of an aeroplane is 36 m. if the plane is flying at $400kmh^{-1}$, the emf induced between the wings tips is (Assume $V = 4 \times 10^{-5}T$)

A. 16 V

B. 1.6 V

C. 0.16 V

D. 0.016 V

Answer: C

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22. The north pole of a magnet is brought near a coil. The induced current in the coil as seen by an observer on the side of magnet will be-

A. clockwise

B. anti-clockwise

C. no current in the coil

D. either clockwise or anti-clockwise

Answer: B

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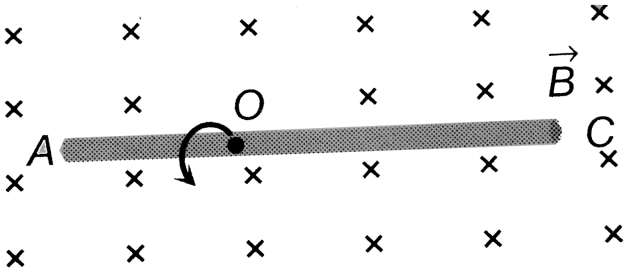
23. A conducting rod AC of length $4l$ is rotate about a point O in a uniform magnetic field $\overrightarrow{B}$ directed into the paper. $AO = l$ and $OC = 3l$. Then



A. $V_A - V_O = \dfrac{B\omega l^2}{2}$

B. $V_O - V_C = \dfrac{9}{2}B\omega l^2$

C. $V_A - V_C = 4B\omega l^2$

D. $V_C - V_O = \dfrac{9}{2}B\omega l^2$

Answer: C

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24. The momentum in mechanics is expressed as $m \times v$. The analogous expression in electricity is

A. $i \times Q$

B. $i \times V$

C. $L \times i$

D. $L \times Q$

Answer: C

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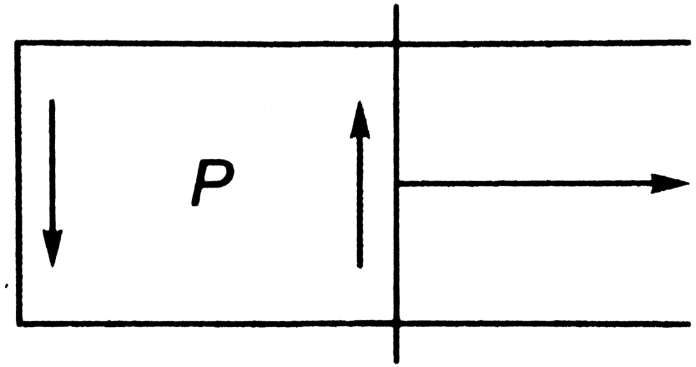
25. A movable wire is moved to the right crossing an anti-clockwise induced current, as shown in figure. The direction of magnetic induction in the region point P



A. to the right

B. to the left

C. upwards the paper

D. downwards into the paper

Answer: D

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26. When the current changes from $+2A$ to $-2A$ in $0.05s$, and emf of $8B$ is induced in a coil. The coefficient of self-induction of the coil is

A. 0.2 H

B. 0.4 H

C. 0.8 H

D. 0.1 H

Answer: D

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27. A coil of wire of a certain radius has 600 turns and a self-inductance of $108mH$. The self-inductance of a 2^{nd} similar coil of 500 turns will be

A. 80 mH

B. 75 mH

C. 108 mH

D. 90 mH

Answer: B

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28. Two coils have a mutual inductance $0.005H$. The current changes in the first coil according to equation $I = I_0 \sin \omega t$, where $I_0 = 10A$ and $\omega = 100\pi$radian//sec`. The maximum value of e.m.f. in the second coil is

A. 2π

B. 5π

C. π

D. 4π

Answer: B

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29. A solenoid of inductance 2 H carries a current 1 A. what is the magnetic energy stored in a solenoid?

A. $2J$

B. $1J$

C. $4J$

D. $5J$

Answer: B

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30. A solenoid 30 cm long is made by winding 2000 loops of wire on an iron rod whose cross-section is $1.5cm^2$. If the relative permeability of the iron is 6000. what is the self-inductance of the solenoid?

A. 1.5 H

B. 2.5 H

C. 3.5 H

D. 0.5 H

Answer: A

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31. The inductance of a coil is proportional to

A. its length

B. the number of turns

C. the resistance of coil

D. the square of the number of turns

Answer: D

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32. What is the self-inductance of solenoid of length 31.4 cm, area of cross-section $10^{-3}m^2$ and total number of turn 10^3?

A. 4 mH

B. 4H

C. 40 H

D. 0.4 H

Answer: A

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33. A current $I = 10\sin(100\pi t)$ amp. Is passed in first coil, which induces a maximum e.m.f of 5π volt in second coil. The mutual inductance between the coils is-

A. 10 mH

B. 15 mH

C. 25 mH

D. 5 mH

Answer: D

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34. What is the self-inductance of an air-core solenoid 1 m long, diameter 0.05 m, if it has 500 turns? Take, $\pi^2 = 10$.

A. $3.15 \times 10^{-4} H$

B. $4.8 \times 10^{-4} H$

C. $5 \times 10^{-4} H$

D. $6.25 \times 10^{-4} H$

Answer: D

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35. A coil of inductance 0.2 H and 1.0 W resistance is connected to a 90 V source. At what rate will the current in the coil grow at the instant the coil is connected to the source?

A. $450As^{-1}$

B. $4.5As^{-1}$

C. $45As^{-1}$

D. $0.45As^{-1}$

Answer: A

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36. In a current carrying long solenoid, the field produced does not depend upon

A. number of turns per unit length

B. current flowing

C. radius of solenoid

D. all of the above

Answer: C

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37. Two coils of inductances L_1, and L_2 are linked such that their mutual inductance is M

A. $M \propto \sqrt{L_1 L_2}$

B. $M \propto \sqrt{\left(\frac{L_1}{L_2}\right)}$

C. $M \propto \sqrt{\left(\frac{L_2}{L_1}\right)}$

D. None of these

Answer: A

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38. According to phenomenon of mutual inductance,

A. the mutual inductance does not depend on the geometry of the two cells involved

B. the mutual inductance depends on the intrinsic magnetic property like relative permeability of the material

C. the mutual inductance is independent of the magnetic property of the material

D. ratio of magnetic flux produced by the coil 1 at the place of the coil2 and the current in the coil 2 will be same even after interchanging the coils

Answer: B

39. Two coil are placed close to each other. The mutual inductance of the pair of coils depends upon.

A. the rates at which currents are changing in the two coils

B. relative positive and orientation of the two coils

C. the materials of the wires of the coils

D. the current in the two coils

Answer: B

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40. A coil is wound as a transformer of rectangular cross section. If all the linear dimension of the transformer are increased by a factor 2 and the number of turns per unit length of the coil remain the same, the self-inductance increased by a factor of

A. 16

B. 8

C. 4

D. 2

Answer: B

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41. A coil of wire of a certain radius has 100 turns and a self inductance of 15 mH. The self inductance of a second similar coil of 500 turns will be

A. 75 mH

B. 375 mH

C. 15 mH

D. None of these

Answer: B

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42. 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

Answer: C

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43. How much mutual inductance will be produced (in joule) if the change in magnetic flux in any coil Y due to current of 4 A in any associated coil X is given by 0.4 Wb?

A. 0.2 H

B. 0.4 H

C. 0.6 H

D. 0.1 H

Answer: D

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44. Two inductors each of inductance L are joined in parallel. Their equivalent inductance is

A. zero

B. $\frac{L}{2}$

C. L

D. 3L

Answer: B

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45. The number of turns of primary and secondary coils of a transformer are 5 and 10 respectively and the mutual inductance of the tranformar is 25 henry. Now the number of turns in the primary and secondary of the transformar are made 10 and 5

respectivaly. The mutual inductance of the transformar in henry will be

A. 25 H

B. 12.5 H

C. 50 H

D. 6.25 H

Answer: A

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46. A coil resistance R and inductance L is connected to a battery of emf E volt. The final current in the coil is

A. $\frac{E}{R}$

B. $\frac{E}{L}$

C. $\sqrt{\left(\frac{E}{R^2+L^2}\right)}$

D. $\sqrt{\left(\frac{EL}{R^2+L^2}\right)}$

Answer: A

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47. The self inductance of a coil which produces 5V when the current changes from 3A to 2A in one millisecond is

A. 5000 H

B. 5 mH

C. 50 H

D. 5 H

Answer: B

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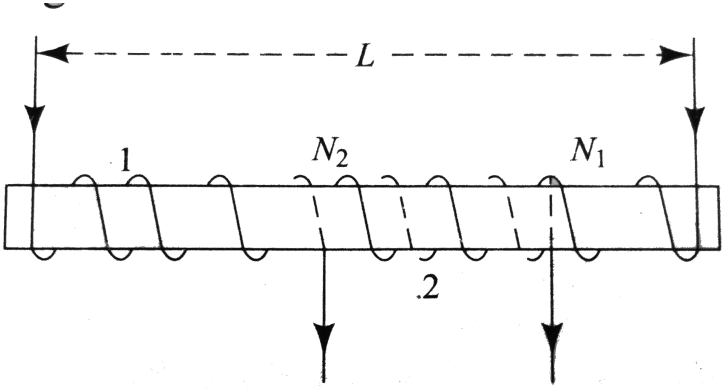
48. A long solenoid of length L, cross section A having N_1 turns has about its center a small coil of N_2 turns as shows in Fig The mutual inductance of two circuits is



A. $\mu_0 u_r \dfrac{N_1 N_2}{l}$

B. $\dfrac{\mu_0 u_r N_1 N_2}{Al}$

C. $\mu_0 u_r N_1 N_2 Al$

D. $\frac{\mu_0 u_r N_1 N_2 A}{l}$

Answer: D

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49. An air-cored coil has a self-inductance of 0.1 H. A soft iron core of relative permeability 1000 is 1/10th. The value of self-inductance now becomes

A. 1 mH

B. 10 mH

C. 1H

D. 10 H

Answer: C

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50. Two coils A and B have 200 and 400 turns respectively. A current of 1 A in coil A causes a flux per turn of 10^{-3} Wb to link with A and a flux per turn of 0.8×10^{-3} Wb through B. the ratio of mutual inductance of A and B is

A. 0.625

B. 1.25

C. 1.5

D. 1.625

Answer: A

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51. In hertz's experiment, the rods connected with an induction coil behave as

A. an inductor

B. capacitor

C. resistor

D. an induction coil

Answer: A

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

A. becomes 4 times

B. becomes 2 times

C. becomes 1/4 times

D. remains unchanged

Answer: A

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53. The output power in step-up transformer used in practice is

A. greater than the input power

B. equal to the input power

C. less than the input power

D. None of these

Answer: C

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54. A transformer having efficiency of $90\,\%$ is working on $200V$ and $3kW$ power supply. If the current in the secondary coil is $6A$, the voltage across the secondary coil and current in the primary coil respectively are

A. 300 V, 15 A

B. 450 V, 15 A

C. 450 V, 13.5 A

D. 600 V, 15 A

Answer: B

Watch Video Solution

55. in a step-up transformer, the turn ratio is $1:2$ leclanche cell (e.m.f. 1.5V) is connected across the primary. The voltage devloped in the secondary would be

A. 3.0 V

B. 0.75 V

C. 1.5 V

D. zero

Answer: D

Watch Video Solution

56. The core of any transformaer is laminated so as to

A. energy losses due to eddy currents may be minimised

B. the weight of the transfomer may be reduced

C. rusting of the core may be prevented

D. ratio of voltage in primary and secondary may be increased.

Answer: A

Watch Video Solution

57. How much current is drawn by the primary coil of a transformer which steps down 220 V to 22 V to operate device with an impedance of 220 ohm.

A. $1A$

B. 0.1 A

C. 1 mA

D. 0.1 mA

Answer: B

Watch Video Solution

58. In an ideal transfomer, the voltage is step-down from 11 kV to 220 V. if the primary current be 100 A, the current in the secondary should be

A. 5 kA

B. 1kA

C. 0.5 kA

D. 1 kA

Answer: A

Watch Video Solution

59. For a large industrial city with much load variations, the DC generator should be

A. series wound

B. shunt wound

C. mixed wound

D. None of these

Answer: C

Watch Video Solution

60. In an ideal transfomer, the voltage is step-down from 11 kV to 220 V. if the primary current be 100 A, the current in the secondary should be

A. $1kA$

B. $0.5kA$

C. 2A

D. $5kA$

Answer: D

Watch Video Solution

61. When power is drawn from the secondary coil of the transformer, the dynamic resistance

A. increases

B. decreases

C. remains unchanged

D. changes erratically

Answer: A

Watch Video Solution

62. An electric motor runs a $D.C.$ source of e.m.f. $200V$ and draws a current of $10A$. If the efficiency is $40\ \%$, then ressistance of the armature is:

A. 2Ω

B. 8Ω

C. 12Ω

D. 16Ω

Answer: C

Watch Video Solution

63. In step-up transfomer, the relation between number of turns in primary (N_p) and number of turns in secondary (N_S) coils is

A. N_S is greater than N_p

B. N_p is greater than N_S

C. N_S is equal to N_p

D. $N_p = 2N_S$

Answer: A

64. A transformer is used to light a 140 W, 24 V lamp from 240 V AC mains. The current in mains cable is 0.7 A, find the efficiency of transformer.

A. 0.9

B. 0.8

C. 0.7

D. 0.6

Answer: B

Watch Video Solution

65. The armature of a DC motor has 20Ω resistance. It draws a current of $1.5A$ when run by $200VDC$ supply The value of back emf induced in it will be

A. 150 V

B. 170 V

C. 190 V

D. 180 V

Answer: C

Watch Video Solution

66. Voltage in the secondary coil of a transfomer does not depend upon

A. frequency of the source

B. voltag ein the primary coil

C. ratio of number of turns in the two coils

D. both (b) and (c)

Answer: A

Watch Video Solution

67. A step up transformer operates on a $230V$ line and a load current of 2 ampere. The ratio of the primary and secondary windings is $1:25$. What is the current in the primary?

A. 12.5A

B. 50 A

C. 8.8 A

D. 25 A

Answer: B

Watch Video Solution

68. The armature of a shunt wound motor can with stand current up to 8 A before it overheats and it damaged. If the armature resistance is 0.5Ω ,minimum back emf that must be motor is connected to a 120 V line is

A. 120 V

B. 116 V

C. 124 V

D. 4 V

Answer: B

Watch Video Solution

69. A step-down transformer has 50 turns on secondary and 1000 turns on primary winding. If a transformer is connected to 220 V, 1A C AC source, then what is output current of the transformer ?

A. $\frac{1}{20}A$

B. 20 A

C. 100 A

D. $2A$

Answer: B

Watch Video Solution

70. A six pole generotar with fixed field excitation developes an e.m.f. of $100V$ when operating at 1500 r.p.m. At what speed must it rotate to develop $120V$?

A. 1200 rps

B. 1800 rps

C. 1500 rpm

D. 400 rpm

Answer: B

Watch Video Solution

71. A step-down transfomer reduces the voltage of a transmission line from 2200 V to 220 V. the power delivered by it is 880 W and its efficiency is 88%. The input current is

A. 4.65 mA

B. 0.045 A

C. 0.45 A

D. 4.65 A

Answer: C

Watch Video Solution

72. The e.m.f. induced in a secondary coil is $20000V$ when the current breaks in the primary coil. The mutual inductance is $5H$ and the current reaches

to zero in $10^{-4}\,\mathrm{sec}$ in the primary. The maximu current in the primary before it breaks is

A. 0.1 A

B. 0.4 A

C. 0.6 A

D. 0.8 A

Answer: B

Watch Video Solution

73. A current of 5A is flowing at 220V in the primary coil of a transformer. If the voltage produced in the secondary coil is 2200V and 50% of power is lost, then the current in the secondary coil will be –

A. 2.5 A

B. $5A$

C. 0.25 A

D. 0.5 A

Answer: C

Watch Video Solution

74. 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. through a circular coil, current is passed

Answer: A

Watch Video Solution

75. The induced emf of a generator when the flux of poles is doubled and speed is doubled

A. becomes half

B. remains same

C. becomes double

D. becomes 4 times

Answer: D

Watch Video Solution

76. If the coils of a transfomer are made up of thick wire, then

A. eddy currents loss will be more

B. magnetic flux leakage is reduced

C. Joule's heating loss is increased

D. Joule's heating loss is reduced

Answer: D

 Watch Video Solution

77. If a transfomer of an audio amplifier has output impedance 8000Ω and the speaker has input impedance of 8Ω, the primary and secondary turns of this transfomer connected between the output

of amplifier and to loud speaker should have the ratio

A. $1000:1$

B. $100:1$

C. $1:32$

D. $32:1$

Answer: D

Watch Video Solution

78. Which of the following is not transducer?

A. Loudspeaker

B. Amplifier

C. Microphone

D. all of the above

Answer: B

Watch Video Solution

79. For high frequency, a capacitor offers

A. more resistance

B. less resistance

C. zero resistance

D. none of these

Answer: B

Watch Video Solution

80. By what percentage the impedance in an AC series circuit should be increased so that the power factir changes from $(1/2)\text{to}(1/4)$ (when R is constant)?

A. 0.2

B. 0.5

C. 0.25

D. 1

Answer: D

Watch Video Solution

81. The maximum value of a.c. voltage in a circuit is 707 V . Its rms value is

A. 70.7 V

B. 100 V

C. 500 V

D. 707 V

Answer: C

Watch Video Solution

82. Which current do not change direction with time?

A. DC current

B. AC current

C. Both (a) and (b)

D. Neither (a) nor (b)

Answer: A

Watch Video Solution

83. Which of the following represents the value of voltage and current at that instant?

A. $V_m \sin \omega t,\ i_m \sin \omega t$

B. $V_m \cos \omega t,\ i_m \cos \omega t$

C. $-V_m \sin \omega t,\ -i_m \sin \omega t$

D. $-V_m \cos \omega t,\ -i_m \cos \omega t$

Answer: A

 Watch Video Solution

84. A $60\mu F$ capacitor is connected to a 110V, 60 Hz AC supply determine the rms value of the curent in the circuit.

A. $2A$

B. 2.49 A

C. 1.85 A

D. 2.05 A

Answer: B

Watch Video Solution

85. A group of electric lamps having total power rating of 600 W, 200 V is supplied by an AC voltage $V = 169\sin(314t + 60^\circ)$. The rms vlaue of the current is

A. $10A$

B. 9.04 A

C. 1.48 A

D. 8 mA

Answer: C

Watch Video Solution

86. In an AC circuit the instantaneous values of emf and current are

$e = 200 \sin 30t$ volt and $i = 2 \sin\left(300t + \frac{\pi}{3}\right)$ amp

The average power consumed (in watts) is

A. 200

B. 100

C. 50

D. 400

Answer: B

Watch Video Solution

87. The peak value of 220 a.c. is

A. $240\sqrt{2}V$

B. $230\sqrt{2}V$

C. $220\sqrt{2}V$

D. $200\sqrt{2}V$

Answer: C

Watch Video Solution

88. Alternating current can not be measured by D.C. Ammeter because

A. AC cannot pass through DC ammeter

B. AC changes direction

C. average value of current for complete cycle is zero

D. DC ammeter will get damaged

Answer: C

Watch Video Solution

89. An AC source is 120 V-60 Hz. The value of voltage after 1/720 s from start will be

A. 20.2 V

B. 42.4 V

C. 84.8 V

D. 106.8 V

Answer: C

Watch Video Solution

90. The instantaneous voltage through a device of impendance 20 Ω is V=$80\sin 100\pi t$. The effective value of the current is

A. 0.125

B. 2.828 A

C. 1.732 A

D. 0.16666666666667

Answer: B

Watch Video Solution

91. For a given ac $i = i_m \sin \omega t$, show that the average power dissipated in a resistor R over complete cycle is $\frac{1}{2} i_m^2 R$.

A. $P = \frac{1}{2} i_m^2 R$

B. $P = \frac{1}{4} i_m^2 R$

C. $P = \frac{3}{4} i_m^2 R$

D. $P = i_m^2 R$

Answer: A

Watch Video Solution

92. If the frequency is doubled, what happens to the capacitive reactance and the current?

A. Capacitive reactance is halved, the current is doubled

B. capacitive reactance is doubled, the current is halved

C. capacitive reactance and the current are halved

D. capacitive reacttance and the current are doubled

Answer: A

Watch Video Solution

93. Voltage and current in an ac circuit are given by

$V = 5\sin\left(100\pi t - \frac{\pi}{6}\right)$ and

$I = 4\sin\left(100\pi t + \frac{\pi}{6}\right)$

A. voltage leands the current by 30°

B. current leads the voltage by 30°

C. current leads the voltage by 60°

D. voltage leads the current by 60°

Answer: C

Watch Video Solution

94. To express AC power in the same from as DC power, a special value of current is defined and used, is called

A. root mean square current (l_{rms})effective current

B. effective current

C. induced current

D. Both (a) and (b)

Answer: D

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95. A light bulb is rated at 100 W for a 220 V ac supply . The resistance of the bulb is

A. 48Ω

B. 484Ω

C. 480Ω

D. 350Ω

Answer: B

Watch Video Solution

96. The peak vlaue of alternating current is $5\sqrt{2}$. The mean square value fo current will be

A. $5A$

B. 2.5 A

C. $5\sqrt{2}A$

D. None of these

Answer: A

Watch Video Solution

97. If reading of an ammeter is 10 A, the peak value of current is

A. $\frac{10}{\sqrt{2}}A$

B. $\frac{5}{\sqrt{2}}A$

C. $20\sqrt{2}A$

D. $10\sqrt{2}A$

Answer: D

Watch Video Solution

98. For high frequency, a capacitor offers

A. more resistance

B. less resistance

C. zero resistance

D. None of these

Answer: B

Watch Video Solution

99. Alternating current is transmitted to distant places at

A. at high voltage and low current

B. at high voltage and high current

C. at low voltage and low current

D. at low voltage and high current

Answer: A

Watch Video Solution

100. In an a.c. Circuit the voltage applied is $E = E_0 \sin(\omega)t$. The resulting current in the circuit is $I = I_0 \sin\left((\omega)t - \left(\frac{\pi}{2}\right)\right)$. The power consumption in the circuit is given by

A. $0.5V_0l_0W$

B. $0.707V_0l_0W$

C. $1.919V_0l_0W$

D. zero

Answer: D

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101. RMS value of AC current is . . . . A . . . . Times its peak value. Here, A refers to

A. 0.704

B. 0.707

C. 0.709

D. 0.705

Answer: B

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102. If L and R denote the inductance and resistance of a coil respectively, then $\frac{R}{L}$ has the dimensions of

A. time

B. mass

C. length

D. frequency

Answer: D

Watch Video Solution

103. The average power dissipated in AC circuit is 2W. If a current flowing throuh a circuit is 2A, impedance is 1Ω, then what is the power factor of the circuit?

A. 0.5

B. 1

C. zero

D. $\frac{1}{\sqrt{2}}$

Answer: A

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104. A lamp consumes only $50\,\%$ of peak power in an $a.c.$ circuit. What is the phase difference between the applied voltage and the circuit current

A. $\frac{\pi}{3}$ rad

B. $\frac{\pi}{6}$ rad

C. $\frac{\pi}{4}$ rad

D. $\frac{\pi}{2}$ rad

Answer: A

Watch Video Solution

105. In an electrical circuit R, L, C and an 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 $\pi/3$. If instead, C is removed from the circuit,

difference the phase difference is again $\pi/3$. The power factor of the circuit is

A. $\frac{1}{2}$

B. $\frac{1}{\sqrt{2}}$

C. $\sqrt{3}$

D. $\frac{\sqrt{3}}{2}$

Answer: C

Watch Video Solution

106. The impedance of a circuit, when a resistance R and an inductor of inductance are connected in series in an AC circuit of frequency f is

A. $\sqrt{R + 2\pi^2 f^2 L^2}$

B. $\sqrt{R + 4\pi^2 f^2 L^2}$

C. $\sqrt{R^2 + 4\pi^2 f^2 L^2}$

D. $\sqrt{R^2 + 2\pi^2 f^2 L^2}$

Answer: C

Watch Video Solution

107. An inductive coil has a resistance of 100Ω. When an AC signal of frequency 1000 Hz is applied to the coil, the voltage leads the current by 45°. What is the inductance of the coil?

A. $\frac{1}{10\pi}$

B. $\frac{1}{20\pi}$

C. $\frac{1}{40\pi}$

D. $\frac{1}{60\pi}$

Answer: B

Watch Video Solution

108. A circuit contains a capacitor and inductance each with negligible resistance. The capacitor is initially charged and the charging battery is disconnected. At subsequent time, the charge on the capacitor will

A. increase exponentially

B. decrease exponentially

C. decrease linearly

D. remain constant

Answer: D

 Watch Video Solution

109. The instantaneous values of current and voltage in an AC circuit are given by

I = 6sin (100πt + π / 4)

V = 5sin (100 πt - π / 4), then

A. The instantaneous values of current and voltage in an $l = 6\sin\left(100\pi t + \frac{\pi}{2}\right), V = 5\sin\left(100\pi t - \frac{\pi}{2}\right)$, ten

B. current leads the voltage by 45°

C. voltage leads the current by 90°

D. current leads the voltage by 90°

Answer: C

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110. In a LCR circuit the $P.D$ between the terminals of the inductance is $60V$, between the terminals of the capacitor is $30V$ and that between the terminals of resistance is $40V$. The supply voltage will be equal to.....

A. 50 V

B. 70 V

C. 130 V

D. 10 V

Answer: A

Watch Video Solution

111. In the non-resonant circuit, what will be the nature of the circuit for frequencies heigher than the resonant frequency?

A. Resistive

B. capacitive reactance is doubled, the current is halved

C. Inductive

D. None of these

Answer: C

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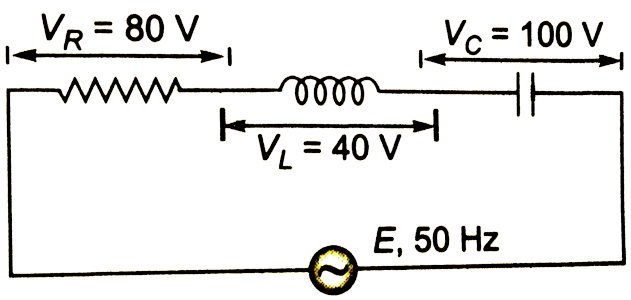
112. The value of alternating emf E in the given circuit will be



A. 220 V

B. 140 V

C. 100 V

D. 20 V

Answer: C

Watch Video Solution

113. The reactance of a coil when used in the domestic AC power supply $(220V, 50cycles)$ is $50ohm$. The inductance of the coil is nearly

A. 0.16 H

B. 0.22 H

C. 2.2 H

D. 1.6 H

Answer: A

Watch Video Solution

114. In terms of q, the voltage equation for series L-C-R circuit is given by

A. $L\frac{dq}{dt} = R\frac{dq}{dt} + q/C = V_m \sin \omega t$

B. $L\frac{d^2q}{dt^2} + R\frac{dq}{dt} + q/C = V_m \sin \omega t$

C. $L\frac{d^2q}{dt} - R\frac{dq}{dt} + q/C = V_m \sin \omega t$

D. $L\frac{d^2q}{dt} - R\frac{dq}{dt} - q/C = V_m \sin \omega t$

Answer: B

Watch Video Solution

115. A charged 30 μF capacitor is connected to a 27 mH inductor. What is the angular frequency of free oscillations of the circuit ?

A. $1.1s^{-1}$

B. $1.1 \times 10^{3}s^{-1}$

C. $1s^{-1}$

D. $1 \times 10^{-3}s^{-1}$

Answer: B

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116. A resistance of 200Ω and capacitor of $15\mu F$ are connected in series to a 220 V, 50 Hz AC source. The voltage (rms) across the resistor and capacitor is that

A. 151 V, 160.4 V

B. 150 V, 100.3 V

C. 220 V, 91.8 V

D. 145 V, 311.3 V

Answer: A

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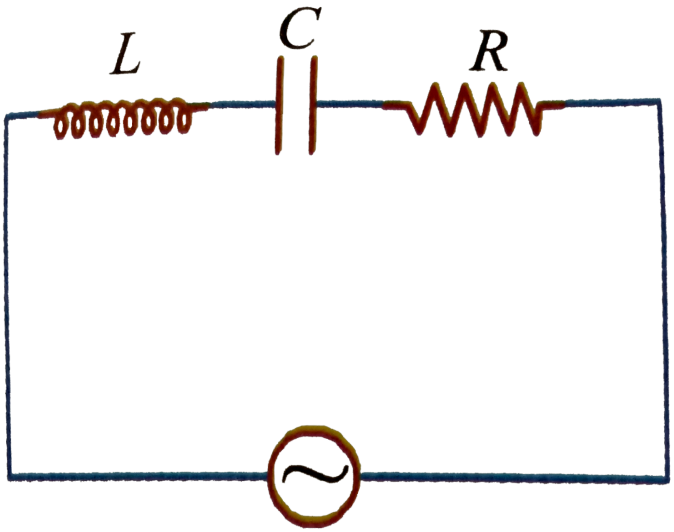
117. For the LCR circuit, shown here, the current is observed to lead the applied voltage. An additional capacitor C', when joined with the capacitor C present in the circuit, makes the power factor of the circuit unity. The capacitor C' must have been connected in:



A. series with C and has a magnitude

$$\frac{C}{(\omega^2 LC - 1)}$$

B. series with C and has a magnitude

$$\frac{(1 - \omega^2 LC)}{\omega^2 L}$$

C. parallel with C and has a magnitude

$$\frac{(1 - \omega^2 LC)}{\omega^2 L}$$

D. parallel with C and has a magnitude

$$\frac{C}{(\omega^2 LC - 1)}$$

Answer: C

Watch Video Solution

118. The current in the series L-C-R circuit is

A. $i = i_m \sin(\omega t + \phi)$

B. $i = \dfrac{v_m}{\sqrt{R^2 + (X_c - X_L)^2}} \sin(\omega t + \phi)$

C. $i = 2i_m \cos(\omega t + \phi)$

D. Both (a) and (b)

Answer: D

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119. the impedance Z in an AC circuit is given by

A. $Z = \sqrt{R^2 + (X_C - X_L)^2}$

B. $Z = \sqrt{R^2 + 3(X_L - X_C)^2}$

C. $Z = \sqrt{R^2 - (X_C + X_L)^2}$

D. $Z = \sqrt{R^2 + 2(X_L - X_C)^2}$

Answer: A

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120. Match the following columns.

Column I		Column II	
A.	V_R	1.	$\pi/2$ ahead of I
B.	V_C	2.	Parallel to I
C.	V_L	3.	$\pi/2$ behind I

A. 1 2 3

B. 2 3 1

C. 3 1 2

D. 3 2 1

Answer: B

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121. 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

Answer: B

Watch Video Solution

122. A coil of 0.01 henry inductance and 1 ohm resistance is connected to 200 volt, 50 Hz ac supply. Find the impedance of the circuit and time lag between max. alternating voltage and current.

A. 3.3Ω and $\frac{1}{250}s$

B. $3.9k\Omega$ and $\frac{1}{160}s$

C. $4.2k\Omega$ and $\frac{1}{100}s$

D. $2.8k\Omega$ and $\frac{1}{120}s$

Answer: A

Watch Video Solution

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

A. $10^4 W$

B. 2.5 kW

C. 5 kW

D. 10 W

Answer: B

Watch Video Solution

124. In an L-C-R circuit, if V is the effective value of the applied voltage V_R is the voltage across R, V_L is the effective voltage across L, V_C is the effective voltage across C, then

A. $V = V_R + V_L + V_C$

B. $V^2 = V_R^2 + V_L^2 + V_C^2$

C. $V^2 = V_R^2 + (V_L - V_C)^2$

D. $V^2 = V_L^2 + (V_R - V_C)^2$

Answer: C

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125. An alternating voltage (in volts) given by $V = 200\sqrt{2}\sin(100t)$ is connected to $1\mu F$ capacitor through an ideal ac ammeter in series. The reading of the ammeter and the average power consumed in the circuit shall be

A. 10 mA

B. 20 mA

C. 40 mA

D. 80 mA

Answer: B

Watch Video Solution

126. An l-C circuit contains 10 mH inductor and a 25 μF capacitor. The ratio of the time periods for the energy to be completely magnetic, is

A. 0,1.57, 4.71

B. 1.57,3.14,4.71

C. 1.57,4.71,7.85

D. None of these

Answer: B

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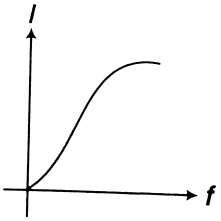
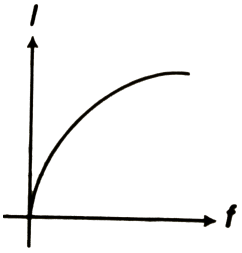
127. An AC source of variable frequency f is connected to an LCR series circuit. Which one of the graphs in figure represents the variation of current of current I in the circuit with frequecy f?

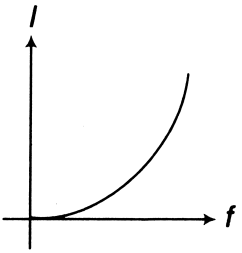
A.

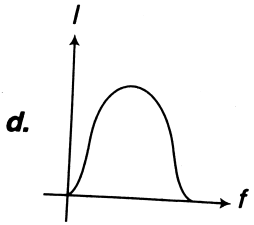


B.



C.



D. 

Answer: D

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Example 2

1. 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 loopin 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 unduced in the loop

Answer: A

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2. Magneic flux linked with a coil is $\phi = 5t^2 + 2t + 3,$ where t is in sec and ϕ is in weber. At time t=1 s, the value of induced emf (in V) is

A. 14

B. 1.2

C. 12

D. 6

Answer: C

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3. If L, C and R denote the inductance, capacitance and resistance respectively, the dimensional formula for C^2LR is

A. $\left[ML^{-2}T^{-1}I^0\right]$

B. $\left[M^0L^0T^3I^0\right]$

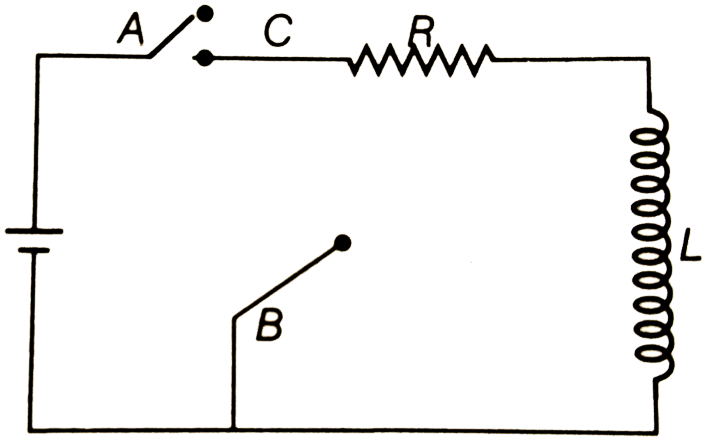
C. $\left[M^{-1}L^{-2}T^6I^2\right]$

D. $\left[M^0L^0T^0I^0\right]$

Answer: B

Watch Video Solution

4. In the circuit shown here, the point C is kept connected to the point A till the current flowing through the circuit becomes constant. Afterward, suddenly ponit C is disconnected from point A and connected to point B at time t=0. ratio of voltage across resistance and the inductor at t=L/R will be equal to



A. $\frac{e}{1-e}$

B. 1

C. -1

D. $\frac{1-e}{e}$

Answer: C

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5. Answer the following questions :

(a) When a low flying aircraft passes overhead, we sometimes notice a slight shaking of the piture on our TV screen. Suggest a possible expanation.

(b) As you have learnt in the text, the principle of

linear superposition of wave displacement is basic to understanding intensity distributions in diffractions and interference patterns. What is the justification of this principle ?

A. diffraction of the signal received from the antenna

B. interference of the direct signal received by the antenna with the weak signal reflected by the passing aircraft

C. change in magnetic flux occuring due to the passage of aircraft

D. vibration created by the passage of aircraft

Answer: C

Watch Video Solution

6. If E_0 is the peak emf , l_0 is the peak current and ϕ is the phase difference between them, then the average power dissipation in the circuit is

A. $\frac{1}{2}E_0 l_0$

B. $\frac{E_0 l_0}{\sqrt{2}}$

C. $\frac{1}{2}E_0 l_0 \sin\phi$

D. $\frac{1}{2}E_0 l_0 \cos\phi$

Answer: D

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7. A capacitor $50\mu F$ is connected to a power source $V220\sin 50t$ (V in volt, t in second). The value of rms current (in ampere) is

A. $\frac{\sqrt{2}}{0.55}$

B. 0.55 A

C. $\sqrt{2}A$

D. $\frac{0.55}{\sqrt{2}}A$

Answer: D

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8. The natural frequency of an LC- circuit is 1,25,000 cycles per second. Then the capacitor C is replaced by another capacitor with a dielectric medium of dielectric constant k. In this case, the frequency decreases by 25 kHz. The value of k is

A. 3

B. 2.1

C. 1.56

D. 1.7

Answer: C

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9. The ratio of secondary to primary turns is 4:5. if power input is P, then the ratio of power output to power input is

A. $4:9$

B. $9:4$

C. $5:4$

D. $1:1$

Answer: D

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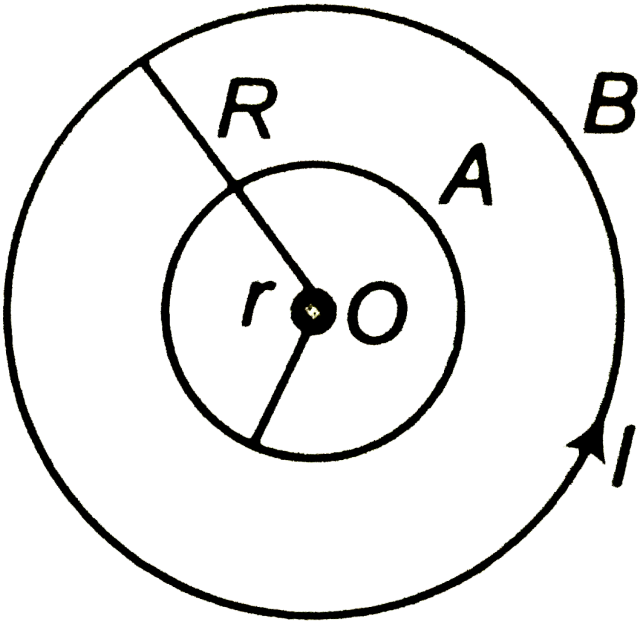
10. O is the centre of two coplanar concentric circular conductors, A and B, of radii r and R respectively as shown in the figure. Here, $r < < < R$. The mutual inductance of the system

of the conductors can be given by



A. $\frac{\mu_0 \pi r^2}{2R}$

B. $\frac{\mu_0 \pi R^2}{2r}$

C. $\frac{\pi R^2}{\mu_0 r}$

D. $\frac{\mu_0 \pi r}{2R}$

Answer: A

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11. In an circuit, V and I are given by $V = 150\sin(150t)V$ and $I = 150\sin\left(150t + \frac{\pi}{3}\right)A$. The power dissipated in the circuit is

A. zero

B. 5625 W

C. 150 W

D. 106 W

Answer: B

Watch Video Solution

12. Alternating current can not be measured by D.C. Ammeter because

A. AC cannot pass through DC ammeter

B. average value of current in complete cycle is zero

C. AC is virtual

D. AC changes its direction

Answer: B

Watch Video Solution

13. A bulb is connected first with DC and the then AC of same voltage then it will shine brightly with

A. AC

B. DC

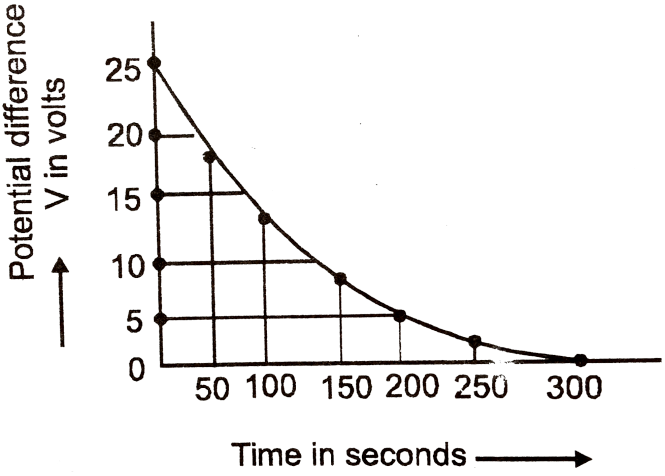
C. brightness will be in ratio 1/1.4

D. equally with both AC and DC supply

Answer: D

Watch Video Solution

14. The figure shows an experimental plot discharging of a capacitor in an RC circuit. The time constant of this circuit lies between:



A. 150 s and 200 s

B. 0 s and 50 s

C. 50 s and 100 s

D. 100 s and 150 s

Answer: D

Watch Video Solution

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

A. 20 W

B. 40 W

C. 1000 W

D. 0 W

Answer: D

Watch Video Solution

16. In an AC circuit $I = 100 \sin 200\pi t$. The time required for the current to achieve its peak value of will be

A. $\frac{1}{100} s$

B. $\frac{1}{200}s$

C. $\frac{1}{300}s$

D. $\frac{1}{400}s$

Answer: D

Watch Video Solution

17. In a series resonant LCR circuit the voltage across R is 100 volts and R = $1k(\Omega)withC = 2(\mu)F.$ The resonant frequency (ω) is $200rad/s.$ At resonance the voltage across L is

A. 100 V

B. 40 V

C. 250 V

D. 400 V

Answer: C

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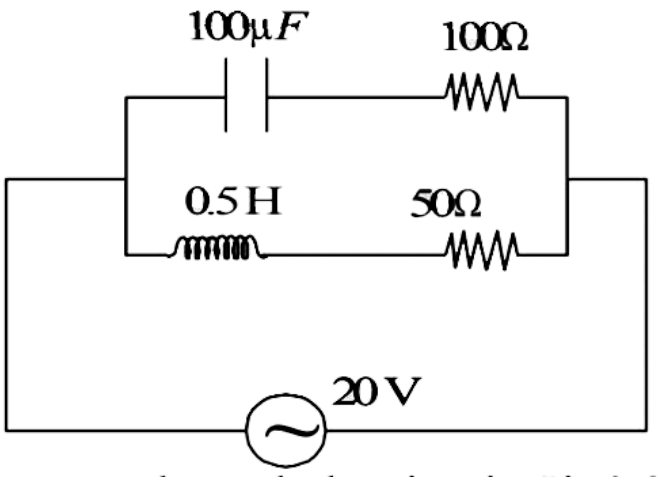
18. In the given circuit, the AC source has $(\omega) = 100 rad/s$. Considering the inductor and

capacitor to be ideal, the correct choice(s) is (are)



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 100Ω resistor $= 10\sqrt{2}V$

D. The voltage across 50Ω resistor =10V

Answer: A

Watch Video Solution

19. A metal conductor of length 1m rotates vertically about one of its ends at angular velocity 5 radians per second. If the horizontal component of earth's magnetic field is $0.2 \times 10^{-4} T$, then the emf developed between the two ends of hte conductor is

A. $5\mu V$

B. $5mV$

C. $50\mu V$

D. $50mV$

Answer: C

Watch Video Solution

20. Energy required to establish a current of 4 A in a coil of self-inductance L=200 mH is

A. 0.16 J

B. 0.18 J

C. 0.40 J

D. 1.6 J

Answer: D

Watch Video Solution

21. The maximum voltage in DC circuit is 282 V. the effective voltage in AC circuit will be

A. 200 V

B. 300 V

C. 400 V

D. 564 V

Answer: A

Watch Video Solution

22. A generator produces a time varying voltage given by $V = 240 \sin 120t$, where t is in second. The rms voltage and frequency are

A. 60 Hz and 240 V

B. 19 Hz and 120 V

C. 19 Hz and 170 V

D. 754 Hz and 70 V

Answer: C

Watch Video Solution

23. An AC is given by the equation $i = i_1 \cos \omega t + i_2 \sin \omega t$. The r.m.s. current is given by

A. $\frac{1}{\sqrt{2}}(i_1 + i_2)$

B. $\frac{1}{\sqrt{2}}(i_1 + i_2)^2$

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

D. $\frac{1}{2}\left(i_1^2 + i_2^2\right)^{1/2}$

Answer: C

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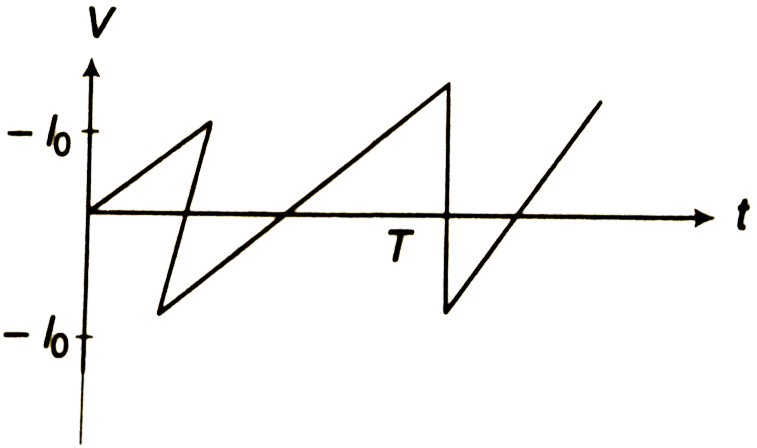
24. The average current in terms of l_0 for the waveform shown is



A. l_0

B. $\frac{l_0}{3}$

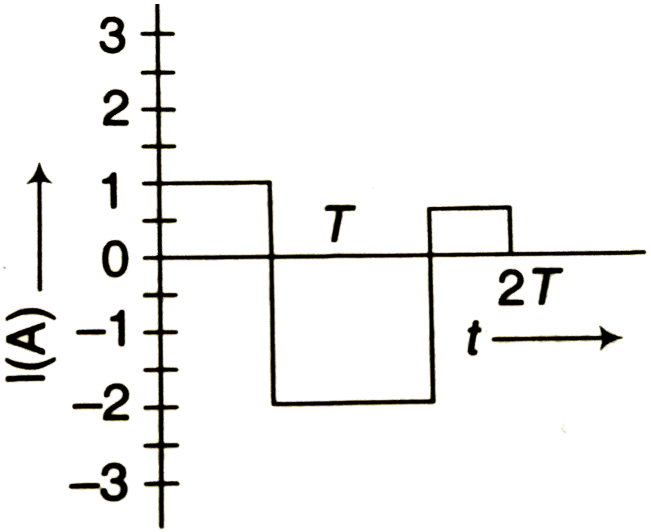
C. $\frac{l_0}{2}$

D. $\frac{l_0}{4}$

Answer: C

Watch Video Solution

25. The alternating current in a circuit is described by graph shown in figure. The rms current obtained from graph would be



A. 1.4 A

B. 2.2 A

C. 1.9 A

D. 2.6 A

Answer: A

Watch Video Solution

26. An AC circuit consists of a 220Ω resistance andn a $0.7H$ choke. Find the power obsorbed from $220V$ and $50Hz$ source connected in this circuti if the resistance and choke are joined

(a) In series

(b) in parallel.

A. 110 W

B. 50 W

C. 220 W

D. 440 W

Answer: A

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27. Match the following column I to column II.

	Column I		Column II
A.	Condenser	1.	increases AC
B.	Inductor	2.	reduces AC
C.	Energy dissipation is due to	3.	is conductor for DC
D.	A transformer	4.	resistance only

A. $A-2, B-2, C-4, D-1,2$

B. $A-4, B-3,4, C-2, D-2,3$

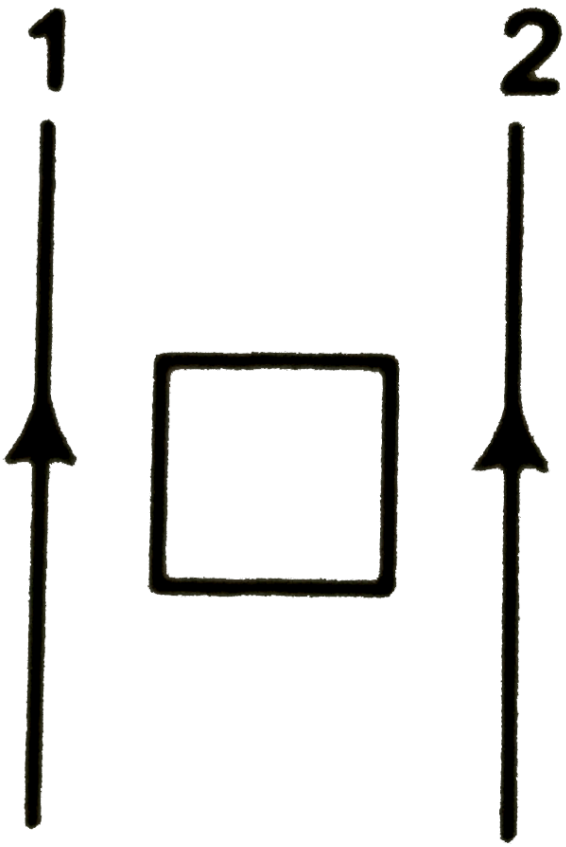
C. $A-1, B-2, C-4, D-2$

D. $A-3, B-2, C-4, D-1$

Answer: A

Watch Video Solution

28. A square loop is symmetrically placed between two infinitely long current carrying wires in the same direction. Magnitude of current in both the wires are same. Now, match the following two columns.



Column I	Column II
A. Loop is moved towards right	1. Induced current in the loop is clockwise
B. Loop is moved towards left	2. Induced current in the loop is anti-clockwise
C. Wire-1 is moved towards left	3. Induced current in the loop is zero
D. Wire-2 is moved towards right	4. Induced current in the loop is non-zero

A. $A-1, B-2, C-1,2, D-2,4$

B. $A \rightarrow 1, 4, B \rightarrow 3, 4, C \rightarrow 2, 4, D \rightarrow 1, 4$

C. $A - 1, 2, B - 2, C - 3, D - 4$

D. $A - 4, B - 2, 3, C - 2, 4, D - 4$

Answer: B

Watch Video Solution

Example 30

1. Two coaxial identical circular carrying loops are shown in the figure currents in them are in the same directions. Now, match the following two

columns.

Column I	Column II
A. Current i_1 is increased	1. Loops will attract each other
B. Current i_2 is decreased	2. Loops will repel each other
C. Loop-1 is moved towards loop-2	3. Current i_1 will increase
D. Loop-2 is moved away from loop-1	4. Current i_2 will increase

A. $A-1, B-2, C-3,4, D-4$

B. $A-1, B-2, C-3, D-4$

C. $A-1, B-2,3, C-4, D-1,4$

D. $A-3, B-1,3, C-2, D-3,4$

Answer: D

View Text Solution

Mht Cet Coner

1. Magnetic flux passing through a coil is initially 4×10^{-4} Wb. It reduces to 10% of its original value in t second. If the emf induced is 0.72 mV then t in second is

A. 0.3

B. 0.4

C. 0.5

D. 0.6

Answer: C

Watch Video Solution

2. 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.m.f. induced in secondary coil is (Frequency of AC= 50 Hz)

A. 100 V

B. 200 V

C. 300 V

D. 400 V

Answer: B

3. Same current is flowing in two alternating circuits. The first circuit contains only inductances and the other contains only a capacitor, if the frequency of the e.m.f of AC is increased, the effect on the value of the current will be

A. increase in first circuit and decrease in second

B. increase in both circuits

C. decrease in both circuits

D. decrease in first circuit and increase in second

Answer: D

Watch Video Solution

4. Two coils A and B have mutual inductance 2×10^{-2} Henry if the current in he primary coil is i=5 sin $(10\pi t)$ then the maximum value of emf induced in coil B is

A. π volt

B. $\frac{\pi}{2}$ volt

C. $\frac{\pi}{3}$ volt

D. $\frac{\pi}{4}$ volt

Answer: A

Watch Video Solution

5. In LCR series circuit , an alternating emf e and current i are given by the equations $e = 100\sin(100t)$ volt .

$i = 100\sin\left(100t + \frac{\pi}{3}\right)$ mA

The average power dissipated in the circuit will be

A. 100 W

B. 10 W

C. 5 W

D. 2.5 W

Answer: D

Watch Video Solution

6. AC measuring instruments measures

A. peak value

B. rms value

C. any value

D. average value

Answer: B

Watch Video Solution

7. The rms value of current I_{rms} is

A. $\frac{l_0}{2\pi}$

B. $\frac{l_0}{\sqrt{2}}$

C. $\frac{2l_0}{\pi}$

D. $\sqrt{2}l_0$

Answer: B

Watch Video Solution

8. If the inductance and capacitance are both doubled in L-C-R circuit, the reonant frequency of the circuit will.

A. decrease to one-half the original value

B. decrease to one-fourth the original value

C. increase to twice the original value

D. decrease to twice the original value

Answer: A

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9. Two coils of self-inductance L_1 and L_2 are placed closed to each other so that total flux in one coil is completely linked with other. If M is mutual inductance between them, then

A. $M = L_1 / L_2$

B. $M = L_1 L_2$

C. $M = \sqrt{L_1 L_2}$

D. $M = (L_1 L_2)^2$

Answer: C

Watch Video Solution

10. What will be the self inductance of a coid of 100 turns if a current of 5 A produces a magnetic flux 5×10^{-5} Wb?

A. 1 mH

B. 10 mH

C. $1\mu H$

D. 10 μH

Answer: A

Watch Video Solution

11. In L-C-R circuit power factor at resonance is

A. less than one

B. greater than one

C. unity

D. Can't predicted

Answer: C

Watch Video Solution

12. In a LR circuit of 3 mH dinductance and 4Ω resistance, emf $E = 4\cos 1000t$ volt is applied. The amplitude of current is

A. 0.8 A

B. $\frac{4}{7}$ A

C. $1A$

D. $\frac{4}{\sqrt{7}}A$

Answer: A

Watch Video Solution

13. Average power in the L-C-R circuit depends upon

A. current

B. phase difference only

C. emf

D. current, emf and phase difference

Answer: D

Watch Video Solution

14. When a current of 2 A is passed through a coil of 100 turns , flux associated with it is 5×10^{-5}Wb.

Find the self inductance of the coil.

A. $4 \times 10^{-3} H$

B. $4 \times 10^{-2} H$

C. $2.5 \times 10^{-3} H$

D. $10^{-3} H$

Answer: C

Watch Video Solution

15. When a rod of length l is rotated with angular velocity of ω in a perpendicular field of induction B ,

about one end , the emf across its ends is

A. $Bl^2\omega$

B. $\frac{Bl^2\omega}{2}$

C. $Bl\omega$

D. $\frac{Bk\omega}{2}$

Answer: B

Watch Video Solution

16. Same current is flowing in two alternating circuits. The first circuit contains only inductances

and the other contains only a capacitor, if the frequency of the e.m.f of AC is increased, the effect on the value of the current will be

A. increases in the first circuit and decreases in the other

B. increases in both the circuits

C. decreases in both the circuits

D. decreases in the first circuit and increases in the other.

Answer: D

 Watch Video Solution

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

A. 200

B. 100

C. 50

D. 25

Answer: C

Watch Video Solution

18. 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

Answer: B

Watch Video Solution

19. What is the value of inductance L for which the current is a maximum in series LCR circuit with $C = 10\mu F$ and $\omega = 1000\frac{rad}{s}$?

A. 100 mH

B. 1 mH

C. cannot be calculated unless R is known

D. 10 mH

Answer: A

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20. A transformer is used to light a $100W$ and $110V$ lamp from a $220V$ mains. If the main current is $0.5A$, the Efficiency of the transformer is approximately:

A. 0.3

B. 0.5

C. 0.9

D. 0.1

Answer: C

Watch Video Solution

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

$e = E_0 \sin \omega t$

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

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

A. $\frac{E_0 l_0}{2}$

B. $\frac{E_0 l_0}{2} \sin \phi$

C. $\frac{E_0 l_0}{2} \cos \phi$

D. $E_0 l_0$

Answer: C

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22. If coil is opened, then L and R become

A. $\infty, 0$

B. $0, \infty$

C. ∞, ∞

D. $0, 0$

Answer: B

Watch Video Solution

23. In a circuit, the current lags behind the voltage by a phase difference of $\pi / 2$, the circuit will contain which of the following ?

A. Only R

B. Only C

C. R and C

D. Only L

Answer: D

Watch Video Solution

24. A step down transformer converts transmission line voltage from 2200 V to 220 V. Primary coil is having 5000 turns. Efficiency of transformer is 90% and output power is 8 kW. Evaluate number of turns in secondary coil and input power.

A. 9.89 kW

B. 8.89 kW

C. 88.9 kW

D. 889 kW

Answer: B

 Watch Video Solution

25. In an ac circuit, the current lags behind the voltage by $\pi / 3$. The components in the circuit are

A. R and L

B. L and C

C. R and C

D. Only R

Answer: A

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26. In an RLC circuit, capacitance is changed from C to 2C. For the resonant frequency to remain unchanged, the inductance should be changed from L to :

A. 4L

B. L/2

C. L/4

D. 2L

Answer: B

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27. The flux associated with coil changes from 1.35 Wb to 0.79 Wb within $\frac{1}{10}$s. then, the charge produced by the earth coil, if resistance of coil is 7Ω is

A. 0.08 C

B. 0.8 C

C. 0.008 C

D. 8 C

Answer: A

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28. In the induction coil, across secondary coil the output voltage is practically

A. unidirectional, high, intermittent

B. unidirectional, low, intermittent

C. unidirectional, high, constant

D. unidirectional, low, constant

Answer: A

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29. A helicopter rises vertically upwards with a speed of 100 m/s. If the helicopter has a length of 10m and horizontal component of earth's magnetic field is $5 \times 10^{-3} Wb/m^2$, then the induced emf between the tip of the nose and the tail of the helicopter is

A. 50 V

B. 0.5 V

C. 5 V

D. 25 V

Answer: C

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30. The current, which does not contribute to the power consumed in an AC circuit is called

A. non-ideal current

B. wattless current

C. convectional current

D. inductance current

Answer: B

Watch Video Solution

31. If a current of $10A$ flows in one second through a coil and the induced e.m.f. is $10V$, then the self-inductance of the coil is

A. 1 H

B. 2 H

C. 4 H

D. $\frac{2}{5}$ H

Answer: A

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32. If an AC main supply is given to be $220V$. What would be the average e.m.f during a positive half cycle?

A. 198 V

B. 386 V

C. 256 V

D. None of these

Answer: A

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33. The current in a coil of inductance $5H$ decreases at the rate of $2A / s$. The induced e.m.f. is

A. 2 V

B. 5 V

C. 10 V

D. $-10V$

Answer: D

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34. A varying current in a coil change from $10A$ to $0A$ in $0.5\,\text{sec}$. If the average emf induced in the coil is $220V$, the self inductance of the coil is

A. 11 H

B. 22 H

C. 5.5 H

D. 5 H

Answer: A

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