PHYSICS

BOOKS - MARVEL PHYSICS (HINGLISH)

ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENTS

Mcqs

1. A bar magnet is kept along the axis is coil with its N-pole facing the coil. The magnet is then rotated along its own axis. The induced current in the coil will we

A. clockwise

B. anticlockwise

C. an alternating current

D. zero

Answer: D

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2. A straight conductor of length $0.4m$ is moving with a velocity of $7m/s$, in a magnetic field of induction $2wb/m^2$. The value of the maximum induced e.m.f. In the conductor is

A. 2V

B. 3V

C. 5.6V

D. 2.8V

Answer: C

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3. The two rails of a railway track separated by 1 metre and insulated from each other, are connected to a millivolmeter. What is the reading of the millivoltmeter when a train passes at a speed of $180 km / hour$ along the track? [The vertical component of earth's magnetic field is $2.0 \times 10^{-4} Wb / m^{2}$].

A. 1 volt

B. 100 mV

C. 1 mV

D. 10 mV

Answer: C

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4. A metal rod of length 1m, rotates about its one end in a plane at right angles to a horizontal magnetic field of induction $\frac{7}{22} \times 10^{-4} T$. If its frequency of rotation is 10 Hz, then the magnitude of induced e.m.f. Is

A. 5mV

B. 1mV

C. 0.5V

D. 1V

Answer: B

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5. A coil of effective area $2m^2$ is placed at right angles to a uniform magnetic field of induction B. When the field reduces to ten percent of its original value in 0.6 sec, an e.m.f. Of 0.24 V is induced in it. The magnetic of magnetic induction (B)is

A. $0.02Wb/m^2$

B. $0.04Wb/m^2$

C. $0.08 Wb/m^2$

D. $0.01 Wb/m^2$

Answer: C

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6. The megnetic flux through a coil is 5×10^{-4} Wb. At time t=0. it reduces to ten percent of its original value in 0.5 s. The magnitude of e.m.f. induced in the coil is

A. 0.9 mV

B. 0.45 mV

C. 2 mV

D. 5 mV

Answer: A

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7. What is the change in magnetic flux produced in a coil in 25 s, if the induced e.m.f. In the coil is $2mV$?

A. $5 \times 10^{-2} Wb$

B. $12 \times 10^{-2} Wb$

C. $7.5 \times 10^{-2} Wb$

D. $15 \times 10^{-2} Wb$

Answer: A

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8. A conductor of length 10 cm is moved parallel to itself with a speed of $10 m/s$, at right to a magentic induction of $10^{-4} Wb/m^2$. The e.m.f. Induced in the conductor is

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

B. $8 \times 10^{-4} V$

C. $24 \times 10^{-4} V$

D. $10^{-4} V$

Answer: D

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9. A conductor is moving with a uniform velocity of $10m/s$ at right angles to magenetic field of inducation $0.4 \times 10^{-4} Wb/m^2$. If the e.m.f. Induced in the conductor is $6 \times 10^{-5} V$, then the length of the conductor is

A. 10 cm

B. 15 cm

C. 20 cm

D. 40 cm

Answer: B

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10. A metre gauge train is running towards north with a speed of $20 m / s$. If the vertical component of earth's magnetic induction is $3 \times 10^{-4} Wb / m^2$, then the e.m.f. induced at the end of the axle is

A. 3 mV

B. 6 mV

C. 12 mV

D. 18 mV

Answer: B

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11. The magnetic flux through a coil is $4 \times 10^{-4} Wb/m^2$ at time $t = 0$. It reduces to $10\,\%$ of its original value in 't' seconds. If the induceds e.m.f. Is 0.72 mV, then the time t is

A. 0.25 s

B. 0.5 s

C. 0.75 s

D. 1 s

Answer: B

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12. The flux in a closed circuit of resistance 20Ω varies with time according to the equation $\phi = 6t^2 - 5t + 1$. What is the induced current at time $t = 0.25$ second?

A. 0.5 A

B. 0.4 A

C. 0.1 A

D. 0.2 A

Answer: C

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13. The megnetic flux lines of 3×10^{-4} Wb are passing through a coil of 100 turns. If the e.m.f. Induced in the coil is 1.5V, the time interval will be

A. 1 sec

B. 0.1 sec

C. 0.02 sec

D. 0.4 sec

Answer: C

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14. 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. is equal to g

B. is more than g

C. is less than g

D. depends upon the width of the gap

Answer: A

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15. A straight metallic wire of length 1m, is moving normally across a field of 0.1 T with a speed of $10m / s$. What is the e.m.f. Induced between the ends of the wire?

A. 0.5 V

B. 0.75 V

C. 1 V

D. 2 V

Answer: C

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16. The magnetic flux in a closed circuit of resistance 20Ω, varies with time (t) according to equation $\phi = 8t^2 - 6t + 5$. What is the magnitude of induced current at time $t = 1$ sec ?

A. 0.25 A

B. 0.5 A

C. 0.75 A

D. 0.1 A

Answer: B

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17. A wire of length 2.5 km and resistance 35Ω has fallen from a height of 10m in earth's horizontal field of $2 \times 10^{-5}T$. The current through the wire is

A. 2A

B. 0.2A

C. 0.02A

D. 0.002A

Answer: C

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18. The dimensional formula for magnetic flux is

A. $[\phi] = [M^2L^1T^{-2}A^{-1}]$

B. $[\phi] = [M^1L^2T^{-2}A^{-1}]$

C. $[\phi] = [M^1L^{-1}T^2A^1]$

D. $[\phi] = [M^1L^2T^2A^{-1}]$

Answer: B

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19. The magnetic flux linked with a coil is given by

$\phi = 5t^2 + 3t + 2$

What is the e.m.f. Induced in the coil in the third second?

A. 5 V

B. 10 V

C. 15 V

D. 20 V

Answer: B

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20. A magnetic field of $2 \times 10^{-2} Wb/m^2$ acts at right angles to a coil of area $100 cm^2$ with 50 turns. The average e.m.f. Induced in the coil is 0.1V, what it is removed from the field in t sed. What is the value of t?

A. 1 sec

B. 0.5 sec

C. 0.1 sec

D. 0.01 sec

Answer: C

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21. At what rate a single conductor should cut the magnetic flux so that a current of 1.5 mA flows through it when a resistance of 5Ω is connected across its ends?

A. $7.5 \times 10^{-3} Wb/s$

B. $6 \times 10^{-3} Wb/s$

C. $8 \times 10^{-3} Wb/s$

D. $4 \times 10^{-4} Wb/s$

Answer: A

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22. A player with 3 meter long iron rod runs toward east with a speed of $30 km / hr$. Horizontal component of eath's magnetic field is $4 \times 10^{-5} Wb / m^2$. If he runs with the rod in horizontal and vertical position, then the potential difference induced between the two ends of the rod in the two cases will be

A. 1 mV is both cases

B. zero in both cases

C. zero in horizontal position and, 1 mV in vertical position

D. zero in vertical position and, 1 mV in horizontal position

Answer: C

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23. A coil having an area of $3m^2$ is placed in a magnetic field which changes from a $9Wb/m^2$ to $5Wb/m^2$ in three seconds. The e.m.f. Induced in the coil is

A. 3V

B. 4V

C. 5V

D. 1V

Answer: B

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24. An aeroplane, in which the distance between the tips of thie wings is 50m, is flying horizontally with a speed of $360 km / hour$, over a place where the vertical component of earth's magnetic field is

2.0×10^{-4} tesla. The potential difference between the tips of the wings would be

A. 0.1 V

B. 0.5 V

C. 0.2 V

D. 1.0 V

Answer: D

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25. Consider the situation shown in the figure.

The wire AB is sliding on the fixed rails with a constant speed. If the wire AB is replaced by a semicircular wire, then magnitude of the induced current will

A. Decrease

B. Increase or decrease depending upon whether the semicircular wire moves towards the resistnace or away from it

C. Remain the same

D. Increase

Answer: C

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26. Maximum potential difference will be induced between the ends of the conductor PQ when the conductor moves in the direction

.

A. Q

B. M

C. P

D. L

Answer: B

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27. A coil having effective area A is held with its plane normal to a magnetic field of induction B. The magnetic induction is quickly reduced of 25% of its initial value in 1s. The e.m.f. Induced across the coil will be

A. $\frac{AB}{4}V$

B. $\frac{AB}{2}V$

C. $\frac{3AB}{4}V$

D. $\frac{3AB}{8}V$

Answer: C

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28. A rectangular coil of 25 turns, area of $25cm^2$ and resistance of $4ohm / turn$ is placed perpendicular to a varying magnetic field, which changes at the rate of $500T / s$. The induced current in the coil is

A. 0.3125 A

B. 0.3225 A

C. 31.25 A

D. 3.225 A

Answer: A

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29. A coil of area $0.05m^2$ and 500 turns is placed in a magnetic field of strength 4×10^{-5} tesla. If it is rotated through 90° in 0.1 sec, then the magnitude of e.m.f. Induced in the coil will be

A. 10 mV

B. 20 mV

C. 5 mV

D. 15 mV

Answer: A

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30. A metal rod moves at a constant velocity in a direction perpendicular to its length. A constant, uniform magnetic field exists in space in a direction perpendicular to the rod as well as its velocity. Select the correct statements(s) from the following

A. The entire rod is at the same electric potential

B. There is an electric field in the rod

C. The electirc potential is highest at the centre of the rod and decrease towards its ends

D. The electirc potential is lowest at the centre of the rod and decrease towards its ends

Answer: B

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31. A metallic square loop ABCD is moving in its own plane with a velocity v in a uniform magnetic field perpendicular to its plane as shown in the figure. Electric field is induced

A. in AD, but not in BC

B. in BC, but not in AD

C. neither in AD nor in BC

D. in both AD and BC

Answer: D

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32. As shown in the figure, P and Q are two coaxial conducting loops separated by some distance. When the switch S is closed, a clockwise current IP flows in P (as seen by E) and an induced current IQ_1 flows in Q. The switch remains closed for a long time. When S is opened, a current IQ_2 flows in Q. then the direction IQ_1 and IQ_2 (as seen by E) are

.

A. respectively clockwise and anticlockwise

B. both clockwise

C. both anticlockwise

D. respectively anticlockwise and clockwise

Answer: D

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33. 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. $50\mu V$

B. $5\mu V$

C. $50mV$

D. $5mV$

Answer: A

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34. The two rails of a railway track, insulated from each other and the ground, are connected to a milli voltmeter. What is the reading of the milli voltmeter when a train travels at a speed of $180km/hours$

along the track, given that the vertical components of earth's magnitic field is $0.2 \times 10^{-4} weber / m^2$ & the rails are separated by 1 meter?

A. 0.5 V

B. 5 mV

C. 3 mV

D. 1 mV

Answer: D

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35. A coil of metal wire is kept stationary in a non-uniform magnetic field. An e.m.f. Is induced in the coil.

A. an e.m.f. and current are both induced in the coil

B. a current but no e.m.f. is induced in the coil

C. an e.m.f. but no current is induced in the coil

D. neither e.m.f nor current is induced in the coil

Answer: D

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36. A conducting square loop of side L and resistance R moves in its plane with a uniform velocity v perpendicular to one of its sides. A magnetic field B, constant in space and time, pointing perpendicular and into the plane of the loop exists everywhere as shown in the figure. What is the current induced in the loop?

A. BLv/R clockwise

B. BLv/R anticlockwise

C. $2BLv/R$ anticlockwise

D. zero

Answer: D

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37. A solenoid is connected to a battery so that a steady current flows through it. If an iron core is inserted into the solenoid, then

A. will increase

B. will decrease

C. will not change

D. may increase or decrease depending upon the direction of the current

Answer: B

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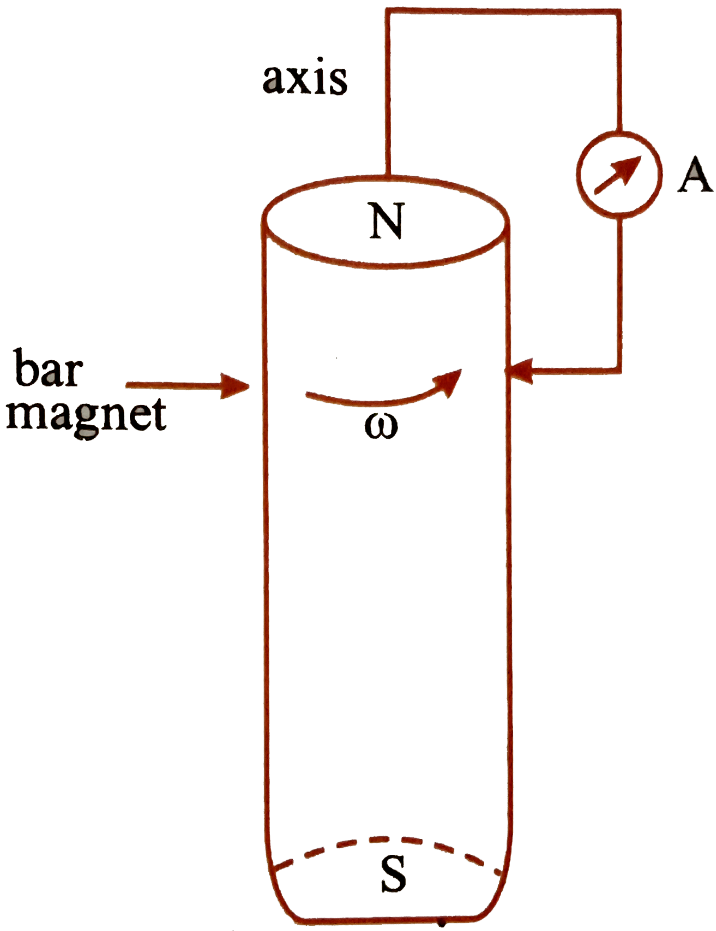
38. A cylindrical bar magnet is rotated about its axis (Figure). A wire is connect from the axis and is made to touch the cylindrical surface through a contact.

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 $T = \frac{2\pi}{\omega}$

D. a time varying non-sinusoidal current flows through the ammeter A

Answer: B

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39. A cycle wheel with 10 spoken was moved at a certain speed in a plane normal to the earth's magnetic induction. It was found that an emf of

$40\mu v$ was induced across each spoke (i.e. Between the axis and the rim of the cycle wheel). What is the total emf induced across the ten spoken?

A. $400\mu v$

B. $200\mu v$

C. $40\mu v$

D. $4\mu v$

Answer: C

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40. Wherever a magnet is moved either towards or away from a conducting coil, an emf is induced, the magnitude of which is independent of

A. the number of turns of the coil

B. the resistance of the coil

C. the area of cross-section of the coil

D. the strength of the magnetic field

Answer: B

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41. A conducing circular loop is placed in a uniform magnetic field of indution B tesla with its plane normal to the field. Now, radius of the loop starts shrinking at the rate (dr/dt). Then the induced e.m.f. at the instant when the radius is r is:

A. $\pi r B\left(\frac{dr}{dt}\right)$

B. $\pi r^2\left(\frac{dB}{dt}\right)$

C. $2\pi r B\left(\frac{dr}{dt}\right)$

D. $\left(\frac{\pi r^2}{2}\right)^2 B \cdot \frac{dr}{dt}$

Answer: C

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42. When a magnet is moved with a fast speed towards a coil at rest, the induced emf, induced current and the induced charge produced in the coil are given by E,I and Q respectively. If the speed of the magnet is doubled, the incorrect statement is

A. Q increases

B. E increases

C. I increases

D. Q remains same

Answer: A

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43. One conducting U tube can slide inside another U tube is shown in the figure maintaining electrical contacts between the tube. The magnetic field is a perpendicular to the plane of the figure. Each tube moves towards the other at a constant speed. What is the e.m.f.induced in the circuit in terms of B,l and v where l is the width of each tube?

A. B/v

B. zero

C. $-B/v$

D. $2B/v$

Answer: D

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44. The magnetic flux through a circuit of resistance R changes by an amount $\Delta\phi$ in a time Δt. Then the total quantity of electric charge Q that passes any point in the circuit during the time Δt is represent by

A. $Q = -\dfrac{\Delta\phi}{\Delta t} + R$

B. $Q = \dfrac{\Delta\phi}{R}$

C. $Q = \dfrac{\Delta\phi}{\Delta t} \times R$

D. $Q = \dfrac{\Delta\phi}{\Delta t}$

Answer: B

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45. 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. $0.5Bl^2\omega$

C. $Bl\omega$

D. $0.5Bl\omega$

Answer: B

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46. A conducting circular loop is placed in a uniform magnetic field, $B = 0.025T$ with its plane perpendicular to the loop. The radius of the loop is made to shrink at a constant rate of $1mms^{-1}$. The induced emf when the radius is $2cm$ is

A. $2\pi\mu V$

B. $\frac{\pi}{2}\mu V$

C. $\pi\mu V$

D. $2\mu V$

Answer: C

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47. The total charge induced in a conducting loop when it is moved in magnetic field depends on

A. the total change in the magnetic flux

B. final magnetic flux only

C. the rate of change of the magnetic flux

D. initial magnetic flux only

Answer: A

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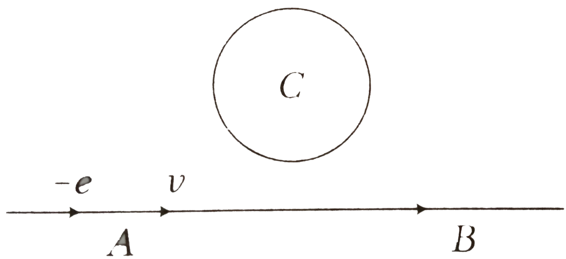
48. An electron moves along the line AB which lies in the same plane as a circular loop of conducting wire as shown in figure. What will be the direction of the current induced (if any) in the loop?



A. The current will change the direction as the electorn passes by

B. No current will be induced

C. The current will be clockwise

D. The current will be anticlockwise

Answer: A

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49. A physicist works in a laboratory where the magnetic field is $2T$. She wears a necklace enclosing area $0.01m^2$ in such a way that the plane of the necklace is normal to the field and is having a resistance $R = 0.01\Omega$. Because of power failure, the field decays to $1T$ in time 10^{-3} seconds.

The what is the total heat produced in her necklace?$(T = tesla)$

A. 40 J

B. 30 J

C. 20 J

D. 10 J

Answer: D

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50. The magnitude of the earth's magnetic field at a place is B_0 and angle of dip is δ. A horizontal conductor of lenth/lying along the magnetic northsouth moves eastwards with a velocity v. The emf induced acroos the coductor is

A. $B_0 lv \cos \delta$

B. $B_0 lv$

C. $B_0 lv \sin \delta$

D. zero

Answer: C

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51. A metal coil of area $5 \times 10^{-3} m^2$, number of turns 100 and resistance 0.5Ω is lying horizontally at the bottom of a vessel made of an insultating material. A uniform magnetic field passing vertically through the coil changes from 0 to 0.8t in 0.2 s. What is induced current (in ampere) flowing through the coil?

A. 2A

B. 3A

C. 4A

D. 5A

Answer: C

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52. A coil having n turns and resistance $R\Omega$ is connected with a galvanometer of resistance $4R\Omega$. This combination is moved in time t seconds from a magnetic field W_1 weber to W_2 weber. The induced current in the circuit is

A. $-\dfrac{n(W_2 - W_1)}{5Rt}$

B. $-\dfrac{n(W_2 - W_1)}{Rt}$

C. $-\dfrac{(W_2 - W_1)}{5Rnt}$

D. $-\frac{(W_2 - W_1)}{Rnt}$

Answer: A

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53. A thin circular ring of area A is held perpendicular to a uniform magnetic field of induction B. A small cut is made in the ring and a galvanometer is connected across the ends such that the total resistance of the circuit is R. When the ring is suddenly squeezed to zero area, the charge flowing through the galvanometer is

A. $\frac{BR}{A}$

B. $\frac{AB}{R}$

C. ABR

D. $\frac{B^2A}{R^2}$

Answer: B

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54. 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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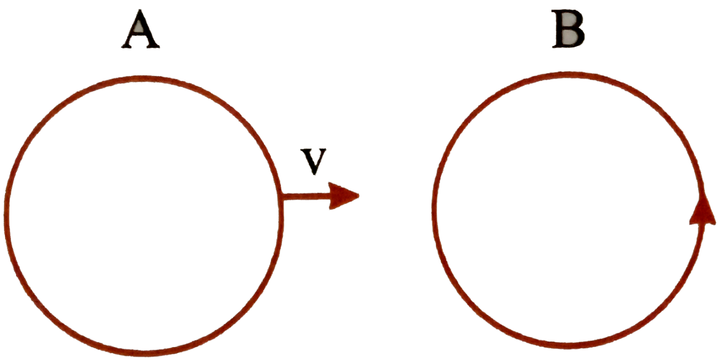
55. There are two coils A and B as shown in Figure. A current starts flowing in B as shown, when A is moved towards B and stops when A stops moving. The current in A is counterclockwise. B is kept stationary when A moves. We can infer that



A. there is a constant current in the clockwise direction in A

B. there is a varying current in A

C. there is no current in A

D. there is a constant current in the counter clockwise direction in A

Answer: D

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56. A cycle wheel with 10 spoken, each of the length 0.5m, is moved at a speed of $18km/hour$, in a plane normal to the earth's magnetic induction of $3.6 \times 10^{-5}T$. What is the emf induced between the axle and the rim of the cycle wheel?

A. $30\mu v$

B. $35\mu v$

C. $40\mu v$

D. $45\mu v$

Answer: D

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

A. $\pi r B v$

B. $2 r B v$

C. zero

D. $B v \pi r^2 / 2$

Answer: B

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58. A rectangular coil of 25 turns, area of $25 cm^2$ and resistance of $4 ohm / turn$ is placed perpendicular to a varying magnetic field, which changes at the rate of $500 T / s$. The induced current in the coil is

A. 0.3125 A

B. 0.3225 A

C. 31.25 A

D. 3.225 A

Answer: A

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59. 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. 5V

B. 25V

C. 50V

D. 0.5V

Answer: A

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

A. 5 mili henry

B. 50 milli henry

C. 5 henry

D. 10 henry

Answer: A

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61. A 100 mHcoil carries a current of 1A. Energy stored in its magetic field is

A. 0.5 J

B. 0.1 J

C. 0.05 J

D. 1 J

Answer: C

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62. The coefficient of mutual inductance of two coils is 10 mH. IF the current flowing in one coil is 4A then the induced e.m.f in the second coil will be

A. 40 mV

B. 20 mV

C. zero

D. 10 mV

Answer: C

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63. The current in a coil decreases from 5 A to 0 in 0.1 sec. If the average e.m.f induced in the coil is 50 V, then the self inductance of the coil is

A. 0.25 H

B. 0.5 H

C. 1 H

D. 2 H

Answer: C

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64. Two coils P and S kept very close to each other. When the current in P changes by 10A, the magnetic flux in S changes by 1.5 weber. The mutal inductance of the coil is

A. 1.5 H

B. 2.5 H

C. 0.15 H

D. 0.8 H

Answer: C

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65. If the current flowing through a coil is reduced by 50% then the energy in the coil

A. will not increased

B. will not change

C. will be decreased by 20%

D. will be decreased by 75%

Answer: D

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66. What is the minimum value of inductance that can be obtained by combining three inductances of 1 H, 2 H and 3 H?

A. $\frac{4}{11}H$

B. $\frac{5}{11}H$

C. $\frac{6}{11}H$

D. $\frac{8}{11}H$

Answer: C

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67. The current in a coil changes from 0 to 2 A in 0.05 sec. If the induced e.m.f is 80 V, the self inductance of the coil is

A. 2.4 H

B. 2 H

C. 1.5 H

D. 1 H

Answer: B

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68. A coil has an inductance of 1 henry if a current changing at the rate of $3A / S$, induces

A. one volt in it

B. three volt in it

C. 3 volt in a neighbouring coil

D. $\frac{1}{3}$ volt in it

Answer: B

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69. An average induced e.m.f of 2V appers in a coil when the current in it is changed from 10 A in opposite direction in 0.5 sec. The self inductance of the coil is

A. 50 mH

B. 60 mH

C. 30 mH

D. 25 mH

Answer: A

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70. The current passing through a choke coil of inductance 4 Henry is decreasing at the rate of $3amp/\sec$. The e.m.f developed across the coil is

A. $-8V$

B. $-10V$

C. $-12V$

D. $-6V$

Answer: C

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71. An e.m.f of 40 mV is induced in a solenoid, when the current in it changes at the rate of $2A/s$. The self inductance of the solenoid is

A. 5 mH

B. 10 mH

C. 20 mH

D. 40 mH

Answer: C

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72. If a current of 4A produces a magnetic flux of 10^{-3} Wb per turn in a coil of 1000 turns, then the self inductance of the coil is

A. 0.1 H

B. 0.15 H

C. 0.25 H

D. 0.4 H

Answer: C

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73. The self inductance of a coil having 100 turns is 10 mH. What is the magnetic flux linked with each turn of the coil, if a current of 4 mA is passed through the coil?

A. 4×10^{-7} weber

B. 2×10^{-7} weber

C. 1×10^{-7} weber

D. 8×10^{-7} weber

Answer: A

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74. A coil of self inductance 80 mH carries a current of 2A. What is the energy stored in the coil?

A. 0.1 J

B. 1.6 J

C. 0.16 J

D. 0.4 J

Answer: C

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75. If a current of 3 A flowing in the primary coil is reduced to zero in 0.01 s, the e.m.f induced in the secondary coil is 750 V. What is the mutual inductance between the two coil ?

A. 1.5 H

B. 2 H

C. 2.5 H

D. 3 H

Answer: C

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76. An inductor stores the energy in

A. 1. its electric field

B. 2. its coil

C. 3. its magnetic field

D. 4. both in electric and magnetic fields

Answer: C

Watch Video Solution

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

A. $E_2 = E_1$

B. $E_2 = 2E_1$

C. $E_2 = \frac{1}{2}E_1$

D. $E_2 = \frac{1}{4}E_1$

Answer: D

Watch Video Solution

78. If a current of 3A, flowing in the primary coil is reduced to zero in $10^{-3}s$, the induced e.m.f in the secondary coil is 15000 V. The mutual inductance between the two coils is

A. 5 H

B. 10 H

C. 0.5 H

D. 2.5 H

Answer: A

Watch Video Solution

79. A long solenoid has 500 turns. When a current of $2A$ is passed through it, the resulting magnetic flux linked with each turn of the solenoid is $4 \times 10^{-3} Wb$. The self-inductance of the solenoid is

A. 2 H

B. 1.5 H

C. 1 H

D. 0.5 H

Answer: C

Watch Video Solution

80. Which one of the following is the unit of self inductance of a coil ?

A. $Vo <^{-1} A^{-1}$

B. $Vo <^{-1} A$

C. Volt sec A^{-1}

D. $Vo <^{-1} A^{-1}$ sec

Answer: C

Watch Video Solution

81. A carspark coil developes an induced e.m.f. of 40000 V in the secondary when when current in primary changes form 4 A to zero in $10\mu s$. What is the mutual inductance of the coil ?

A. 0.1 H

B. 0.2 H

C. 0.01 H

D. 0.5 H

Answer: C

Watch Video Solution

82. The unit of L/R is (where $L =$ inductance and $R =$ resistance)

A. Ampere

B. Volt

C. per sec

D. sec

Answer: D

Watch Video Solution

83. The coefficient of mutual inductance of two coils is $6mH$. If the current flowing in one is 2 ampere, then the induced e.m.f. in the second coil will be

A. 2 mV

B. 3 V

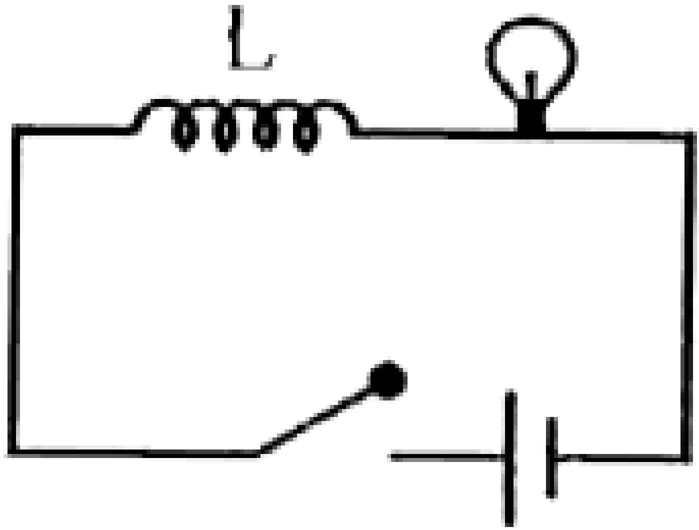
C. zero

D. 3 mV

Answer: C

Watch Video Solution

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



A. Contact is made

B. Won't become bright at all

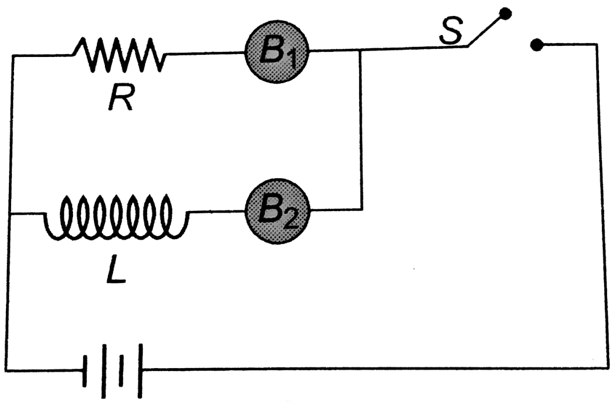
C. Contact is made or broken

D. Contact is broken

Answer: D

View Text Solution

85. The adjoining figure shows two bulbs B_1 and B_2 resistor R and an inductor and L. When the switch S is turned off



A. B_1 dies out immediately but B_2 will with some delay

B. B_2 dies out immediately but B_1 with some delay

C. Both B_1 and B_2 will die out immediately

D. Both B_1 and B_2 will die out with some delay

Answer: A

Watch Video Solution

86. The pointer of a dead-beat galvanometer gives a steady deflection because

A. Its pointer is very light

B. Its frame is made of ebonite

C. Eddy currents are produced in the conducting frame over which the coil is would

D. Its magnet is very strong

Answer: C

Watch Video Solution

87. A 200 mH coil carries a current of 1A. The energy stored in its magnetic field is

A. 0.5 J

B. 1 J

C. 0.1 J

D. 0.05 J

Answer: C

Watch Video Solution

88. In a coil, the current increases from 0 to 6 A in 0.4 s. If an induced of e.m.f of 15V is produced in the coil, then the coeffiecient of self-induction of the coil will be

A. 0.5 H

B. 0.75 H

C. 1 H

D. 1.5 H

Answer: C

Watch Video Solution

89. The current in the primary coil at time t is given by $I = (8t^2 - 4)$ Ampere. If the e.m.f induced in the secondary coil is given by $e_s = 32 \times 10^{-3}$ t volt, then the mutual inductance between the two coil is

A. 1 millihenry

B. 2mH

C. 5 mH

D. 10 mH

Answer: B

Watch Video Solution

90. A coil is suspended in a uniform magnetic field, with the plane of the coil parallel to the magnetic lines of force. When a current is passed through the coil it starts oscillating, It is very difficult to stop. But if an aluminium plate is placed near to the coil, it stops. This is due to :

A. induction of electrical charge on the plate

B. shielding of magnetic lines of force as aluminium is a paramagnetic material

C. electromagnetic induction in the aluminium plate giving rise to electromagnetic damping

D. development of air current when the plate is placed

Answer: C

Watch Video Solution

91. 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

Answer: B

Watch Video Solution

92. 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 position and orientation of the two coils

C. the meterials of the wire of the coils

D. the currents in the two coils

Answer: C

Watch Video Solution

93. 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. $4 \times 10^{-2} H$

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

C. $10^{-3} H$

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

Answer: B

Watch Video Solution

94. 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. 2 H

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

C. 1 H

D. 4 H

Answer: C

Watch Video Solution

95. An e.m.f. of 100 millivolts is induced in a coil when the current in another nearby coil becomes 10 ampere from zero in 0.1 second. The coefficient of mutual induction between the two coils will be

A. 0.5 H

B. 100 mH

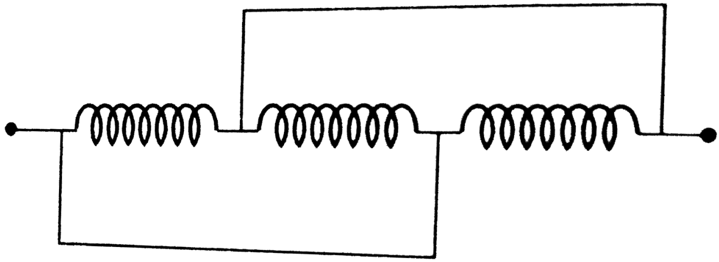
C. 1 mH

D. 10 mH

Answer: C

Watch Video Solution

96. Pure inductance of $3.0 H$ is connected as shown below. The equivalent inductance of the circuit is



A. 1 H

B. 4 H

C. 9 H

D. 3 H

Answer: A

Watch Video Solution

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

A. 2 s

B. 3 s

C. 4 s

D. 1 s

Answer: A

Watch Video Solution

98. What is the dimensional formula for the coefficient of self induction?

A. $[L] = [M^1 L^2 T^{-2}]$

B. $[L] = [M^1 L^2 T^{-3} A^1]$

C. $[L] = [M^1 L^2 T^{-2} A^{-2}]$

D. $[L] = [M^0 L^1 T^{-2} A^{-3}]$

Answer: C

Watch Video Solution

99. Two coils have a mutual inductance of $5 \times 10^{-3} H$. The current changes in the first coil according to the euquation, $I_1 = I_0 \sin \omega t$ where $I_0 = 10A$ and $\omega = 100\pi rad / s$. What is the value of the maximum e.m.f in the second coil?

A. $2\pi V$

B. $3\pi V$

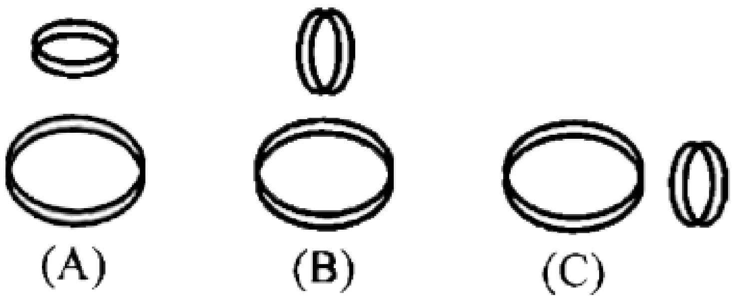
C. $4\pi V$

D. $5\pi V$

Answer: D

Watch Video Solution

100. Two circular coils can be kept in any of the three arrangement as shown in the figure. Their mutual inductance will be



A. Maximum in arrangement (C)

B. Maximum in arrangement (A)

C. The same in all arrangement

D. Maximum in arrangement (B)

Answer: B

View Text Solution

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

A. $L \times Q$

B. $1 \times V$

C. $I \times Q$

D. Li

Answer: C

Watch Video Solution

102. When the current changes from $+2A \rightarrow -2A$ in 0.05 second, an e.m.f. of 8 V is induced in a coil. The coefficient of self - induction of the coil is

A. 0.1 H

B. 1.5 H

C. 2 H

D. 2.2 H

Answer: A

Watch Video Solution

103. If $'N'$ is the number of turns in a coil, the value of self inductance varies as

A. N^0

B. N^{-2}

C. N^2

D. N^1

Answer: C

Watch Video Solution

104. A circuit having a self inductance of 1 henry carries a current of 1 A. To prevent the sparking when the circuit is broken, a capacitor which can withstand 500 V is connected across the switch. What is the minimum value of the capacitance of the capacitor?

A. A. $2 \mu F$

B. B. $4 \mu F$

C. C. $6 \mu F$

D. D. $8 \mu F$

Answer: B

Watch Video Solution

105. The equivalent inductance of two inductances is 2.4 henry when connected in parallel and 10 henry when connected in series. The difference between the two inductance is

A. 5H

B. 4H

C. 3H

D. 2H

Answer: D

Watch Video Solution

106. The SI unit of inductance the Henry can not be written as :

A. joule / $ampere^2$

B. ohm-sec

C. volt-sec / ampere

D. weber-ampere

Answer: D

Watch Video Solution

107. Which of the following units denotes the dimensions $[ML^2/Q^2]$, where Q denotes the electric charge?

A. H/m^2

B. Weber (Wb)

C. Wb/m^2

D. Henry(H)

Answer: D

Watch Video Solution

108. 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. 12

C. 4

D. 8

Answer: D

Watch Video Solution

109. A metal plate is getting heated . It can be because

A. a direct current is passing through the plate

B. it is placed in a time varying magnetic field

C. it is placed in a space varying magnetic field but does not vary with time

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

Answer: C

Watch Video Solution

110. 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. $\pi / 2$ volt

C. $\pi / 3$volt

D. $\pi / 4$ volt

Answer: A

Watch Video Solution

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

A. a.time

B. b.length

C. c.frequency

D. d.mass

Answer: C

Watch Video Solution

112. When a current i = 10 sin $(100\pi t)$ A is passed through a coil, an induced emf having a maximum value of $5\pi V$ is produced in a nearby coil kept parallel to the first coil. What is the mutual inductance between the two coils?

A. 20 mH

B. 15 mH

C. 10 mH

D. 5 mH

Answer: D

Watch Video Solution

113. In a step up transformer, the input voltage is 300 V and the output voltage is 15 KV. Then the ratio of the number of turns in the primary to that in the secondary is

A. $1:20$

B. $1:30$

C. $1:40$

D. $1:50$

Answer: D

Watch Video Solution

114. A step down transformer works on 220 volts a.c. mains. It is used to light a 100 w, 20 V bulb. The main current is 0.5 A. What is the efficiency of the transformer?

A. A. 0.91

B. B. 0.8

C. C. 0.71

D. D. 0.51

Answer: A

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115. A transformer has 100 turns in the primary and 500 turns in the secondary. If the primary is connected to 220V DC supply, then the voltage develop across the secondary will be

A. A. 2200 V

B. B. 1100 V

C. C. zero

D. D. 44 V

Answer: C

Watch Video Solution

116. A step down transformer has a trum ratio of 5:1. it is connected to 220 V, 50 Hz a.c. Mains supply. The secondary voltage and the frequency of secondary voltage are given by

A. 44V, 10 Hz

B. 110V, 50 Hz

C. 44V, 50 Hz

D. 1100V, 10 Hz

Answer: C

Watch Video Solution

117. A transformer has 230 volts applied to the primary and gives 4.6 V in the secondary. The secondary is connected to a load which draws a current of 5A. The current in the primary is

A. 1A

B. 0.1A

C. 2A

D. 10A

Answer: C

Watch Video Solution

118. The primary winding of a transfomer has 50 turns while its secondary has 500 turns. If the primary is connected to an a.c. supply of 220 V, 50 Hz, then the output at the secondaray will be

A. a.220V, 50Hz

B. b.2200V, 50Hz

C. c.2200V, 500Hz

D. d.22V, 5Hz

Answer: B

Watch Video Solution

119. 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. 20V

B. 30V

C. 40V

D. zero

Answer: D

Watch Video Solution

120. A transformer is used to reduce the main supply of 220V to 22V. If the currents in the primary and secondary are 2A and 15 A respectively, then the efficiency of the transformer is

A. 0.65

B. 0.75

C. 0.8

D. 0.9

Answer: B

Watch Video Solution

121. The number of turns in the primary and secondary coils of a transformer are 200 and 800 respectively. If the voltage developed across the secondary is 240 V, then the potential difference across each turn of the primary will be

A. $0.1V / turn$

B. $0.2V / turn$

C. $0.3V / turn$

D. $0.5V / turn$

Answer: C

Watch Video Solution

122. In an ideal step down transformer, the input voltage is 400V and the output voltage is 20 V. The output voltage is used to operate a device, having an impendance of 100 ohms. What is the current in the primary circuit?

A. 10 mA

B. 20 mA

C. 5 mA

D. 1 mA

Answer: A

Watch Video Solution

123. In a step up transformer, the turn ratio is 1:10. A resistance of 200Ω connected across the secondary draws a current of 0.5 A. What is the primary voltage?

A. 5 V

B. 10 V

C. 20 V

D. 2.5 V

Answer: B

Watch Video Solution

124. An ideal transformer has primary and secondary coils of 200 turn and 40 turns respectively. If the current in the primary coil is 3A. Then the value of current in the secondary coil wil be

A. a.$10A$

B. b.15A

C. c.1.5 A

D. d.$5A$

Answer: B

Watch Video Solution

125. The number of turns in the primary and secondary coils of a transformer are 100 and 300 respectively. If a 50 V, 50 Hz, a.c. supply is applied to the primary coil of the transformer, then the P.D. Per turn of the secondary will be

A. 0.2 V

B. 0.3 V

C. 0.4 v

D. 0.5 v

Answer: D

Watch Video Solution

126. In relation to a transformer, the relation $\frac{n_p}{n_s} = 10$ indicated that

A. the secondary voltage is 10 times the primary voltage

B. the primary current is 10 times the secondary voltage

C. there are 10 turns in the primary and only one turn in the secondary

D. for every 10 turns in the primary there is only one turns in the secondary

Answer: D

Watch Video Solution

127. 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. 450V, 13.5A

B. 600V, 15A

C. 300V, 15A

D. 450V, 15A

Answer: D

Watch Video Solution

128. 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. 8.89 kW

B. 88.9 kW

C. 889 kW

D. 989 kW

Answer: A

Watch Video Solution

129. A $220V$ input is supplied to a transformer. The output circuit draws a current of $2.0A$ at $440V$. If the efficiency of the transformer is 80%, the current drawn by the primery winding of the transformer is

A. 2.5 A

B. 5A

C. 10A

D. 7.5A

Answer: B

Watch Video Solution

130. The core of a transformer is laminated to reduce

A. to increase the secondary voltage

B. to reduce the eddy current losses

C. to give strength and to increase the life of the core

D. to avoid the short circulating between the primary and secondary windings

Answer: B

Watch Video Solution

131. In an ideal transformer, the number of turns in the primary is 120 and that in the secondary is 240. what is the secondary current if the primary current is 6A ?

A. 1.5A

B. 3A

C. 4A

D. 5A

Answer: B

Watch Video Solution

132. A transformer rated at 10 KW is used to connect a 5KV transmission line to a 250 V circuit. What is the ratio of the turns in the primary and secondary windings of the transformer?

A. A. 10

B. B. 15

C. C. 20

D. D. 25

Answer: C

Watch Video Solution

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

A. $1/\sqrt{2}A$

B. $\sqrt{2}A$

C. $2A$

D. $2\sqrt{2}A$

Answer: A

Watch Video Solution

134. A transformer with efficiency 80% works at $4kW$ and $100V$. If the secondary voltage is $200V$, then the primary and secondary currents are respectively

A. 16A, 40A

B. 40A, 16A

C. 30A, 45A

D. 50A, 30A

Answer: B

Watch Video Solution

135. We cannot use a D.C. Voltmeter to measure an alternating voltage because,

A. the alternating voltage changes direction

B. A.C. cannot pass thorugh the D.C. voltmeter

C. The average value of an alternating emf over a complete is zero, Hence D.C. Voltmeter will not show any deflection

D. As the pointer showing the reading of the voltmeter is deflected 50 times per second, it is damaged

Answer: C

View Text Solution

136. A current $I = 100\sqrt{2}\cos(\omega t - \phi)$ is passed through a D.C. ammeter. The ammeter will read

A. $100\sqrt{2}$

B. $100A$

C. $\frac{100}{\sqrt{2}}A$

D. zero

Answer: D

Watch Video Solution

137. The instantaneous current in an A.C. circuit is given by $I = 2\sin(\omega t + \theta)$ ampere. The r.m.s. value of the current is

A. 2 ampere

B. $2\sqrt{2}$ ampere

C. $\sqrt{2}$ ampere

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

Answer: C

Watch Video Solution

138. A 40Ω electric heater is connected to a $200V, 50Hz$ main supply. The peak value of electric current flowing in the circuit is approx.

A. 5A

B. 7.5 A

C. $10A$

D. $2.5A$

Answer: C

Watch Video Solution

139. The time taken by an A.C. Of frequency 50 Hz to reach from 0 to positive maximum is

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

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

C. $\frac{1}{500}S$

D. $\frac{1}{10}S$

Answer: B

Watch Video Solution

140. The electric supply line is houses works on 220 V. The amplitude of e.m.f. will be

A. A. 110V

B. B. 311V

C. C. 220V

D. D. 440V

Answer: B

Watch Video Solution

141. In an A.C. circuit the peak value of voltage is 424V. Its effective voltage is

A. a. 340V

B. b. 320V

C. c. 250V

D. d. 300V

Answer: D

Watch Video Solution

142. An electric bulb operates at 12 V d.c. If this bulb is connected to an a.c. source and gives normal brightness, what would be the peak value of the source ?

A. 12V

B. 24V

C. $12\sqrt{2}V$

D. $\frac{12}{\sqrt{2}}V$

Answer: C

Watch Video Solution

143. An alternating e.m.f. is given by $E = E_0 \sin \omega t$. In what time the e.m.f. will have half its maximu value, if E starts from zero?

A. A. $\frac{T}{4}$

B. B. $\frac{T}{8}$

C. C. $\frac{T}{12}$

D. D. $\frac{T}{16}$

Answer: C

Watch Video Solution

144. A coil of effective area $2m^2$ is rotated so as to cut a magnatic field of induction $7x10^{-5}$ wb/m^2makes 100 revolution / sec, then the maximum e.m.f. Induced in the coil is

A. 44 mV

B. 88 mV

C. 22 mV

D. 200 mV

Answer: B

Watch Video Solution

145. A sinusoidal voltage of amplitude 5V is applied to resistance of 500Ω. The r.m.s. current in the circuit is

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

B. B. $\frac{10}{\sqrt{2}} mA$

C. C. $10\sqrt{2} mA$

D. D. $20\sqrt{2} mA$

Answer: B

Watch Video Solution

146. if the effective value of A.C in a circuit is 10A, then the peak value of current a

A. a. $10A$

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

C. c. $14.14A$

D. d. $5A$

Answer: C

Watch Video Solution

147. The e.m.f. In an A.C. circuit at any instant is $E = 200\sin\left[100\pi t + \frac{\pi}{6}\right]$ volt. The time when the voltage become maximum for the first time is

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

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

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

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

Answer: D

Watch Video Solution

148. The phase difference between the voltage and the current in an AC circuit is $\pi / 4$. If the frequency is $50 Hz$ then this phase difference will be equivalent to a time of

A. 0.05 s

B. 2.5 millisecond

C. 25 millisecond

D. 0.25 s

Answer: B

Watch Video Solution

149. If the frequency in an A.C. circuit is 100 Hz, then the time taken by the voltage to cover from maximum to next positive maximum will be

A. $5 \times 10^{-3} s$

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

C. $20 \times 10^{-3} s$

D. $30 \times 10^{-3} s$

Answer: B

Watch Video Solution

150. The length of each side of a square coil of 10 turns is 10 cm. It rotates in a magnetic field of flux density $25 \times 10^{-3} T$. If the maximum induced e.m.f. is 20 mV, then the angulare velocity of the coil will be

A. 2 rad / sec

B. 4 rad / sec

C. 6 rad / sec

D. 8 rad / sec

Answer: D

Watch Video Solution

151. The rms value of a sinusoldal ac current is equal to its instantaneous value at an angle of ________ degree.

A. 30°

B. 60°

C. 90°

D. 45°

Answer: D

Watch Video Solution

152. What is the frequency of an ac signal having a time period of 50 nanosecond?

A. 20 KHz

B. 20 MHz

C. 2000 Hz

D. 200 MHz

Answer: B

Watch Video Solution

153. Two sinusoidal current are given by

$$i_1 = 20\sin\left(\omega t + \frac{\pi}{6}\right) \text{ and } i_2 = 10\sin\left(\omega t - \frac{\pi}{4}\right)$$

The pahase difference between them is

A. a. 30°

B. b. 60°

C. c. 75°

D. d. 90°

Answer: C

Watch Video Solution

154. A sinusoidal waveform is given by

$i = 20 \sin(6284t + 20^\circ) A$. What is its period?

A. 1 second

B. 1 nanosecond

C. 1 microsecond

D. 1 milisecond

Answer: D

Watch Video Solution

155. A resistance of 25Ω is connected to 100 V, 50 Hz a.c. source. What is the maximum instanteous current in the resistor?

A. 6.66 A

B. $2\sqrt{2}A$

C. $4\sqrt{2}A$

D. $\frac{4}{\sqrt{2}}A$

Answer: C

Watch Video Solution

156. The instantaneous value of an alternating current is given by $i = 50\sin(100\pi t)$. It will achieve a value of 25 A after a time interval of

A. a. $\frac{1}{300}\text{sec}$

B. b. $\frac{1}{600}\text{sec}$

C. c. $\frac{1}{1200}\text{sec}$

D. d. $\frac{1}{500}\text{sec}$

Answer: D

Watch Video Solution

157. From the two e.m.f. Equation $e_1 = E_0 \sin(100\pi t)$ and $e_2 = E_0 \sin\left(100\pi t + \frac{\pi}{3}\right)$, we find that

A. $e_1 \text{leads} e_2 \text{by} 60^\circ$

B. $e_2 \text{lags behind} e_1 \text{by} 60^\circ$

C. e_2 achieves its maximum value $\frac{1}{300}$ second before e_1

D. e_1 achieves its maximum value $\frac{1}{300}$ second before e_2

Answer: C

Watch Video Solution

Watch Video Solution

158. Two coils have a mutual iductance of 0.001 H. The current in the first coil is given by $I = I_0 \sin(\omega t)$ where $I_0 = 5A$ and $\omega = 100\pi$. What is the value of maximum e.m.f. in the second coil?

A. 1.57 V

B. 3.14 V

C. 5 V

D. 6.28 V

Answer: A

Watch Video Solution

159. An alternating voltage $e = 220\sqrt{2}\sin(100t)$ is connected to $4\mu F$ capacitor and a ammeter. The ammeter will read

A. 11 mA

B. 22 mA

C. 44 mA

D. 88 mA

Answer: D

Watch Video Solution

160. An alternating current of rms value 5A, passes through a resistance of 24Ω. What is the maximum P.D. across the resister?

A. 17 V

B. 34 V

C. 170 V

D. 10 V

Answer: C

Watch Video Solution

161. The length of each side of a square coil of 10 turns is 10 cm. This coil rotates in a magnetic field of induction 0.02 Tesla. If the maximum induced e.m.f. in the coil is 20 mV, then the angular velocity of the coil will be

A. $5rad/s$

B. $10rad/s$

C. $2.5rad/s$

D. $15 rad / s$

Answer: B

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162. An a.c. Voltage given by $e = 100 \sin(3.14t + 60^{\circ})$ is applied to a machine having a power rating of 500 W. The r.m.s. value of the current is the circuit is

A. $10A$

B. $10\sqrt{2}A$

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

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

Answer: B

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163. A constant current of 1.5 A is maintained in a resistance of 5Ω. What is its r.m.s. value ?

A. $\frac{1.5}{\sqrt{2}}A$

B. 1.5 A

C. $1.5\sqrt{2}A$

D. 0.75 A

Answer: B

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

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

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

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

Answer: B

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

A. 386 V

B. 256 V

C. 198 V

D. None of these

Answer: C

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166. An alternating current is given by $I = 100\sin(5\pi t)$. How many times will be current become zero in one second?

A. a. 50 times

B. b.25 times

C. c. 40 times

D. d. 100 times

Answer: A

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167. The peak value of an alternating e.m.f. is 141.4 V. What would be the reading of an a.c. voltmeter when connected across this e.m.f. ?

A. a. 100 V

B. b. 141.1 V

C. c. 220 V

D. d. zero

Answer: A

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168. The frequency of the sinusoidal wave

$y = 0.40 \cos[2000t + 0.80x]$ would be

A. $1000\pi Hz$

B. $2000 Hz$

C. $20 Hz$

D. $\frac{1000}{\pi} Hz$

Answer: D

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169. A current $I = 100\sqrt{2}\cos(\omega t - \phi)$ is passed through a D.C. ammeter. The ammeter will read

A. a. $100\sqrt{2}$

B. b. $100A$

C. c. $\frac{100}{\sqrt{2}}A$

D. d. zero

Answer: D

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170. An alternating voltage is given by

$$V = V_0 \sin\left(\omega t - \frac{\pi}{3}\right)$$

When will be the voltage maximum for the first time?

A. a. $\frac{T}{6}$

B. $b.$ $\frac{T}{3}$

C. c. $\frac{T}{2}$

D. $d.$ $\frac{T}{12}$

Answer: D

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171. The household supply voltage as measured by an a.c. voltmeter is 200 meter is 220 volts. If the frequency of a.c. Supply is 50 Hz, then the equation of the line voltage, will be

A. 1. $V = 220\sin(100\pi t)$

B. 2.$V = 110\sin(50\pi t)$

C. 3.$V = 440\sin(100\pi t)$

D. 4. $V = 311\sin(100\pi t)$

Answer: D

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172. A resistance of 20Ω is connected to a source of an alternating potential $V = 220\sin(100\pi t)$. The time taken by the current to change from the peak value to rms value is

A. 0.25 sec

B. 25×10^{-3} sec

C. 2.5×10^{-3} sec

D. 0.2 sec

Answer: C

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173. In a region of uniform magnetic inductance $B = 10^{-2}$tesla. A circular coil of radius $30cm$ and resistance $\pi^2 ohm$ is rotated about an axis which is perpendicular to the direction of B and which forms a dimater of the coil. If the coil rotates at 200 r.p.m the amplitude of the alternatic current induced in the coil is

A. 200 mA

B. 30 mA

C. `4 pi^(2)mA

D. 6 mA

Answer: D

Watch Video Solution

174. The domestic power supply of 220 V, 50 Hz is connected to a resistor. What is the time taken by the alternating current flowing in the resistor, to change from its maximum value to turns value?

A. $5 \times 10^{-3}s$

B. $2.5 \times 10^{-3}S$

C. $10 \times 10^{-3} S$

D. $2.5 \times 10^{3} S$

Answer: D

Watch Video Solution

175. The resultant current wave in an electric circuit consists of two components (i) a 10 A d.c. component and (ii) a 50 Hz a.c. Component, having a sinusoidal wave form and which has the peak value of 10 A. If a time t=0, the a.c. component has zero value and dI/dt is positive, then the average value of the resultant current over a complete cycle is

A. $5A$

B. $10A$

C. $14.4A$

D. 0

Answer: B

Watch Video Solution

176. An ac ammeter is used to measure currnet in a circuit. When a given direct current passes through the circuit. The ac ammeter reads 3 A. When another alternating current passes through the circuit, the ac ammeter reads 4A. Then find the reading of this ammeter (inA), if dc and ac flow through the circuit simultaneously.

A. 7A

B. 5A

C. 3A

D. 1A

Answer: B

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177. In an A.C. circuit the instantaneous values of e.m.f. And current are given by $E = 100\sin(200t)$ volt and $I = 2\sin\left(200t + \frac{\pi}{3}\right)$ ampere.

The average power consumed is the circuit is

A. A. 200 W

B. B. 100 W

C. C. 50 W

D. D. 25 W

Answer: C

Watch Video Solution

178. An L-C_R series circuit is joined to a source of alternating e.m.f. If $R = 9\Omega, X_L = 28\Omega, X_C = 16\Omega,$ then the impedance of the circuit will be

A. 10Ω

B. 15Ω

C. 20Ω

D. 30Ω

Answer: B

Watch Video Solution

179. A current $I = 3 \sin \omega t$ ampere flows through a bulb. The P.D. across the bulb is given by $V = 4 \cos \omega t$ volt. The power dissipated in the bulb is

A. 12 W

B. 6 W

C. zero W

D. 3 W

Answer: C

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180. An inductance of $\frac{0.4}{\pi}$ henry and a resistace of 30Ω are joined in series. If an alternating e.m.f. of 200 V, 50 Hz is applied to their combination, then the impedance of the circuit will be

A. 50Ω

B. 40Ω

C. 100Ω

D. 10Ω

Answer: A

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

A. $25\mu F$

B. $75\mu F$

C. $100\mu F$

D. $50\mu F$

Answer: D

Watch Video Solution

182. The inductive reactance of a choke coil of $\frac{1}{4\pi}mH$ in an A.C. Circuit of frequency 50 Hz is

A. 25Ω

B. 2.5Ω

C. 0.025Ω

D. 0.25Ω

Answer: C

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183. If an alternating e.m.f. is applied to a series L-R circuit, the phase angle between e.m.f. and current is given by $\tan\theta = \frac{\omega L}{R}$. Hence the power factor of the series L-R circuit is

A. 1. $\frac{\omega L}{R}$

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

C. 3. $\frac{R}{R+\omega L}$

D. 4. $\frac{R}{\sqrt{R^2+\omega^2 L^2}}$

Answer: D

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184. For an A.C. Circuit, contianing a resistance and a capacitance in series, the angle between current and e.m.f. is given by $\tan\theta = 1(\omega CR)$. The power factor of this circuit is

A. ωCR

B. $\dfrac{R}{\omega C}$

C. $\dfrac{R}{\sqrt{R^2 + \left(\frac{1}{\omega C}\right)^2}}$

D. $\dfrac{R}{\sqrt{R + \frac{1}{\omega C}}}$

Answer: C

Watch Video Solution

185. The valules of resistance and inductive reactance of a choke coil are 8Ω and 6Ω respectively. What is the power factor of the coil?

A. A. 0.2

B. B. 0.4

C. C. 0.6

D. D. 0.8

Answer: D

Watch Video Solution

186. In an A.C. circuit I=10 cos(100 t) ampere and `V=20 sin(100t). The power loss in the circuit will be

A. 20 watt

B. 200 watt

C. 0 watt

D. 50 watt

Answer: C

Watch Video Solution

187. An alternating e.m.f. of 200V,50Hz is applied to a series L-R circuit. If $L = \frac{0.4}{\pi}$ henry and $R = 30\Omega$, then the impendance of the circuit and the current in the circuit will be

A. $35\Omega, 8A$

B. $15\Omega, 10A$

C. $50\Omega, 4A$

D. $37.5\Omega, 6.5A$

Answer: C

Watch Video Solution

188. An a.c. circuit contains a resistance of 3Ω and inductive reactance of 4Ω. The cosine of the phase angle between the current and potential difference in this circuit is

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

B. $\frac{3}{5}$

C. $\frac{3}{2}$

D. $\frac{4}{5}$

Answer: B

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189. An alternating e.m.f. $E = 10\sqrt{2}\sin\omega$ volt is applied to a circuit containing a pure inductance L and a resistance and voltage acros the resistance is 6 v between the current and potential difference in this circuit is

A. 10 V

B. 8 V

C. 6 V

D. 12 V

Answer: B

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190. In a series LCR circuit, the total reactance is 4Ω and resistance is 3Ω . Its power factor is

A. 0.4

B. 0.5

C. 0.8

D. 0.6

Answer: C

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191. In a series L-C-R circuit $X_L 350\Omega$, $X_C = 200\Omega$ and $R = 150\Omega$.

A. 0°

B. 30°

C. 15°

D. 45°

Answer: D

Watch Video Solution

192. The reactance offered by a capcitor to an a.c. of frequency 50 Hz is 15Ω. What would be its reactance if the frequency is increased to 75 Hz?

A. 10Ω

B. 20Ω

C. 15Ω

D. 25Ω

Answer: A

Watch Video Solution

193. A current of 6A flows through a coil when connected to a 24 volt d.c. supply. To get the same current with a 50 Hz a.c. supply, the voltage required is 30 V. What is the power factor of the coil?

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

B. $\frac{4}{5}$

C. $\frac{5}{6}$

D. $\frac{3}{5}$

Answer: B

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194. The phase angle between the current and voltage in an L-R circuit is 30°. What is the impendance of the circuit if the resistance in the circuit is $10\sqrt{3}\Omega$?

A. 10Ω

B. 15Ω

C. 20Ω

D. 30Ω

Answer: C

Watch Video Solution

195. If the impedance of an L-C R circuit is 40Ω, then the admitance of the circuit will be

A. A. 0.1 siemen

B. B. 0.025 siemen

C. C. 0.05 sieman

D. D. 0.075 siemen

Answer: B

Watch Video Solution

196. In a.c. circuit, the instantaneous value of e.m.f. and current are

A. 100 W

B. 75 W

C. 50 W

D. 25 W

Answer: C

View Text Solution

197. The reactance of a capacitor is X_C. If both the frequency and the capacitance are double, then the new reactance will be

A. X_C

B. $2X_C$

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

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

Answer: D

Watch Video Solution

198. An a.c. circuit an inductive reactance of $80\Omega$and a pure resistace of 60Ω. What is the impendance of the circuit?

A. 20Ω

B. 120Ω

C. 140Ω

D. 100Ω

Answer: D

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199. If a cell of e.m.f. 1.5V is applied to a resistance $R = 4\Omega$ and a reactance of 3Ω. What is the power factor of the a.c. circuit?

A. zero

B. Infinity

C. 1.5Ω

D. 100Ω

Answer: B

View Text Solution

200. When a capacitance is connected in series with a series L-R, a.c. circuit, the total impedance of the circuit

A. is increased

B. is decreased

C. does not change

D. is doubled

Answer: B

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201. An electric bulb consumes only 25% of the peak power in an a.c. circuit. What is the phase difference between the circuit and the applied a.c. voltage ?

A. $\frac{\pi}{6}$

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

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

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

Answer: C

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202. In an AC circuit, a resistance of $R ohm$ is connected is series with an inductance L. If phase angle between volage and current be 45°, the value of inductive reactance will be

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

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

C. R

D. 2R

Answer: C

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203. In a circuit containing an inductance of zero resistance, the current leads the applied a.c. voltage by a phase angle at

A. 0°

B. 90°

C. 180°

D. (-90°)

Answer: D

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

A. 180°

B. 45°

C. 60°

D. 90°

Answer: D

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205. The ohm second is equal to

A. weber

B. tesla

C. henry

D. watt

Answer: C

Watch Video Solution

206. When an alternating voltage of 100V, 50 Hz is applied to a choke coil, it takes a current of 10 A and the power is 500 W. What is the choke coil?

A. $5\sqrt{3}\Omega$

B. $4\sqrt{3}\Omega$

C. 3Ω

D. $3\sqrt{3}\Omega$

Answer: A

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207. An alternating potential $E = E_0 \sin \omega t$ is applied to a series L-C circuit. What is the phase difference between the voltage across L and C?

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

B. π

C. $\frac{3\pi}{2}$

D. zero

Answer: B

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208. The reactance of a capacitor of capcitance $C \mu F$ for an a.c. of frequency $\frac{400}{\pi}$ Hz is 25Ω. What is the value of C?

A. $25\mu F$

B. $50\mu F$

C. $75\mu F$

D. $90\mu F$

Answer: B

Watch Video Solution

209. A choke coil is preferred to a resistance for reducing current in an ac circuit because .

A. the choke is very cheap

B. choke is compact in size

C. choke is a good absorber of heat

D. there is no wastage of power

Answer: D

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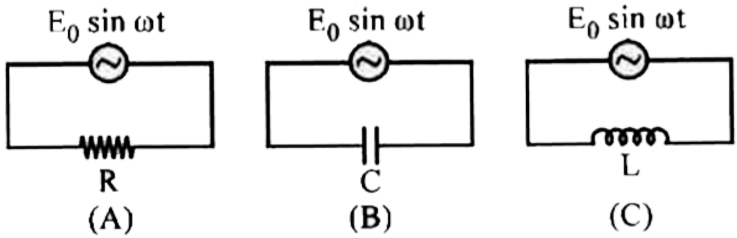
210. Alternating currents I_A, I_B and I_C are flowing in the circuits A,B and C if the frequency of alternating e.m.f. in each circuit is increased, how the currents I_A, I_B and I_C respectively are affected?



A. I_A, I_B and I_C will increase

B. I_A, I_B and I_C will decrease

C. I_A will remain constant, I_B will increase , I_C will decrease

D. I_A will remain constant, I_B will decrease , I_C will increase

Answer: C

View Text Solution

211. In an AC circuit, the reactannce is equal to the resistance. The power factor of the circuit will be

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

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

C. 1

D. zero

Answer: B

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212. 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. Decrease in both the circuits

B. Decrease in the first circuit and increase in the other

C. Increase in the first circuit and Decrease in the other

D. Increase in both the circuit

Answer: B

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

A. 1.0A

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

C. $0.8A$

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

Answer: C

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214. 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. 250 W

B. 25 W

C. 2.5 W

D. 5 W

Answer: C

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215. An alternating e.m.f. $e = 50\sqrt{2}\sin(100t)$, its connected to a capacitor $C = 1\mu F$. Then the reading shown by the a.c. ammeter connected in the circuit is

A. $2.5mA$

B. $5\sqrt{2}mA$

C. $5mA$

D. $\frac{5}{\sqrt{2}}mA$

Answer: C

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216. A capacitor has capacity C and reactance X. If capacitance and frequency become double, then reactance will be

A. $2X$

B. $4X$

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

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

Answer: D

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217. When a coil is connected to a Leclanche cell, its resistance is found to be R. What is the effect on its resistance, if it is conncected to an a.c. source?

A. it will decrease

B. it will remain the same

C. it will be zero

D. it will increase

Answer: D

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218. The phase diffenernce between the alternating current and emf is $\frac{\pi}{2}$. Which of the following cannot be the constiuent of the circuit?

A. L alone

B. LC

C. R,L

D. C alone

Answer: C

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219. The inductice reactance for a coil of inductance $5mH$ when an alternating source of 220 V, 50 Hz is connected to it is X_1. The inductive reactance for the same coil connected to it is X_1. The inductive reactance for the same coil connected to a battery of e.m.f. 220 V is X_2. The ratio X_1 / X_2 is

A. 1

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

C. ∞

D. zero

Answer: C

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220. The average power dissipated in A.C. circuit containing resistance, inductance and capacitance depends upon

A. only on the effective value of current

B. only on the phase difference between e.m.f. and current

C. on the effecitive value of e.m.f. current and phase difference between them

D. only on the effective value of e.m.f.

Answer: C

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

A. only R

B. L and C

C. R and C

D. R and L

Answer: D

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222. An a.c. Voltage is applied to a resistance $R = 30\Omega$ and an inductor L in series. If the inductive reactance is also 30Ω, the phase difference between the applied voltage and the current in the circuit is

A. $\frac{\pi}{6}$

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

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

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

Answer: D

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223. 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. $\frac{1}{40\pi}H$

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

C. $\frac{1}{60\pi}H$

D. $\frac{1}{10\pi}H$

Answer: B

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224. An e.m.f. $E = E_0 \cos \omega t$ is applied to a circuit containing L and R in series. If $X_L = R$, then the power dissipated in the circuit is given by

A. $\frac{E_0^2}{8R}$

B. $\frac{E_0^2}{4R}$

C. $\frac{E_0^2}{2R}$

D. $\frac{E_0^2}{R}$

Answer: B

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225. A current of 1 A flows through a coil, when a 100 V d.c. is applied to it. But a current of 0.5 A flows through the same coil, when a 100V a.c. of frequency 50 Hz is applied. The resistance and inductance of the coil are given by (take $\pi^2 = 10$)

A. $100\Omega, \sqrt{0.2}H$

B. $50\Omega, \sqrt{0.3}H$

C. $100\Omega, \sqrt{0.3}H$

D. $100\Omega, \sqrt{0.2}H$

Answer: C

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226. An alternating voltage is applied to a series L-C-R circiut. If the current leads the voltage by 45°, then

A. $X_L = X_C - R$

B. $X_L = X_C + R$

C. $X_C = X_L + R$

D. $R = X_L + X_C$

Answer: B

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227. A resistance R and an inductance L are connected in series in an a.c. circut. If ω is the angular frequency of the source, then the power factor is given by

A. $\frac{\omega L}{R}$

B. $\frac{R}{\omega L}$

C. $\frac{R}{\sqrt{R^2 + \omega^2 L^2}}$

D. $\frac{R}{\sqrt{R^2 - \omega^2 L^2}}$

Answer: C

Watch Video Solution

228. An alternating voltage $E = 200\sqrt{2}\sin(100t)V$ is applied to a $2\mu F$ capacitor through an A.C. ammeter. The reading of the ammeter is

A. 80 mA

B. 10 mA

C. 40 mA

D. 20 mA

Answer: C

Watch Video Solution

229. A circuit has a resistance of 12Ω and an impedance of 20Ω. The power factor of the circuit will be

A. 0.4

B. 0.5

C. 0.6

D. 1.5

Answer: C

Watch Video Solution

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

A. $\dfrac{V^2 R}{(R^2 + \omega^2 L^2)}$

B. $\dfrac{V}{(R^2 + \omega^2 L^2)}$

C. $\left(\dfrac{\sqrt{R^2 + \omega^2 L^2}}{V^2}\right)$

D. $\dfrac{(R^2 + \omega^2 L^2)}{V}$

Answer: A

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231. 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. $P = \frac{E_0 I_0}{2}$

B. $P = \frac{E_0 I_0}{\sqrt{2}}$

C. P=0

D. $P = \sqrt{2} E_0 I_0$

Answer: C

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232. The r.m.s. current in an A.C. circuit is 4A. If the wattless current $2\sqrt{3}A$, then the power factor of the circuit is

A. a. $\frac{1}{3}$

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

C. c. $1(\sqrt{2})$

D. d. $\sqrt{3}$

Answer: B

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233. An inductance L, a cpacitance C and a resistance R may be connected to an AC souorce of angular frequency ω in three different combinations of RC, RL and LC in series. Assume that $\omega L = \frac{1}{\omega C}$. The power drawn by the three combinatios are P_1, P_2, P_3 respectively. THen

A. $P_1 = P_2 < P_3$

B. $P_1 > P_2 > P_3$

C. $P_1 = P_2 = P_3$

D. $P_1 = P_2 > P_3$

Answer: D

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234. An alternating e.m.f. of angular frequency ω is applied across an inductance. The instantaneous power developed in the circuit has an angular frequency

A. 2ω

B. ω

C. $\frac{\omega}{4}$

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

Answer: A

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235. 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. 1

C. zero

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

Answer: B

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236. The self inductance of the motor of an electric fan is 10H. In order to impart maximum power at 50 Hz, it should be connected to a capacitance of

A. $4\mu F$

B. $2\mu F$

C. $8\mu F$

D. $1\mu F$

Answer: D

Watch Video Solution

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

A. $\frac{(B\pi\omega)^2}{2R}$

B. $\dfrac{\left(B\pi r\omega^2\right)^2}{2R}$

C. $\dfrac{B\pi r^2\omega}{2R}$

D. $\dfrac{\left(B\pi r^2\omega\right)^2}{8R}$

Answer: D

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238. A coil of inductive reactance 31Ω has a resistance of $8ohm$. It is placed in series with a condenser of capacitive reactance 25Ω. The combination is connected to an ac source of $110V$. The power factor of the circuit is

A. 0.4

B. 0.64

C. 0.8

D. 0.32

Answer: C

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239. An alternating e.m.f. is applied to a series L-C-R circuit. If the frequency of the applied e.m.f. is more than the resonant frequency of the circuit then the circuit will act as

A. a resistive circuit

B. an indcutive circuit

C. a capacitive circuit

D. an oscillatory circuit

Answer: B

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240. For a series L C R circuit, the power loss at resonance is

A. $I^2\omega L$

B. $I^2 \omega C$

C. $I^2 R$

D. $\dfrac{E^2}{\sqrt{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}}$

Answer: C

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241. In an alternating current circuit in which an inductance and capacitance are joined in series, current is found to be maximum when the value of inductance is 0.5 henry and the value of capacitance is 8μF. The angular frequency of applied alternating voltage will be

A. $500 rad / s$

B. $1000 rad / s$

C. $2000 rad / s$

D. $100 rad / s$

Answer: A

Watch Video Solution

242. An alternating e.m.f. is applied to a series combination of $L = 2H, C = 10\mu F$ and $R = 50\Omega$. For a particular value of the angular frequency of the applied e.m.f., resonance is produced. Then the impedance z of the combination is

A. a. 20Ω

B. b.30Ω

C. .c. 40Ω

D. d. 50Ω

Answer: D

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243. The resonant frequency of a circuit is 100 Hz. If the capacitor is replaced by another capacitor of capacity = 4 times the original capacity, then the resonant frequency will be

A. 25 Hz

B. 100 Hz

C. 50 Hz

D. 75 Hz

Answer: C

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244. An LCR Circuit is in reasonance. The capacitance is decreased to $1/4$ of its original value. What should be the new inductance so that the circuit remains in resonance?

A. increase 2 times

B. increase 4 times

C. increase 8 times

D. increase 16 times

Answer: B

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245. Out of the many input signals of different frequencies, a series resonant circuit will accept one which has

A. the highest frequency

B. the lowest frequency

C. the frequency very close to its resonant frequency

D. half the resonant frequency

Answer: C

View Text Solution

246. A coil having an inductance of 50 mH and a resistance of 10Ω is connected in series with a $25\mu F$ capacitor across a 200 V supply. What is the Q factor of the circuit at resonance?

A. 3.5

B. 4.47

C. 5.5

D. 7

Answer: B

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247. A parallel resonant circuit can be used

A. as a circuit of zero impedance

B. as a filter circuit as it rejects a small band of frequencies near the resonant frequency

C. as an acceptor circuit of small band of frequencies

D. to draw maximum current

Answer: B

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248. In a series L-C-R circuit, the values of L and C are so adjusted that the maximum current flows through the circuit. In this case, if the P.D. across L is 200V, then the P.D. across the capacitance will be

A. more than 200 V

B. less than 200 V

C. equal to 200 V

D. P.D. across the resistance

Answer: C

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249. An alternating e.m.f. of 0.1 V is applied across an LCR series circuit having $R = 2\Omega, C = 40\mu F$ and $L = 100mH.$ At resonance, the voltage drop across the inductor is

A. 10 V

B. 5 V

C. 2.5 V

D. 20 V

Answer: C

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250. In a series LCR circuit, at resonant frequency.

A. the impedance and the current are maximum

B. the impedance is maximum

C. the current and voltage are maximum

D. the current and voltage are minimum

Answer: C

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251. Which is the wrong relation from the following ? At resonance, in a series L-C-R a.c. circuit

A. $\omega = \frac{1}{\sqrt{LC}}$

B. $\frac{1}{LC}$

C. $\omega L = \frac{1}{\omega C}$

D. $f = \frac{1}{2\pi\sqrt{LC}}$

Answer: B

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252. An alternating e.m.f. is applied to a circuit containing an inductance and a capacitance in series. It is found that for a particular frequency 'f' of the A.C. Genrator, the current in the circuit is maximum. If $L=\frac{1}{2\pi}$ Henry and $c=\frac{1}{2\pi}\mu F$, then the reasonant frequency is

A. 100 Hz

B. 1000 Hz

C. 500 Hz

D. 50 Hz

Answer: B

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253. The self inductance of the motor of an electric fan is 10H. In order to impart maximum power at 50 Hz, it should be connected to a capacitance of

A. $1\mu F$

B. $2\mu F$

C. $3\mu F$

D. $4\mu F$

Answer: A

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254. The square root of the product of inductance and capacitance has the dimension of

A. length

B. mass

C. time

D. resistance

Answer: C

Watch Video Solution

255. When there is resonance in an a.c. circuit containing L,C and R, the current

A. is zero

B. is maximum

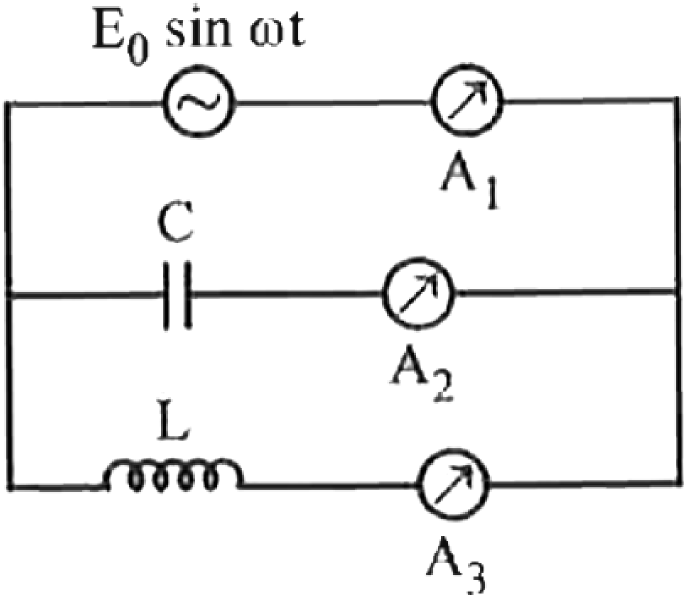
C. may be maximum or zero

D. is half of its peak value

Answer: C

Watch Video Solution

256. An inductor L and a capacitor C are connected in parallel in an a.c. circuit as shown in the figure.



The frequency of the source is equal to the resonant frequency of the circuit. Which ammeter will read zero ampere?

A. Ammeter A_1

B. Ammeter A_2

C. Ammeter A_3

D. All Ammeters A_1, A_2, A_3

Answer: A

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257. 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. $100mH$

B. $80mH$

C. $50mH$

D. $40mH$

Answer: A

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258. A resistance of 100Ω, a coil inductance 5 mH and a capacitor of $10\mu F$ are joined in series. When this L-C-R circuit is joined to a suitable frequency a.c., the circuit resonates. What is the effect on the resonant frequency, if the resistance is made 50Ω?

A. It is halved

B. it is doubled

C. it does not change

D. it is tripled

Answer: C

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259. If the P.D. across the inductor $(3mH)$ is the same as that across the condenser $(30\mu F)$ in a series R-L-C circuit, then the frequency of the applied e.m.f. is

A. 180 Hz

B. 530 Hz

C. 890 Hz

D. 5 KHz

Answer: B

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260. In LCR series circuit if the frequency is increased, the impendance of the circuit

A. increases

B. decreases

C. either increases or decreases

D. first decreases then becomes minimum and then increases.

Answer: D

Watch Video Solution

261. In an A.C. Circuit containing an inductance and a capacitance in series, the current is found to be maximum, when $L = 0.5H$ and $C = 8\mu F$. Then the angular frequency of the applied alternating e.m.f. will be

A. $25 rad / \sec$

B. $500 rad / \sec$

C. $750 rad / \sec$

D. $1000 rad / \sec$

Answer: B

Watch Video Solution

262. An AC voltage source of variable angular frequency (ω) and fixed amplitude V_0 is connected in series with a capacitance C and an electric bulb of resistance R (inductance zero). When (ω) is increased

A. the bulb glows dimmer

B. the bulb glows brighter

C. total impedance of the circuit is unchanged

D. total impedance of the circuit increases

Answer: B

Watch Video Solution

263. An acceptor circuit is

A. a parallel LC resonant circuit

B. a series LCR resonant circuit

C. used as a fitter circuit

D. used at the output stage of a radiowave transmitter

Answer: B

Watch Video Solution

264. In LCR series circuit if the frequency is increased, the impendance of the circuit

A. increases

B. either increases or decrease

C. decreases

D. first decreases then becomes minimum and then increases.

Answer: D

Watch Video Solution

265. In a series LCR circuit, at resonance, power factor is ....

A. 0.1

B. 0

C. 1

D. infinite

Answer: C

Watch Video Solution

266. In an LCR series circuit, the voltage across each of the components L,C and R is 20 V. The voltage across the L-C combination will be

A. 20 V

B. 40 V

C. zero

D. $20\sqrt{2}V$

Answer: C

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267. L, C and R represent the physical quantities, inductance, capacitance and resistance respectively. The combination(s) which have the dimensions of frequency are

A. $\frac{L}{C}$

B. $(LC)^2$

C. $(LC)^{-1/2}$

D. $\left(\frac{LC}{R}\right)^{1/2}$

Answer: C

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

A. 100 V

B. 150 V

C. 200 V

D. 250 V

Answer: D

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269. A 200 km long telegraph wire has a capacitance of $0.025\mu F / km$. It carries an alternating current of 50 KHz. What should be the value of an inductance required to be connected in series, so that the impedance is minimum. (take $\pi^2 = 10$)

A. $1\mu H$

B. $2\mu H$

C. $5\mu H$

D. $8\mu H$

Answer: B

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270. A series L-C-R circuit is connected to an alternating voltage source of frequecy f. If the current leads the e.m.f. By 45°, then the value of C is

A. $\dfrac{1}{2\pi f(2\pi fL+R)}$

B. $\dfrac{1}{2\pi fC(2\pi fL-R)}$

C. $\dfrac{1}{\pi f(2\pi fL-R)}$

D. $\dfrac{1}{\pi f(2\pi fL+R)}$

Answer: B

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271. An LCR series circuit with $R = 100\Omega$ is connected to a 300V, 50Hz a.c. source. If the capacitance is removed from the circuit then the current lags behind the voltage by 30°. But if the inductance is removed form the circuit the current leads the voltage by 30°. What is the current in the circuit?

A. 2A

B. 3A

C. 1.5A

D. 4.5A

Answer: B

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272. In a series circuit $C = 2\mu F, L = 1mH$ and $R = 10\Omega$, when the current in the circuit is maximum, at that time the ratio of the energies stored in the capacitor and the inductor will be

A. $1:2$

B. $5:1$

C. $1:5$

D. $1:1$

Answer: B

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273. In the circuit shown below, what will be the readings of the voltmeter and the ammter?

A. 100 V, 2 A

B. 220 V, 2.2 A

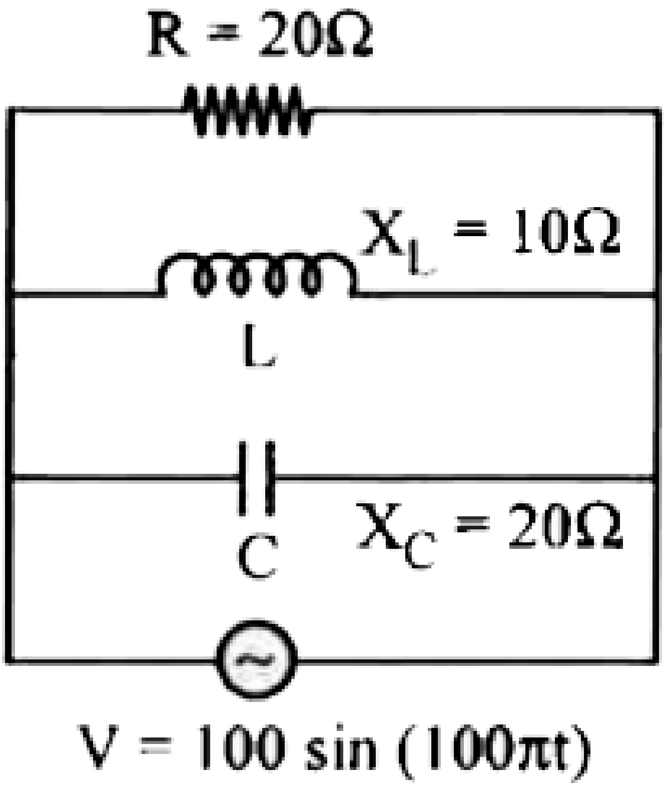
C. 300 V, 2 A

D. 800 V, 2 A

Answer: B

View Text Solution

274. What is the current drawn from the source in the following circuit?



A. 5A

B. 10A

C. $5\sqrt{2}A$

D. $10\sqrt{2}A$

Answer: C

Watch Video Solution

275. A series resonant LCR circuit has a quality factor (Q-factor)=0.4. If $R = 2k\Omega, C = 0.1\mu F$ then the value of inductance is

A. 2H

B. 10 H

C. 0.064 H

D. 0.1 H

Answer: C

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276. In a series LCR circuit, the voltage across the resistance, capacitance and inductance is 10 V each. If the capacitance is short circuited the voltage across the inductance will be

A. $10\sqrt{2}V$

B. 10 V

C. 20 V

D. $\frac{10}{\sqrt{2}}V$

Answer: D

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277. An inductor coil, a capacitor and an a.c. source of rms voltage 24 V are connected in series. When the frequency of the source is varied, a maximum rms current of 6A is obtained. The inductor coil is then connected to a battery of emf 12 V and internal resistance of 2Ω. what will be the circuit?

A. 1.5 A

B. $2A$

C. $2.5A$

D. $3A$

Answer: B

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278. An $L-C-R$ series circuit with 100Ω resistance is connected to an AC source of $200V$ and angular frequency $300rad/s$. When only the capacitance is removed, the current lags behind the voltage by 60°. When only the inductance is removed the current leads the voltage by 60°.

Calculate the current and the power dissipated in the $L - C - R$ circuit

A. 100 W

B. 200 W

C. 400 W

D. 800 W

Answer: C

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279. Which of the following combinations should be selected for better turning of an LCR circuit used for communication ?

A. $R = 20\Omega, L = 1.5H, C = 35\mu F$

B. $R = 25\Omega, L = 2.5H, C = 45\mu F$

C. $R = 15\Omega, L = 3.5H, C = 30\mu F$

D. $R = 25\Omega, L = 1.5H, C = 45\mu F$

Answer: C

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280. A series L-C-R circuit contains inductancle 5 mH, capacitor $2\mu F$ and resistance 10Ω. If a frequency AC source is varied, then what is the frequency at which maximum power is dissipated?

A. $\frac{10^{-5}}{\pi}Hz$

B. $\frac{5}{\pi} \times 10^3 Hz$

C. $\frac{2}{\pi} \times 10^5 Hz$

D. $\frac{10^5}{\pi}Hz$

Answer: B

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281. A variable frequency a.c. source is connected to a capacitor. What is the effect on the displacement current (I_d) when the frequency of the a.c. source is increased from 500 Hz to 1000 Hz?

A. I_d will remain constant

B. I_d will decrease

C. I_d will be doubled

D. I_d will become half

Answer: C

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282. Displacement current is produced due to

A. displacement of charge from one point to another

B. an electric field

C. a magnetic field

D. a time varying electric field

Answer: D

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283. The charging current for a capacitor is 0.5A. What is the displacement current across its plates?

A. 0.25 A

B. 0.5 A

C. 0.75 A

D. 1.5 A

Answer: B

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284. Which one of the following equations represents the modified from of Ampere's circuital law?

A. $\oint \overrightarrow{B} \cdot d\overrightarrow{s} = \mu_0 I$

B. $\oint \overrightarrow{B} \cdot d\overrightarrow{l} = \mu_0 I$

C. $\oint \overrightarrow{B} \cdot d\overrightarrow{l} = \mu_0 \left[I + \varepsilon_0 \dfrac{d\phi_E}{dt}\right]$

D. $\oint \overrightarrow{B} \cdot d\overrightarrow{l} = \mu_0 I + \dfrac{1}{\mu_0 \varepsilon_0} \dfrac{d\phi_E}{dt}$

Answer: C

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285. The conduction current is the same as displacement current when the source is

A. for only on a.c. source

B. for only on d.c. source

C. for both a.c. and d.c. sources

D. neither for a.c. nor for d.c. sources

Answer: C

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286. The voltage between the plates of a parallel plate capacitor of capacitance $2\mu F$ is changing at the rate of $4V / s$. What is the displacement current in the capacitor?

A. $5\mu A$

B. $6\mu A$

C. $7\mu A$

D. $8\mu A$

Answer: D

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287. A variable frequency a.c. source is connected only to a parallel plate capacitor. What is the effect on the displacment current (I_D), if the frequency is decreased?

A. I_D will decrease

B. I_D will increase

C. I_D will not change

D. I_D may increase or decrease, depending upon the values of capacitance and frequency

Answer: A

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288. The potential difference between the plates of a parallel plate capacitor of capacitance $2\mu F$ is changing at the rate of $10^5 V / s$. What is the displacement current in the dielectric of the capacitor?

A. 1A

B. 0.5A

C. 0.2 A

D. 0.75A

Answer: C

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289. A variable frequency a.c. source is connected only to a parallel plate capacitor. What is the effect on the displacment current (I_D), if the frequency is decreased?

A. I_d increase

B. I_d decrease

C. I_d does not change

D. I_d varies between $0 \rightarrow \infty$

Answer: B

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290. The capacity of a parallel plate air capacitor is $2\mu F$ and voltage beteen the plates is changing at the rate of 3 v/s the displacement current in the capacitor is

A. $2\mu F$

B. $3\mu F$

C. $5\mu F$

D. $6\mu F$

Answer: D

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291. The voltage between the plates of a parallel plate capacitor of capacitance $1\mu F$ is changing at the rate of $4V / s$. What is the displacement current in the capacitor?

A. $3\mu A$

B. $4\mu A$

C. $5\mu A$

D. $10\mu A$

Answer: B

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292. A parallel plate capacitor with plate area A and plate separation d, is charged by a constant current I. Consider a plane surface of area $A/2$ parallel to the plates and situated symmetrically between the plates. Determine the displacement current through this area.

A. I

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

C. $2I$

D. $\frac{I}{3}$

Answer: B

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293. A parallel plate capacitor has circular plates, each of radius $5.0cm$. It is being charged so that electric field in the gap between its plates rises steadily at the rate of $10^{12}\mathrm{Vm}^{-1}\mathrm{s}^{-1}$. What is the displacement current?

A. $0.14A$

B. $0.21A$

C. $0.28A$

D. $0.35A$

Answer: C

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294. Consider a parallel plate capacitor, of capacitance C, plate area A and plate separation d. It is being charged by using a battery. The quantity $\varepsilon_0 \frac{d\phi_E}{dt}$ has the dimensions of [ε_0=permittivity of free space, ϕ_E is the electric flux, dt = time]

A. e.m.f.

B. current

C. resistance

D. frequency

Answer: B

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295. You are given a $2\mu F$ parallel plate capacitor. How would you establish an instantaneous displacement current fo 1mA in the space between its plates?

A. $100V / s$

B. $300V/s$

C. $500V/s$

D. $750V/s$

Answer: C

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296. The armature coil of an a.c. generator has 1000 turns, each of area $2m^2$. It was rotating in a uniform magnetic field of B=0.2 T at an angular speed of $60rad/s$. It was found that in a certain position of the coil, the current in the circuit become zero.

What is the displacement current through this area?

A. 200 Wb

B. 250 Wb

C. 300 Wb

D. 400 Wb

Answer: D

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297. A student peddles a stationary bicycle. The pedals are connected to a coil of 100 turns and area $0.1m^{-2}$. The coil is placed in a uniform magnetic field of $10^{-2}T$, perpendicular to the axis of rotation of the coil. What is the maximum voltage generated in the coil if the coil rotates at 60 revolution per minute?

A. 3.14 V

B. 0.314 V

C. 0.628 V

D. 6.28 V

Answer: C

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298. 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 coils is

A. NABR

B. ωNAB

C. $\omega NABR$

D. NAB

Answer: B

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299. The coil of an a.c. generator has 100 turns, each of cross sectional area $2m^2$. It is rotating at a constant angular speed of 30 radians / s, in a uniform magnetic field of 2×10^{-2}T. What is the maximum power dissipated in the circuit, if the resistance of the circuit including that of the coil is 600Ω?

A. 6 W

B. 9 W

C. 12 W

D. 24 W

Answer: C

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300. The e.m.f. of a.c. Generator is given by

$E = 200 \sin(100\pi t + \pi / 3)$

where E is in volt and t in sec.

Which is the correct option from the following?

A. The peak value of the e.m.f. is $200\sqrt{2}V$

B. At time t=0, the plane of the coil is perpendicular to the field

C. At times t=0, the plane of the armature makes an angle of 60° with the magnetic field

D. The frequency of rotation of the armature is 50 Hz

Answer: D

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301. A non-resistive inductor is connected across a fully charged capacitor and the L-C circuit is set oscillating at its natural frequency. What is the value of the current when the charge on the capacitor has the maximum value of $100\mu C$?

A. Zero

B. Infinity

C. $10\mu A$

D. $100\mu A$

Answer: A

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302. A capacitor of capacitance $1\mu F$ is charged to a potential of 20 volt. The battery is then disconnected and a pure inductive coil of inductance 10 mH is connected across the capacitor so that L-C oscillation are set-up in the circuit. What is the maximum current in the circuit?

A. 0.1 A

B. 0.15 A

C. 0.2 A

D. 0.3 A

Answer: C

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303. In an LCR series a.c. circuit, the voltage across each of the components L,C, and R is 60 V. What is the voltage across the LC combination ?

A. 60 V

B. 120 V

C. zero V

D. $\frac{60}{\sqrt{2}}V$

Answer: C

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304. A wave of wavelength 300 m is to be radiated through a transmitter. You are given a capacitor of $2.5\mu F$. What should be the value of the inductance of the coil required to produce the oscillatory circuit? [Take $\pi^2 = 10$]

A. $10^{-6}H$

B. $10^{-8}H$

C. $2 \times 10^{-7}H$

D. $3 \times 10^{-8} H$

Answer: B

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305. Consider the following circuit.

By keeping S_1 closed the capacitor is fully charged and then S_1 is opened and S_2 is closed, then

A. At time t=0, the energy stored in the circuit is purely in the form of magnetic energy

B. At any time tgt0, the current in the circuit is in the same direction

C. At tgt0, there is no exchange of energy between L and C

D. At any time $t > 0$, the instantaneous current in the circuit may be $V\sqrt{\frac{C}{L}}$

Answer: D

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306. An inductor of inductance 2.0 mH is connected across a charged capacitor of capacitance $0.5\mu F$ and the resulting LC circuit is set oscillating at its natural frequency. Let Q denote the instantaneous charge on the capacitor and I the current in the circuit. it is found that the maximum value of charge Q is $200\mu C$. what is the maximum value of I (in ampere)?

A. 1A

B. 1.5A

C. 2A

D. 3A

Answer: C

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307. In an oscillating LC circuit the maximum charge on the capacitor is Q. The charges on the capacitor when the energy is stored equally between the electric and magnetic field is

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

B. Q

C. $\frac{Q}{\sqrt{3}}$

D. $\frac{Q}{2}$

Answer: A

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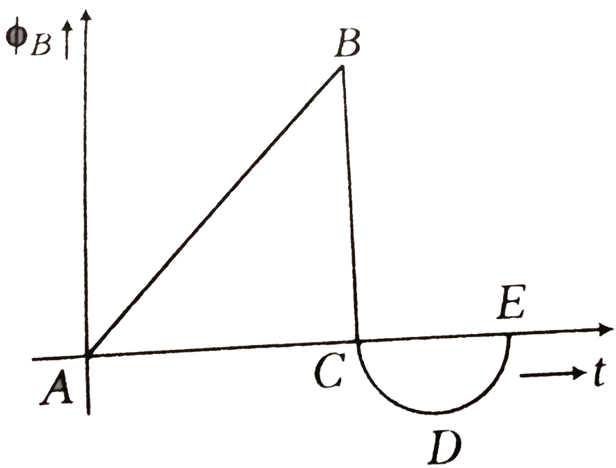
308. The graph shows the variation in magnetic flux $\phi(t)$ with time through a coil. Which of the statements given below in not correct?



A. The magnitude of the induced e.m.f. is maximum between B and C

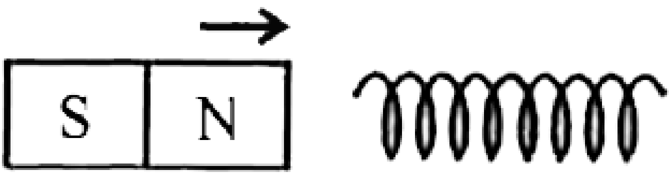
B. There is change in the direction as well as magnitude of induced e.m.f. between A and C

C. The induced e.m.f. is not zero at B

D. There is a change in the direction as well as magnitude of the induced e.m.f. between B and D

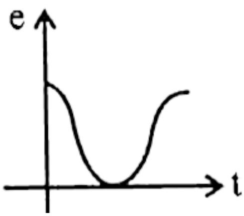
Answer: C

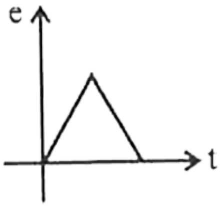
309. A short bar magnet is moved along the axis of a coil with a constant speed. Which one of the following figures, correctly given the variation of induced e.m.f. (e) with time t?



A.

B.

C. 

D. 

Answer: B

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310. The graph gives the relation between the inductive reactance (X_1) of an inductor against the frequency of the applied e.m.f. What is the value of the inductance?

A. $1.2 \times 10^{-3} H$

B. $2.2 \times 10^{-3} H$

C. $3.2 \times 10^{-3} H$

D. $4.2 \times 10^{-3} H$

Answer: C

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311. The following graphs gives the dependence of two reactive impedances X_1 and X_2 on the frequency of the alternating e.m.f. applied individually to them. From these graphs we infer that

A. X_1 is a capacitor and X_2 is an inductor

B. X_1 is an inductor and X_2 is a capacitor

C. X_1 is an inductor and X_2 is a resistor

D. X_1 is a resistor and X_2 is a capacitor

Answer: A

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312. The flux linked with a circuit is given by

$\phi = t^3 + 3t - 5$

The graph between the indued e.m.f. (e) along the Y-axis and the time (t) along the X-axis will be

A. a straight line through the origin

B. a straight line with a negative intercept on the e-axis

C. a straight line with a +ve intercept on the e-axis

D. a parabola not passing through the origin

Answer: D

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313. A transformer converts 240 V AC to 60 V AC. The secondary has 75 turns. The number of turns in the primary are

A. 600

B. 500

C. 400

D. 300

Answer: D

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314. The reactance of a coil is 157Ω. On connecting the coil across a source of frequency 100 Hz, the current lags behind the e.m.f. by 45°. What is the inductance of the coil?

A. 0.25 H

B. 0.5 H

C. 4 H

D. 314 H

Answer: A

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315. A metal rod $\frac{1}{\sqrt{\pi}}$ m long rotates about one of its ends in a plane perpendicular to a magnetic field of induction $4 \times 10^{-3} T$. If the emf induced between the ends of the rod is 16 mv, then the number of revolutions made by the rod per second is

A. 3 rps

B. 4 rps

C. 5 rps

D. 6 rps

Answer: B

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316. 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

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317. In an oscillator, for sustained oscillations, Barkhausen criterion is $A\beta$ equal to (A = voltage gain without feedback and β = feedback factor)

A. zero

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

C. 1

D. 2

Answer: C

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318. The L-C parallel resonant circuit

A. has a very high impedance

B. has a very high current

C. acts as resistance of very low value

D. has zero impedance

Answer: A

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319. 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

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320. In series LCR circuit $R = 18\Omega$ and impedence is 33Ω. An Vrms voltage $220V$ is applied across the circuit . The true power consumed in AC circuit is

A. 220 W

B. 400 W

C. 600 W

D. 800 W

Answer: D

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321. Out of the following graphs, which graph shows the correct relation (graphical representation) for LC parallel resonant circuit?

A.

B.

C.

D.

Answer: D

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322. Two coils P and Q are kept near each other. When no current flows through coil P and current increases in coil Q at the rate $10A/s$, the emf in coil P is 15 mV. When coil Q carries no current and current of $1.8A$ flows through coil P, the magnetic flux linked with the coil Q is

A. 1.5 mWb

B. 2.2 mWb

C. 2.7 mWb

D. 2.9 mWb

Answer: C

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Test Your Grasp 16

1. A coil having an area of $2m^2$ is placed in a magnetic field which changes from $2Wb/m^2$ to $5Wb/m^2$ in 3 seconds. The e.m.f. Induced in the coil is

A. 4V

B. 3V

C. 2V

D. 1V

Answer: C

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2. A straight conductor of length 2 is moves a velocity of $2m/s$, in a magnetic field of induction $0.5wb/m^2$ and perpendicular to it. The e.m.f. Induced in the conductor is

A. 2V

B. 1V

C. 0.5V

D. 3V

Answer: A

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3. The magnetic flux passing perpendicular to the plane of a coil given by

$\phi = 6t^2 + 4t + 3$

Where ϕ is in milliweber and t is in seconds.

What is the e.m.f. induced in the coil at t=1 sec?

A. 4 mV

B. 8 mV

C. 12 mV

D. 16 mV

Answer: D

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4. Two identical circular loops of metal wire are lying on a table without touching each other. Loop-A carries a current which increases with time. In response, the loop-B

A. It rotates about its centre of mass, with CM fixed

B. It is repelled by the loop A

C. It is attracted by the loop A

D. It remains stationary

Answer: B

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5. A telegraph wire of length 2500m, is kept in E-W direction, at a height of 10 m from the ground. If it falls freely on the ground, then the current induced in the wire is ______. [Given : Resistance of the wire = $25\sqrt{2}\Omega$, $g = 10m/s^2$ and $B_H = 2 \times 10^{-5}T$]

A. 6.1 A

B. 0.01 A

C. 0.02 A

D. 0.2 A

Answer: C

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6. When the current in a coil changes from 2A to 4A in 0.05 sec, the e.m.f. developed in the coil is 8V. The coefficent of self induction of the coil is

A. 0.1 H

B. 0.2 H

C. 0.4 H

D. 0.3 H

Answer: B

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7. Two coil A and B are placed in a circuit. When current changes by 8 Amps in the coil A, the magnetic flux change of 1.6 weber occurs in B. Then the mutual inductance of the coil is:

A. 0.2 H

B. 12.8 H

C. 0.025 H

D. 5.0 H

Answer: A

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8. Two coils P and S have a mutual inductance of $5 \times 10^{-3} H$. If the current in the primary is $I = 10 \sin(100\pi t)$, then the maximum value of the e.m.f. induced in S is

A. 6.82 V

B. 12.56 V

C. 15.70 V

D. 3.14 V

Answer: C

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9. The primary and secondary voltage of an ideal step down transformer are 200 V and 25V respectively. The secondary is connected to a device, which draws a current of 2A. What is the current in the primary?

A. 100 mA

B. 150 mA

C. 200 mA

D. 250 mA

Answer: D

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10. A step down transformer has a turn ratio of $20 : 1$. If 8 volt are developed across 0.4Ω secondary, then the primary current will be:

A. $1A$

B. $2A$

C. $4A$

D. $0.5A$

Answer: A

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11. A step down transformer of efficiency 80% is used on a 1000V line to deliver a current of 20 A at 120 V at the secondary coil. What is the current drawn from the line?

A. 0.3 A

B. 30 A

C. 2.4 A

D. $2A$

Answer: D

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12. A coil 10 turns and area $10^{-2}m^2$ rotates in a magnetic field of 0.25 tesla. If the maximum induced e.m.f. is 25 mV, then the angular speed of rotation of the coil will be

A. $0.5 rad / s$

B. $1 rad / s$

C. $2 rad / s$

D. $3 rad / s$

Answer: B

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13. An alternating e.m.f. is given by $E = 10\cos\omega t$. If the frequency is 50 Hz, then at time $t = \left(\frac{1}{600}\right)s$ the instantaneous value of e.m.f. is

A. 5 volt

B. 1 volt

C. 10 volt

D. $5\sqrt{3}$ volt

Answer: D

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14. In an A.C. Circuit, the current is given by

$$I = 6\sin\left(200\pi t + \frac{\pi}{6}\right)A$$

The initial value of the current is

A. 1A

B. 2A

C. 3A

D. 4A

Answer: C

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15. An alternating e.m.f. given by e=200 sin 50 t is applied to a circuit containing only a resistance of 50Ω. What is the value of r.m.s. current in the circuit?

A. 2.828 A

B. 28.28 A

C. 0.2828 A

D. 0.02828 A

Answer: A

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16. An alternating voltage is represented by

$V = 80 \sin(100\pi t) \cos(100\pi t)$ volt,

What is the peak voltage?

A. 20 V

B. 30 V

C. 40 V

D. 50 V

Answer: C

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17. In an A.C. circuit, $E = 100\sin(500t)$ volt and $I = 1000\sin\left(500t + \frac{\pi}{3}\right)mA.$ The power dissipated in the circuit is

A. 10 W

B. 100 W

C. 50 W

D. 25 W

Answer: D

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18. In an A.C. circuit, a resistance $R = 40\Omega$ and an inductance L are connected in series. If the phase angle between voltage and current is 45°, then the value of the inductive reactance will be

A. 20Ω

B. 40Ω

C. 10Ω

D. 50Ω

Answer: B

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19. The inductance of a coil is 10 H. What is the ratio of its reactance when it is connected first to an A.C. source and then to a D.C. source?

A. 10

B. 0

C. ∞

D. 0.5

Answer: C

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20. For tuning radio and T.V. circuits, series resonance circuits are used as

A. rectifier circuits

B. amplifier circuits

C. rejector circuits

D. acceptor circuits

Answer: D

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21. At what frequency 1 Henry inductance offers the same impedance as $1\mu F$ capacitor?

A. $\dfrac{500}{2\pi} Hz$

B. $\dfrac{500}{\pi} Hz$

C. $500\pi Hz$

D. $1000\pi Hz$

Answer: B

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22. In a series resonant L-C-R circuit, the capacitance is changed from C to 3C. For the same resonant frequency, the inductance should be changed from L to

A. 3 L

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

C. 6L

D. $\frac{L}{6}$

Answer: B

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23. A series L-C-R circuit with a resistance of 500Ω is connected to an a.c. source of 250 V. When only the capacitance is removed, the current lags behind the voltage by 60°. When only the inductance is removed, the current leads the voltage by 60°. What is the impedance of the circuit?

A. 250Ω

B. 500Ω

C. $500\sqrt{3}\Omega$

D. $\dfrac{500}{\sqrt{3}}\Omega$

Answer: B

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24. At what rate the potential difference between the plates of a parallel plate capacitance $2\mu F$ should be changed to establish a displacement current of 2mA between its plates?

A. $2 \times 10^2 V / s$

B. $2 \times 10^3 V / s$

C. $10^3 V / s$

D. $2 \times 10^{-3} V / s$

Answer: C

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25. A parallel plate capacitor having plate area $0.5m^2$ and plate separation of 5 mm is complete filled with a dielectric of dielectric constant 10. What is the instantaneous displacement current, if it is being charged at the rate of $100V/s$? $\left[\varepsilon_0 = 8.85 \times 10^{-12}C^2N/m^2\right]$

A. $8.85\mu A$

B. $0.885\mu A$

C. $0.177\mu A$

D. $1.77\mu A$

Answer: B

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26. An a.c. generator consists of a coil of 1000 turns and area $2m^2$. The coil is rotating in a transverse uniform magnetic field of 0.2 T at an angular speed of $60 rad / s$. What is the maximum current drawn from the generator if resistance of the circuit including that of the coil is 6000Ω?

A. 2.5 A

B. $3A$

C. $4A$

D. $5A$

Answer: C

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27. In Koyna hydroelectric power station, water stored at a height of 600 metre fall on the turbine blades and the water flow avilable is $100m^3/s$. The efficiency of the turbine generator is 50%. What is the power available from the power station? $[g = 10m/s^2]$

A. 150 MW

B. 200 MW

C. 250 MW

D. 300 MW

Answer: D

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28. An inductor of inductance 2 mH is connected across a charged capacitor of capacitance $5\mu F$ and the L-C circuit is set oscillating at its natural frequency. What is the natural angular frequency of its oscillations?

A. $2 \times 10^3 rad/s$

B. $10^4 rad/s$

C. $2 \times 10^4 rad/s$

D. $0.5 \times 10^5 rad/s$

Answer: B

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29. The frequency of the output signal of an LC oscilliator circuit is 100 Hz, with a capacitance of $0.1 \mu F$. If the value of the capacitor is increased to $0.2 \mu F$, then the frequency of the output signal will

A. be doubled

B. be half

C. increase by $\frac{1}{\sqrt{2}}$

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

Answer: D

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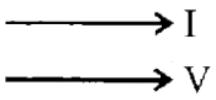
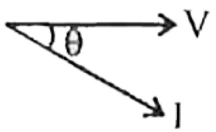
30. Which is the correct phasor diagram for an a.c. circuit containing only a pure capacitor?

A. 

B. 

C.

D.

Answer: C

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