PHYSICS

BOOKS - MODERN PUBLICATION

TEXTUAL QUESTIONS

EXAMPLE

1. A storage battery of a car has an e.m.f. of 12V. If the internal resistance of the battery is

0.4Ω, what is the maximum current that can be drawn from the battery?

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2. A battery of e.m.f. 10V and internal resistance 3Ω is connected to a resistor. If the current in the circuit is 0.5 A, What is the resistance of the resistor? What is the terminal voltage of the battery when the circuit is closed?

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3. Three resistors 2Ω, 4Ω and 5Ω are combined in parallel. What is the total resistance of the combination?

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4. Three resistors 2 ohm ,4 ohm and 5 ohm are combined in parallel and the combination is connected to a battery of emf 20 V and negligible internal resistance, determine the current through each resistor, and the total current drawn from the battery.

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5. At room temperature $(27.0^{\circ} C)$ the resistance of a heating element is 100Ω. What is the temperature of the element if the resistance is found to be 117Ω, given that the temperature coefficient of the materials of the resistors is $1.70 \times 10^{-4} \hat{\ } \circ C^{-1}$?

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6. A negligibly small current is passed through a wire of length 15 m and uniform cross section $6.0 \times 10^{-7} m^2$ and its resistance is measured to be 5.0Ω. What is the resistivity of the material at the temperatuare of the experiment?

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7. A silver wire has a resistance of 2.1Ω at $27.5^\circ C$, and a resistance of 2.7Ω at $100^\circ C$.

Determine the temperature co-efficient of resistivity of silver.

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8. A heating element using nichrome connected to a 230 V supply draws an initial current of 3.2 A which settles after a few seconds to a steady value of 2.8 A. What Is the steady temperature of the heating element If the room temperature is $27.0^{\circ} C$? Temperature coefficient of resistance of nichrome averaged over the temperature range involved is $1.70 \times 10^{-4} \circ C$.

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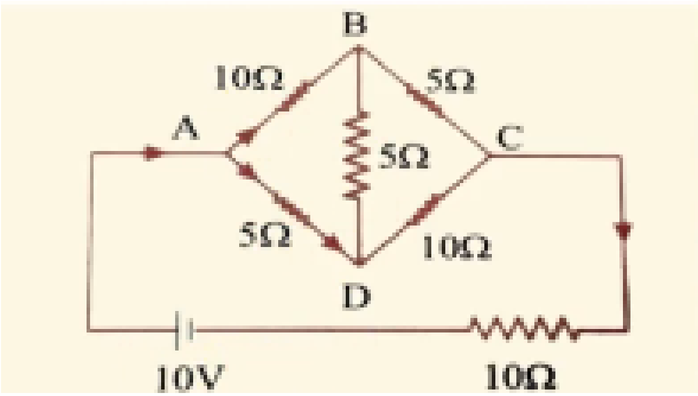
9. Determine the current in each branch of the network as shown in the figure



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10. A storage battery of emf 8.0 V and internal resistance 0.5Ω is being charged by a 120 V dc supply using a series resistor of 15.5Ω . What is the terminal voltage of the battery during charging? What is the purpose of having a series resistor in the charging circuit?

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11. In a potentiometer arrangement, a cell of emf 1.25 V gives a balance point at 35.0 cm length of the wire. If the cell is replaced by another cell and the balance point shifts to 63.0 cm, what is the emf of the second cell?

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12. The number density of free electrons in a copper conductor estimated in Example 3.1 is $8.5 \times 10^{28} m^{-3}$. How long does an electron take to drift from one end of a wire 3.0 m long to its other end? The area of cross-section of the wire is $2.0 \times 10^{-6} m^2$ and it is carrying a current of 3.0 A.

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13. The earth's surface has a negative surface charge density of $10^{-9} Cm^{-2}$. The potential difference of 400 kV between the top of the atmosphere and the surface results (due to the low conductivity of the lower atmosphere) in a current of only 1800 A over the entire globe. If there were no mechanism of sustaining atmospheric electric field, how much time (roughly) would be required to neutralise the earth's surface? (This never happens in practice because there is a mechanism to replenish electric charges, namely the continual thunderstorms and lightning in different parts of the globe). (Radius of earth = $6.37 \times 10^6 m$.)

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14. Six lead-acid type of secondary cells each of emf 2.0 V and internal resistance 0.015Ω are joined in series to provide a supply to a resistance of 8.5Ω . What are the current drawn from the supply and its terminal voltage?

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15. A secondary cell after long use has an emf of 1.9 V and a large internal resistance of 380Ω

. What maximum current can be drawn from the cell? Could the cell drive the starting motor of a car?

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16. Two wires of equal length, one of aluminium and the other of copper have the same resistance. Which of the two wires is lighter? Hence explain why aluminium wires are preferred for overhead power cables. (

$\rho_A l = 2.63 \times 10^{-8} \Omega m, \rho_C u = 1.72 \times 10^{-8} \Omega m$

. Relative density of A1 = 2.7, of Cu = 8.9.)

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17. Answer the following questions: A steady current flows in a metallic conductor of non-uniform cross-section. Which of these quantities is constant along the conductor: current, current density, electric field, drift speed?

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18. Answer the following questions: Is Ohm's law universally applicable for all conducting elements? If not, give examples of elements which do not obey Ohm's law.

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19. A low voltage supply from which one needs high currents must have very low internal resistance. Why?

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20. Answer the following questions: A high tension (HT) supply of, say, 6 kV must have a very large internal resistance. Why?

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21. Choose the correct alternative: Alloys of metals usually have $(greater / \leq ss)$ resistivity than that of their constituent metals.

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22. Choose the correct alternative: Alloys usually have much $(lower / higher)$ temperature coefficients of resistance than pure metals.

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23. Choose the correct alternative: The resistivity of the alloy manganin is nearly independent (of/ or increases) rapidly with increase of temperature.

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24. Choose the correct alternative: The resistivity of a typical insulator (e.g., amber) is greater than that of a metal by a factor of the order of $\left(10^{22} / 10^{23}\right)$.

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25. Given n resistors each of resistance R. how will you combine them to get the maximum effective resistance? What is the ratio of the maximum to minimum resistance?

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26. You are given n-resistors each of resistance r. These are first connected to get minimum possible resistance. In second case again connected to the maximum possible resistance. Compare the ratio between the minimum and maximum value of resistance so obtained?

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27. Given the resistances of $1\Omega, 2\Omega, 3\Omega$, how will be combine them to get an equivalent resistance of (i) $(11/3)\Omega$ (ii) $(11/5)\Omega$, (iii) 6Ω , (iv) $(6/11)\Omega$?

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28. Given the resistances of $1\Omega, 2\Omega, 3\Omega$, how will be combine them to get an equivalent resistance of (i) $(11/3)\Omega$ (ii) $(11/5)\Omega$, (iii) 6Ω , (iv) $(6/11)\Omega$?

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29. Given the resistances of $1\Omega, 2\Omega, 3\Omega$, how will be combine them to get an equivalent resistance of (i) $(11/3)\Omega$ (ii) $(11/5)\Omega$, (iii) 6Ω , (iv) $(6/11)\Omega$?

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30. Given the resistances of $1\Omega, 2\Omega, 3\Omega$, how will be combine them to get an equivalent resistance of (i) $(11/3)\Omega$ (ii) $(11/5)\Omega$, (iii) 6Ω , (iv) $(6/11)\Omega$?

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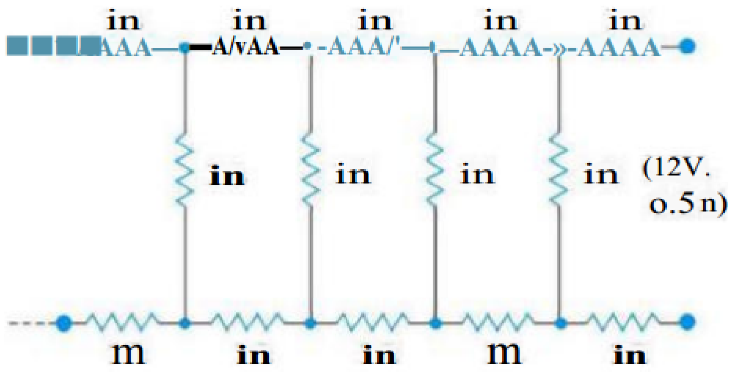
31. Determine the current drawn from a 12V supply with internal resistance 0.5Ω by the infinite network shown in Fig. Each resistor

has 1Ω resistance. :



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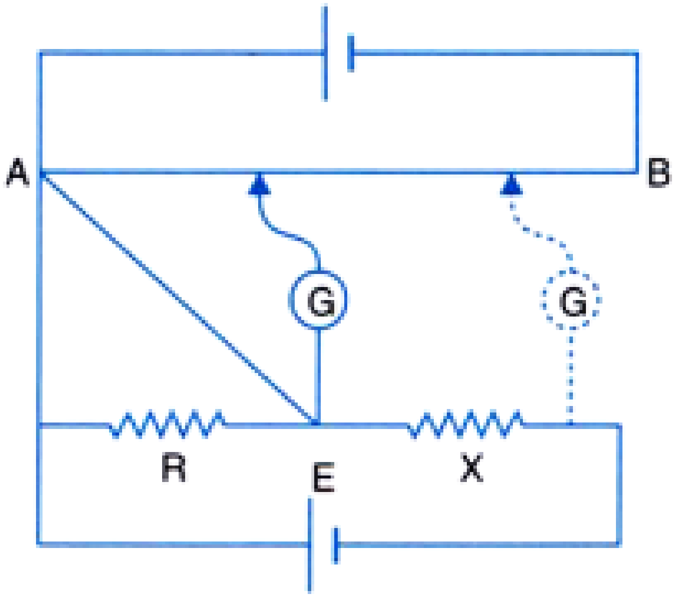
32. Figure shows a potentiometer circuit for comparison of two resistances. The balance point with a standard resistor $R = 10\Omega$ is found to be 58.3 cm, while that with the unknown resistance x is 68.5 cm. determine the value of X.



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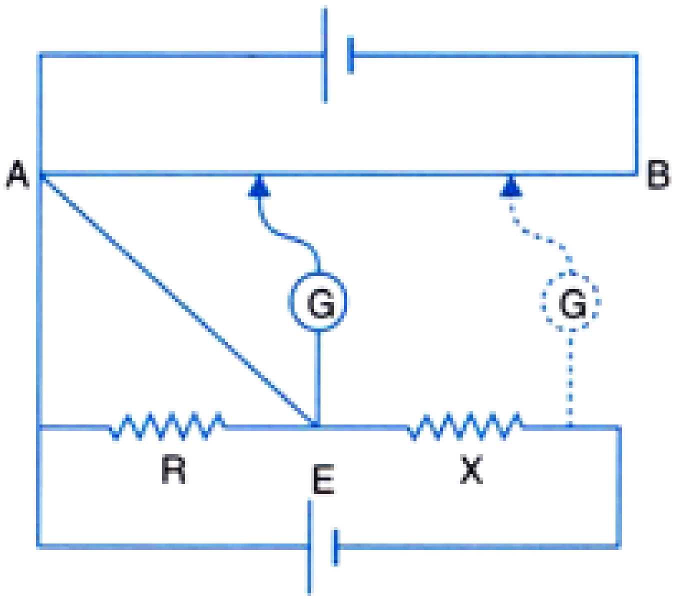
33. Figure shows a potentiometer circuit for comparison of two resistances. The balance point with a standard resistor $R = 10 \Omega$ is found to be 58.3 cm, while that with the unknown resistance x is 68.5 cm. What would you do, if you failed to find a balance point with the given cell E?



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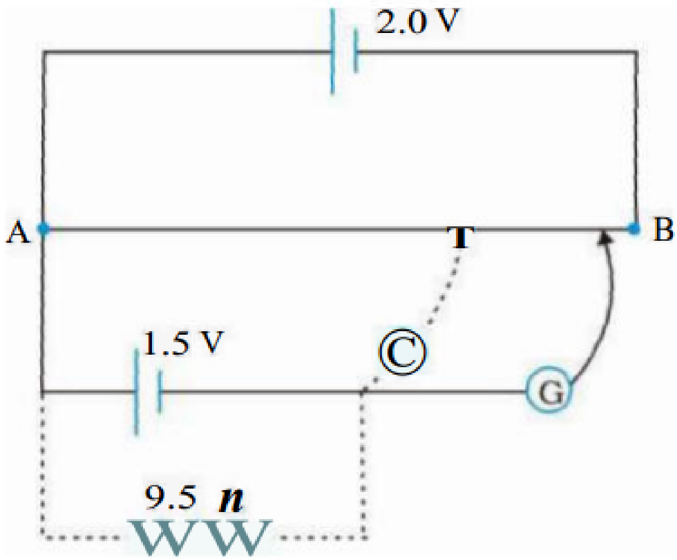
34. Figure 3.35 shows a 2.0 V potentiometer used for the determination of internal resistance of a 1.5 V cell. The balance point of the cell in open circuit is 76.3 cm. When a resistor of 9.5Ω is used in the external circuit of the cell, the balance point shifts to 64.8 cm length of the potentiometer wire. Determine the internal resistance of the cell. :



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35. Is the motion of a charge across junction momentum conserving? Why or why not?

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36. The relaxation time $\tau$is nearly independent of applied E field whereas it changes significantly with temperature T. first fact is responsible for Ohm's law whereas the second fact leads to variation of ρ with temperature. Elaborate why?

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37. What are the advantages of the null-point method in Wheatstone bridge? What additional masurements would be required to calculate the value of unknown resistance by any other method?

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38. What is the advantage of using thick metallic strips to join wires in a potentionmeter?

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39. For wiring in the home, one uses Cu wires or Al wires. What considerations are involved in this?

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40. Why are alloys used for making standard resistance coils?

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41. Power p is to be delivered to device via transmission cables having resistance R_C. If V is the voltage across R and I is the current through it, find the power wasted and how it can be reduced.

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42. A cell of e.m.f. E an internal resistance r is connected across an external resistance R. Plot a graph showing the variation of P.D. across R, verses R.

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43. First a set of n equal resistors of R each are connected in series to a battery of emf E and internal resistance R. A current I is observed to flow. Then, the n resistors are connected in parallel to the same battery. It is observed that the current is increased 10 times. What is 'n'?

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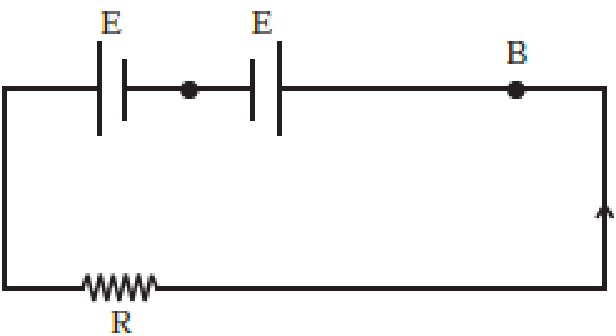
44. Two cells, having the same emf, are connected in series through an external resistance R. Cells have internal resistance r_1 and $r_2 (r_1 > r_2)$respectively. When the circuit is closed, the potentail difference across the first cell is zero the value of R shown in the figure



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45. Two conductors are made of the same material and have the same length. Conductor A is a solid wire of diameter 1 mm. Conductor B is a hollow tube of outer diameter 2 mm and inner diameter 1mm. Find the ratio of resistanceR_A to R_B.

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46. Suppose there is a circuit consisting of only resistances and batteries. Suppose one is to double (or increase it to n times) all voltages and resistances. Show that currents are unaltered.

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47. A circular coil of wire consisting of 100 turns, each of radius 8.0 cm carries a current of 0.40 A. What is the magnitude of the magnetic field B at the centre of the coil?

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48. A long straight wire carries a current of 35 A. What is the magnitude of the field B at a point 20 cm from the wire?

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49. A long straight wire in the horizontal plane carries a current of 50 A in north to south direction. Give the magnitude and direction of B at a point 2.5 m east of the wire.

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50. A horizontal overhead power line carries a current of 90 A in east to west direction. What is the magnitude and direction of the magnetic field due to the current 1.5 m below the line?

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51. What is the magnitude of magnetic force per unit length on a wire carrying a current of 8 A and making an angle of 30° with the direction of a uniform magnetic field of 0.15 T?

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52. A 3.0 cm wire carrying a current of 10 A is placed inside a solenoid perpendicular to its axis. The magnetic field inside the solenoid is given to be 0.27 T. What is the magnetic force on the wire?

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53. Two long and parallel straight wires A and B carrying currents of 8.0 A and 5.0 A in the same direction are separated by a distance of

4.0 cm. Estimate the force on a 10 cm section of wire A.

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54. A closely wound solenoid 80 cm long has 5 layers of windings of 400 turns each. The diameter of the solenoid is 1.8 cm. If the current carried is 8.0 A. estimate the magnitude of B inside the solenoid near its centre.

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55. A square coil of side 10 cm consists of 20 turns and carries a current of 12 A. The coil is suspended vertically and the normal to the plane of the coil makes an angle of 30° with the direction of a uniform horizontal magnetic field of magnitude 0.80 T. What is the magnitude of torque experienced by the coil?

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56. In a chamber, a uniform magnetic field of 6.5 G $(1G = 10^{-4}T)$ is maintained. An electron is shot into the field with a speed of $4.8 \times 10^{6} ms^{-1}$ normal to the field. Explain why the path of the electron is a circle. Determine the radius of the circular orbit. $(e = 1.5 \times 10^{-19} C.\ m_e = 9.1x10^{-31} kg)$

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57. Obtain the frequency of revolution of the electron in its circular orbit. Does the answer depend on the speed of the electron ? Explain.

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58. A circular coil of 30 turns and radius 8.0 cm carrying a current of 6.0 A is suspended vertically in a uniform horizontal magnetic field of magnitude 1.0 T. The field lines make an angle of 60° with the normal of the coil.

Calculate the magnitude of the counter torque that must be applied to prevent the coil from turning.

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59. A circular coil of 30 turns and radius 8.0 cm carrying a current of 6.0 A is suspended vertically in a uniform horizontal magnetic field of magnitude 1.0 T. The field lines make an angle of 60° with the normal of the coil. Calculate the magnitude of the counter torque that must be applied to prevent the coil from turning.

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60. Two concentric circular coils X and Y of radii 16 cm and 10 cm, respectively, lie in the same vertical plane containing the north to south direction. Coil X has 20 turns and carries a current of 16 A, coil Y has 25 turns and carries a current of 18 A. The sense of the current in X is anticlockwise, and clockwise in

Y, for an observer looking at the coils facing west. Give the magnitude and direction of the net magnetic field due to the coils at their centre.

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61. A magnetic field of 100 G $\left(1G = 10^{-4}T\right)$ is required which is uniform in a region of linear dimension about 10 cm and area of cross-section about $10^{-3}m^2$. The maximum current-carrying capacity of a given coil of wire is 15 A and the number of turns per unit length that can be wound round a core is at most 1000 turns m^{-1}. Suggest some appropriate design particulars of a solenoid for the required purpose. Assume the core is not ferromagnetic.

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62. For a circular coil of radius R and N turns carrying current I, the magnitude of the magnetic field at a point on its axis at a distance x from its centre is given by,

$B = \frac{\mu_0 I R^2 N}{2(x^2 + R^2)^{\frac{3}{2}}}$. Show that this reduces to the familiar result for field at the centre of the coil.

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63. For a circular coil of radius R and N turns carrying current I, the magnitude of the magnetic field at a point on its axis at a distance x from its centre is given by,

$B = \frac{\mu_0 I R^2 N}{2(x^2 + R^2)^{\frac{3}{2}}}$. Consider two parallel coaxial circular coils of equal radius R, and number of turns N, carrying equal currents in the same direction, and separated by a distance R. Show that the field on the axis around the mid-point between the coils is uniform over a distance that is small as compared to R, and is given by, $B = 0.72\frac{\mu_0 NI}{R}$ approximately.

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64. A toroid has a core of inner radius 20cm and outer radius 22cm around which 4200 turns of a wire are wound. If the current in the wire is 10A, what is the magnetic field inside the core of toroid.

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65. A toroid has a core of inner radius 20cm and outer radius 22cm around which 4200 turns of a wire are wound. If the current in the wire is 10A, what is the magnetic field

outside the toroid.

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66. A toroid has a core of inner radius 20cm and outer radius 22cm around which 4200 turns of a wire are wound. If the current in the wire is 10A, what is the magnetic field outside the toroid.

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67. Answer the following questions: A magnetic field that varies in magnitude from point to point but has a constant direction (east to west) is set up in a chamber. A charged particle enters the chamber and travels undeflected along a straight path with constant speed. What can you say about the initial velocity of the particle?

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68. Answer the following questions: A charged particle enters an environment of a strong and non-uniform magnetic field varying from point to point both in magnitude and direction, and comes out of it following a complicated trajectory. Would its final speed equal the initial speed if it suffered no collisions with the environment?

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69. Answer the following questions:An electron travelling west to east enters a chamber having a uniform electrostatic field in north to south direction. Specify the direction in which a uniform magnetic field should be set up to prevent the electron from deflecting from its straight line path.

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70. An electron emitted by a heated cathode and accelerated through a potential difference of 2.0 kV, enters a region with uniform magnetic field of 0.15 T. Determine the trajectory of the electron if the field makes an angle of 30° with the initial velocity.

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71. A magnetic field set up using Helmholtz coils is uniform in a small region and has a magnitude of 0.75 T. In the same region, a uniform electrostatic field is maintained in a direction normal to the common axis of the coils. A narrow beam of (single species) charged particles all accelerated through 15 kV enters this region in a direction perpendicular to both the axis of the coils and the electrostatic field. If the beam remains undeflected when the electrostatic field is $9.0 \times 10^{5} Vm^{-1}$ make a simple guess as to what the beam contains. Why is the answer not unique?

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72. A straight horizontal conducting rod of length 0.45 m and mass 60 g is suspended by two vertical wires at its ends. A current of 5.0 A is set up in the rod through the wires. What magnetic field should be set up normal to the conductor in order that the tension in the wires is zero?

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73. A straight horizontal conducting rod of length 0.45 m and mass 60 g is suspended by two vertical wires at its ends. A current of 5.0 A is set up in the rod through the wires. What will be the total tension in the wires if the direction of current is reversed keeping the magnetic field same as before? (Ignore the mass of the wires.) $g = 9.8ms^{-2}$.

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74. The wires which connect the battery of an automobile to its starting motor carry a current of 300 A (for a short time). What is the force per unit length between the wires if they are 70 cm long and 1.5 cm apart? Is the force attractive or repulsive?

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75. A uniform magnetic field of 1.5 T exists in a cylindrical region of radius10.0 cm, its direction parallel to the axis along east to west. A wire carrying current of 7.0 A in the north to south direction passes through this region. What is the magnitude and direction of the force on the wire if, the wire intersects the axis.

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76. A uniform magnetic field of 1.5 T exists in a cylindrical region of radius10.0 cm, its direction parallel to the axis along east to west. A wire carrying current of 7.0 A in the north to south direction passes through this region. What is the magnitude and direction of the force on the wire if, the wire is turned from N-S to northeast-northwest direction,

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77. A uniform magnetic field of 1.5 T exists in a cylindrical region of radius10.0 cm, its direction parallel to the axis along east to west. A wire carrying current of 7.0 A in the north to south direction passes through this region. What is the magnitude and direction of the force on the wire if, the wire in the N-S direction is lowered from the axis by a distance of 6.0 cm?

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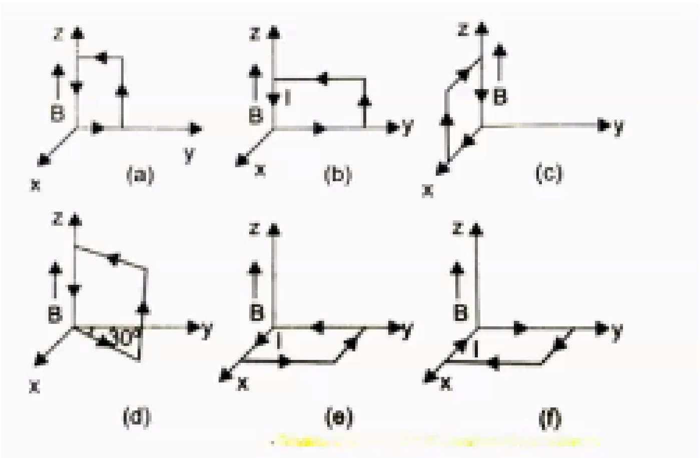
78. A uniform magnetic field of 3000 G is established along the positive z-direction. A rectangular loop of sides 10 cm and 5 cm carries a current of 12 A. What is the torque on the loop in the different cases shown in Figure? What is the force on each case? Which case corresponds to stable equilibrium?



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79. A circular coil of 20 turns and radius 10 cm is placed in a uniform magnetic field of 0.10 T normal to the plane of the coil. If the current in the coil is 5.0 A, what is the total torque on the coil, (The coil is made of copper wire of cross-sectional area $10^{-5}m^2$, and the free electron density in copper is given to be about $10^{29}m^{-3}$.)

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80. A circular coil of 20 turns and radius 10 cm is placed in a uniform magnetic field of 0.10 T normal to the plane of the coil. If the current in the coil is 5.0 A, what is the total force on the coil, (The coil is made of copper wire of cross-sectional area $10^{-5} m^2$, and the free electron density in copper is given to be about $10^{29} m^{-3}$.)

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81. A circular coil of 20 turns and radius 10 cm is placed in a uniform magnetic field of 0.10 T normal to the plane of the coil. If the current in the coil is 5.0 A, what is the average force on each electron in the coil due to the magnetic field? (The coil is made of copper wire of cross-sectional area $10^{-5}m^2$, and the free electron density in copper is given to be about $10^{29}m^{-3}$.)

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82. A solenoid 60 cm long and of radius 4.0 cm has 3 layers of windings of 300 turns each. A 2.0 cm long wire of mass 2.5 g lies inside the solenoid (near its centre) normal to its axis, both the wire and the axis of the solenoid are in the horizontal plane. The wire is connected through two leads parallel to the axis of the solenoid to an external battery which supplies a current of 6.0 A in the wire. What value of current (with appropriate sense of circulation) in the windings of the solenoid can support the weight of the wire? $g = 9.8ms^{-2}$.

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83. A galvanometer coil has a resistance of 15Ω and the metre shows full scale deflection for a current of 4mA. How will you convert the metre into an ammmeter of range 0 to 6 A?

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84. A galvanometer coil has a resistance of 15 ohm and gives full scale deflection for a current of 3 mA. To convert it to an ammeter of range 0 to 18.

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85. A vector needs three quantities for its specification. Name the three independent quantities conventionally used to specify the earth's magnetic field.

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86. Answer the following questions regarding earth’s magnetism:The angle of dip at a location In southern India Is about 18°. Would you expect a greater or smaller dip angle In Britain?

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87. Answer the following questions regarding earth's magnetism: f you made a map of magnetic field lines at Melbourne In Australia, would the lines seem to go Into the ground or come out of the ground?

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88. Answer the following questions regarding earth's magnetism: In which direction would a compass free point to, If located right on the geomagnetic north or south pole?

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89. Answer the following questions regarding earth's magnetism:The earth's field, It Is claimed, roughly approximates the field due to a dipole of magnetic moment $8 \times 10^{22} J$ "T1 located at Its centre. Check the order of magnitude of this number In some way.

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90. Answer the following questions regarding earth's magnetism:Geologists claim that besides the main magnetic N-S poles, there are several local poles on the earth's surface oriented In different directions. How Is such a thing possible at all?

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91. Answer the following questions: The earth's magnetic field varies from point to point in space. Does it also change with time? If so, on what time scale does it change appreciably?

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92. Answer the following questions:The earth's core Is known to contain Iron. Yet geologists do not regard this as a source of the earth's magnetism. Why?

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93. Answer the following questions:The charged currents in the outer conducting regions of the earth's core are thought to be responsible for earth's magnetism. What might be the 'battery' (i.e., the source of energy) to sustain these currents?

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94. Answer the following questions:The earth may have even reversed the direction of Its field several times during its history of 4 to 5 billion years. How can geologists know about the earth's field in such distant past?

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95. Answer the following questions:The earth's field departs from its dipole shape substantially at large distances (greater than about 30,000 km). What agencies may be responsible for this distortion?

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96. Answer the following questions:Interstellar space has an extremely weak magnetic field of the order of 10^{-12} T.Can such a weak field be of any significant consequence? Explain.

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97. A short bar magnet placed with its axis at 30° with an external field of 800 G experiences a torque of 0.016 Nm.

What is the magnetic moment of the magnet ?

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98. A short bar magnet of magnetic moment m = $0.32JT^{-1}$ is placed in a uniform magnetic field of 0.15 T. If the bar is free to rotate in the plane of the field, which orientation would correspond to its stable equilibrium?What is the potential energy of the magnet in this case?

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99. A short bar magnet of magnetic moment m = $0.32JT^{-1}$ is placed in a uniform magnetic field of 0.15 T. If the bar is free to rotate in the plane of the field, which orientation would correspond to its unstable equilibrium?What is the potential energy of the magnet in this case?

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100. A closely wound solenoid of 800 turns and area of cross section $2.5 \times 10^{-4} m^2$ carries a current of 3.0 A. Explain the sense in which the solenoid acts like a bar magnet. What is its associated magnetic moment?

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101. A closely wound solenoid of 800 turns and area of cross section $2.5 \times 10^{-4} m^2$ carries a current of 3.0 A. If the solenoid is free to turn about the vertical direction and a uniform horizontal magnetic field of 0.25 T is applied, what is the magnitude of torque on the solenoid when its axis makes an angle of 30° with the direction of applied field?

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102. A bar magnet of magnetic moment $1.5JT^{-1}$ lies aligned with the direction of a uniform magnetic field of 0.22 T.

What is the amount of work required by an external torque to turn the magnet so as to align its magnetic moment?

normal to the field direction.

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103. A bar magnet of magnetic moment $1.5JT^{-1}$ lies aligned with the direction of a uniform magnetic field of 0.22 T.What is the amount of work required by an external torque to turn the magnet so as to align its magnetic moment: opposite to the field direction?

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104. A bar magnet of magnetic moment $1.5 JT^{-1}$ lies aligned with the direction of a uniform magnetic field of 0.22 T.

What is the amount of work required by an external torque to turn the magnet so as to align its magnetic moment?

normal to the field direction.

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105. A closely wound solenoid of 2000 turns and area of cross-section $1.6 \times 10^{1} m^{2}$. carrying a current of 4.0 A, is suspended through its centre allowing it to turn in a horizontal plane. What is the magnetic moment associated with the solenoid?

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106. A closely wound solenoid of 2000 turns and area of cross-section $1.6 \times 10^{1} m^{2}$.

carrying a current of 4.0 A, is suspended through its centre allowing it to turn in a horizontal plane. What is the force and torque on the solenoid if a uniform horizontal magnetic field of $7.5x10^2$ T is set up at an angle of 30° with the axis of the solenoid?

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107. A circular coil of 16 turns and radius 10 cm carrying a current of 0.75 A rests with its plane normal to an external field of magnitude

5.0×10^{-2} T. The coil is free to turn about an axis in its plane perpendicular to the field direction. When the coil is turned slightly and released, it oscillates about its stable equilibrium with a frequency of $2.0s^{-1}$. What is the moment of inertia of the coil about its axis of rotation?

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108. A magnetic needle free to rotate in a vertical plane parallel to the magnetic meridian has its north tip pointing down at 22° with the horizontal. The horizontal component of the earth's magnetic field at the place is known to be 0.35 G. Determine the magnitude of the earth's magnetic field at the place.

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109. At a certain location in Africa, a compass points 12° west of the geographic north. The north tip of the magnetic needle of a dip circle placed in the plane of magnetic meridian points 60° above the horizontal. The horizontal component of the earth's field is measured to be 0.16 G. Specify the direction and magnitude of the earth's field at the location.

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110. A short bar magnet has a magnetic moment of $0.48 JT^{-1}$. Give the direction and magnitude of the magnetic field produced by the magnet at a distance of 10 cm from the centre of the magnet on the axis.

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111. A short bar magnet has a magnetic moment of $0.48JT^{-1}$. Give the direction and magnitude of the magnetic field produced by the magnet at a distance of 10 cm from the centre of the magnet on the equatorial lines (normal bisector) of the magnet.

Watch Video Solution

112. A short bar magnet placed in a horizontal plane has its axis aligned along the magnetic north-south direction. Null points are found on the axis of the magnet at 14 cm from the centre of the magnet. The earth's magnetic field at the place is 0.36 G and the angle of dip is zero. What is the total magnetic field on the normal bisector of the magnet at the same distance as the null-point (i.e., 14 cm) from the centre of the magnet? (At null points, field due to a magnet is equal and opposite to the horizontal component of earth’s magnetic field.)

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113. A short bar magnet placed in a horizontal plane has its axis aligned along the magnetic north-south direction. Null points are found on the axis of the magnet at 14 cm from the center of the magnet. The earth's magnetic field at the place is 0.36 G and the angle of dip is zero. If the bar magnet is turned around by

180°, where will the new null points be located?

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114. A short bar magnet of magnetic movement $5.25 \times 10^{-2} JT^{-1}$ is placed with its axis perpendicular to the earth's field direction. At what distance from the centre of the magnet, the resultant field is inclinedat 45° with earth's field on its normal bisector. Magnitude of the earth's field at the place is given to be 0.42 G. Ignore the length of the magnet in comparison to the distances involved.

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115. A short bar magnet of magnetic movement $5.25 \times 10^{-2} JT^{1}$ is placed with its axis perpendicular to the earth's field direction. At what distance from the centre of the magnet, the resultant field is inclined at 45° with earth's field on its axis. Magnitude of the earth's field at the place is given to be 0.42 G. Ignore the length of the magnet in comparison to the distances involved.

Watch Video Solution

116. Answer the following questions: Why does a paramagnetic sample display greater magnetisation (for the same magnetising field) when cooled?

Watch Video Solution

117. Why is diamagnetism independent of temperature?

Watch Video Solution

118. Answer the following questions: If a toroid uses bismuth for its core, will the field in the core be (slightly) greater or (slightly) less than when the core is empty?

Watch Video Solution

119. Answer the following questions: Is the permeability of a ferromagnetic material independent of the magnetic field? If not, is it more for lower or higher fields?

Watch Video Solution

120. Answer the following questions: Magnetic field lines are always nearly normal to the surface of a ferromagnet at every point. (This fact is analogous to the static electric field lines being normal to the surface of a conductor at every point.) Why?

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121. Answer the following questions: Would the maximum possible magnetisation of a paramagnetic sample be of the same order of magnitude as the magnetisation of a ferromagnet?

Watch Video Solution

122. Answer the following questions: Explain qualitatively on the basis of domain picture the irreversibility in the magnetisation curve of a ferromagnet.

Watch Video Solution

123. Answer the following questions:The hysteresis loop of a soft iron piece has a much smaller area than that of a carbon steel piece. If the material is to go through repeated cycles of magnetisation, which piece will dissipate greater heat energy?

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124. Answer the following questions: What kind of ferromagnetic material is used for coating magnetic tapes in a cassette player, or for building ‘memory stores’ in a modern computer?

Watch Video Solution

125. Answer the following questions: A certain region of space is to be shielded from magnetic fields. Suggest a method.

Watch Video Solution

126. Answer the following questions: What kind of ferromagnetic material is used for coating magnetic tapes in a cassette player, or for building ‘memory stores’ in a modern computer?

Watch Video Solution

127. A long straight horizontal cable carries a current of 2.5 A in the direction 10° south of west to 10° north of east. The magnetic meridian of the place happens to be 10° west of the geographic meridian. The earth's magnetic field at the location is 0.33 G, and the angle of dip is zero. Locate the line of neutral points (ignore the thickness of the cable)? (At neutral points, magnetic field due to a current-carrying cable is equal and opposite to the horizontal component of earth's magnetic field.)

Watch Video Solution

128. A telephone cable at a place has four long straight horizontal wires carrying a current of 1.0 A in the same direction east to west. The earth's magnetic field at the place is 0.39 G, and the angle of dip is 35°. The magnetic declination is nearly zero. What are the resultant magnetic fields at points 4.0 cm below the cable?

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129. A compass needle free to turn in a horizontal plane is placed at the centre of circular coil of 30 turns and radius 12 cm. The coil is in a vertical plane making an angle of 45° with the magnetic meridian. When the current in the coil is 0.35 A, the needle points west to east. Determine the horizontal component of the earth's magnetic field at the location.

Watch Video Solution

130. A compass needle free to turn in a horizontal plane is placed at the centre of a circular coil of 30 turns and radius 12 cm. The coil is in a vertical plane making an angle of 45° with the magnetic meridian when the current in the coil is 0.35amp., the needle points west to east.

The current in the coil is reversed and the coil is rotated about its vertical axis by an angle of 90° in the anticlockwise sense looking from above. Predict the direction of the needle. Take the magnetic declination at the places to be zero.

Watch Video Solution

131. A magnetic dipole is under the influence of two magnetic fields. The angle between the field directions is 60°, and one of the fields has a magnitude of $1.2 \times 10^{-2} T$. If the dipole comes to stable equilibrium at an angle of 15° with this field, what is the magnitude of the other field?

Watch Video Solution

132. A monoenergetic (18 keV) electron beam initially in the horizontal direction is subjected to a horizontal magnetic field of 0.04 G normal to the initial direction. Estimate the up or down deflection of the beam over a distance of 30 cm $\left(m_e = 9.11 \times 10^{-31} kg\right)$.

Watch Video Solution

133. A sample of paramagnetic salt contains 2.0×10^{24} atomic dipoles each of dipole moment $1.5 \times 10^{-23} JT^{-1}$. The sample is placed under a homogeneous magnetic field of 0.64 T, and cooled to a temperature of 4.2 K. The degree of magnetic saturation achieved is equal to 15%. What is the total dipole moment of the sample for a magnetic field of 0.98 T and a temperature of 2.8 K? (Assume Curie's law)

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134. A Rowland ring of mean radius 15 cm has 3500 turns of wire wound on a ferromagnetic core of relative permeability 800. What is the magnetic field B in the core for a magnetising current of 1.2 A?

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135. The magnetic moment vectors μ_s andμ_l (associated with the intrinsic spin angular momentum S and orbital angular momentum 1, respectively, of an electron are predicted by quantum theory (and verified experimentally to a high accuracy) to be given by: $\mu_s = -(e/m)S, \mu_l = -(e/2m)l$ Which of these relations is in accordance with the result expected classically? Outline the derivation of the classical result.

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136. Verify that the cyclotron frequency $\omega = \frac{eB}{m}$ has the correct dimensions of $[T]^{-1}$.

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137. Show that a force that does no work must be a velociy dependent force.

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138. The magnetic force depends on v which depends on the inertial frame of reference. Does then the magentic force differ from inertial frame to frame? Is it reasonable that the net acceleration has a different value in different frames of reference?

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139. Describe the motion of a charged particle in a cyclotron if the frequency of the radio frequency field were doubled.

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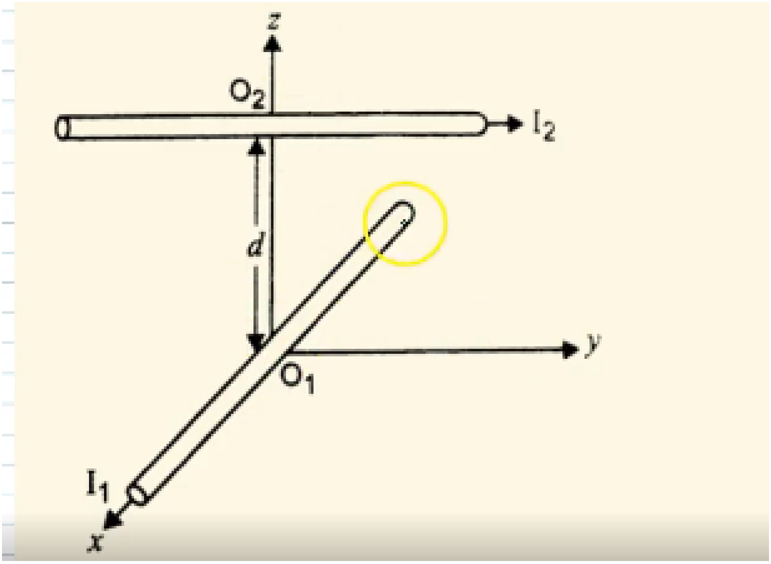
140. Two long wires carrying current I_1 and I_2 are arranged as shown in figure. The one carrying current I_1 is along the x-axis. The other carrying current I_2 is along a line parallel to the y-axis given by x=0 and z=d. Find the force exerted at O_2 because of the wire along the x-axis.



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141. A 4 A current carrying loop consists of three identical quarter circles of radius 5 cm lying in the positive quadrants of the x-y, y-z and z-x planes with their centres at the origin joined together, value of B at the origin.

Watch Video Solution

142. A charged particle of charge e and mass m is moving in an electric field $\vec{E}$ and magnetic field $\vec{B}$. Construct dimensionless quantities and quantities of dimention $[T]^{-1}$.

Watch Video Solution

143. An electron enters with a velocity $\overrightarrow{v} = v_0 \hat{i}$ into a cubical region (faces parallel to coordinate planes) in which there are uniform electric and magnetic fields. The orbit of the electron is found to spiral down inside the cube in plane parallel to the x-y plane. Suggest a configuration of fields $\overrightarrow{E}$ and $\overrightarrow{B}$ that can lead to it.

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144. Do magnetic field obey Newton's third law. Verify for two current elements $\overrightarrow{d} l_1 = dl\hat{i}$ located at the origin and $\overrightarrow{d} l_2 = dl\hat{j}$ located at (0, R, 0). Both carry current I.

Watch Video Solution

145. A multirange voltmeter can be constructed by using a galvanometer circuit as shown in Fig. EP 4.21. We want to construct a voltmeter that can measure 2V, 20V and 200 V using a galvanometer of resistance 10Ω and that produces maximum deflection for current of 1 mA. find R_1, R_2 and R_3 that have to be used.

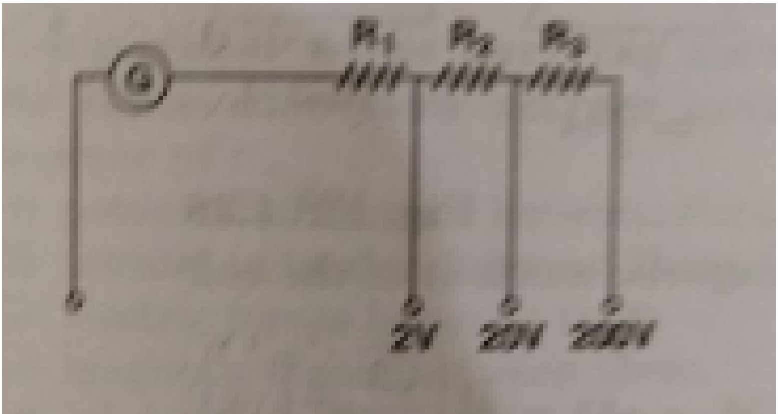

Fig. EP 4.21

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146. A long straight wire carrying current of 25 A rests on a table as shown in Fig. EP 4.22. Another wire PQ of length 1m, mass 2.5 g carries the same current but in the opposite direction. The wire PQ is free to slide up and down. To what height will PQ rise?

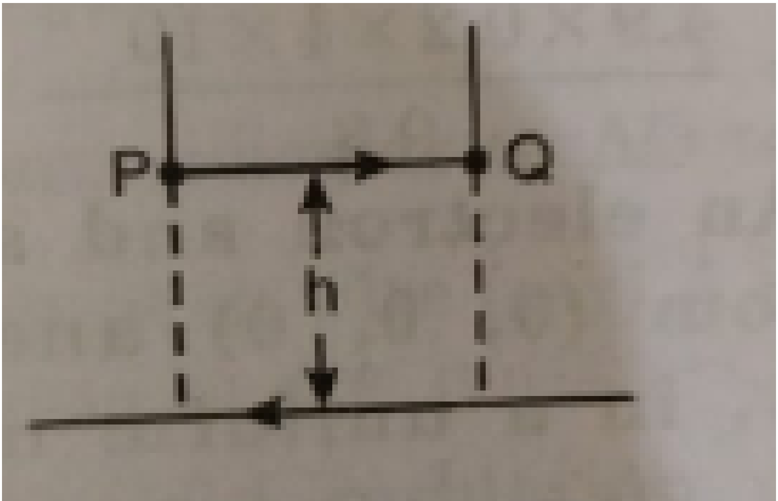

Fig. EP 4.22

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147. A proton has spin and magnetic moment just like an electron. Why then its effect is neglected in magnetism of materials?

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148. Explain quantitatively the order of magnitude differnece between the diamagnetic susceptibility of $N_2(\text{~}5 \times 10^{-9})(atSTP)Cu(\text{~}10^{-5})$.

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149. From molecular view point, discuss the temperature dependence of susceptibility for diamagnetism, paramagnetism and ferromagnetism.

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150. A ball of superconducting material is dipped in liquid nitrogen placed near a bar magnet.

In which direction will it move?

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151. A ball of superconducting material is dipped in liquid nitrogen placed near a bar magnet.

What will be the direction of its magnetic moment?

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152. A bar magnet of magnetic moment M and moment of inertia I (about centre, perpendicular to length) is cut into two equal pieces, perpendicular to length. Let T be the period of oscillation of the original magnet about an axis through the mid point, perpendicular to length, in a magnetic field $\vec{B}$. What would be the similar period T' for each piece?

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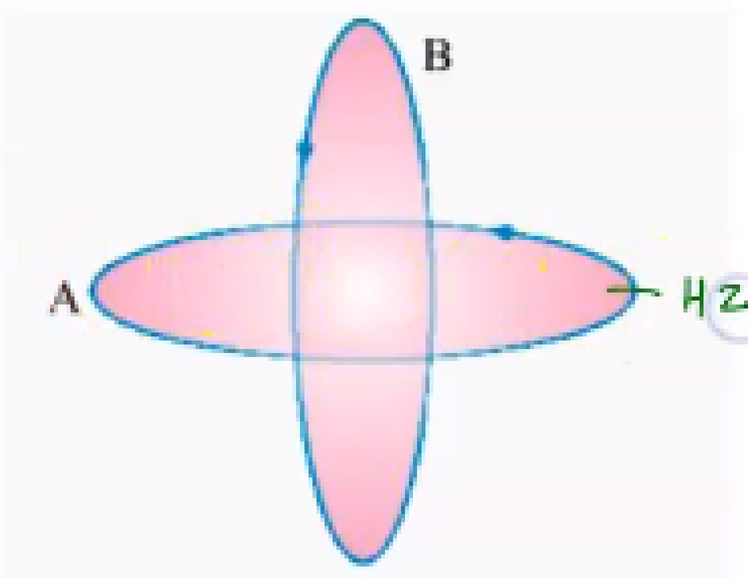
153. Two circular conductors are perpendicular to each other as shown in figure. If the current is changed in conductor B, will a current be induced in the conductor A,



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154. A uniform electric field and a uniform magnetic field are acting along the same direction in a certain region. If an electron is projected in the region with a velocity along the direction of fields, then electron

will turn towards right of the direction of motion

speed will decrease.

speed will increase.

will turn towards left of the direction of motion.

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155. Separation between two parallel pates facing each other is 2 cm and surface are $l^2 = 100cm^2$. If 10^6 electrons of velocity $10^8 ms^{-1}$ projected into the gap between the plates kept at a potential difference of 400 V, find the deflection of an electron.

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156. The magnetic moment of a diamagnetic atom is

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157. If temperature and magnetic field applied across a paramagnetic substane are trippled, how many times intensity of magnetisation of the substance will change?

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158. There is a magnetic material of coericivty $2 \times 10^3 Am^{-1}$. What current should flow through a solenoid of length 15 cm havign 150 turns to demagnetise the substance completely?

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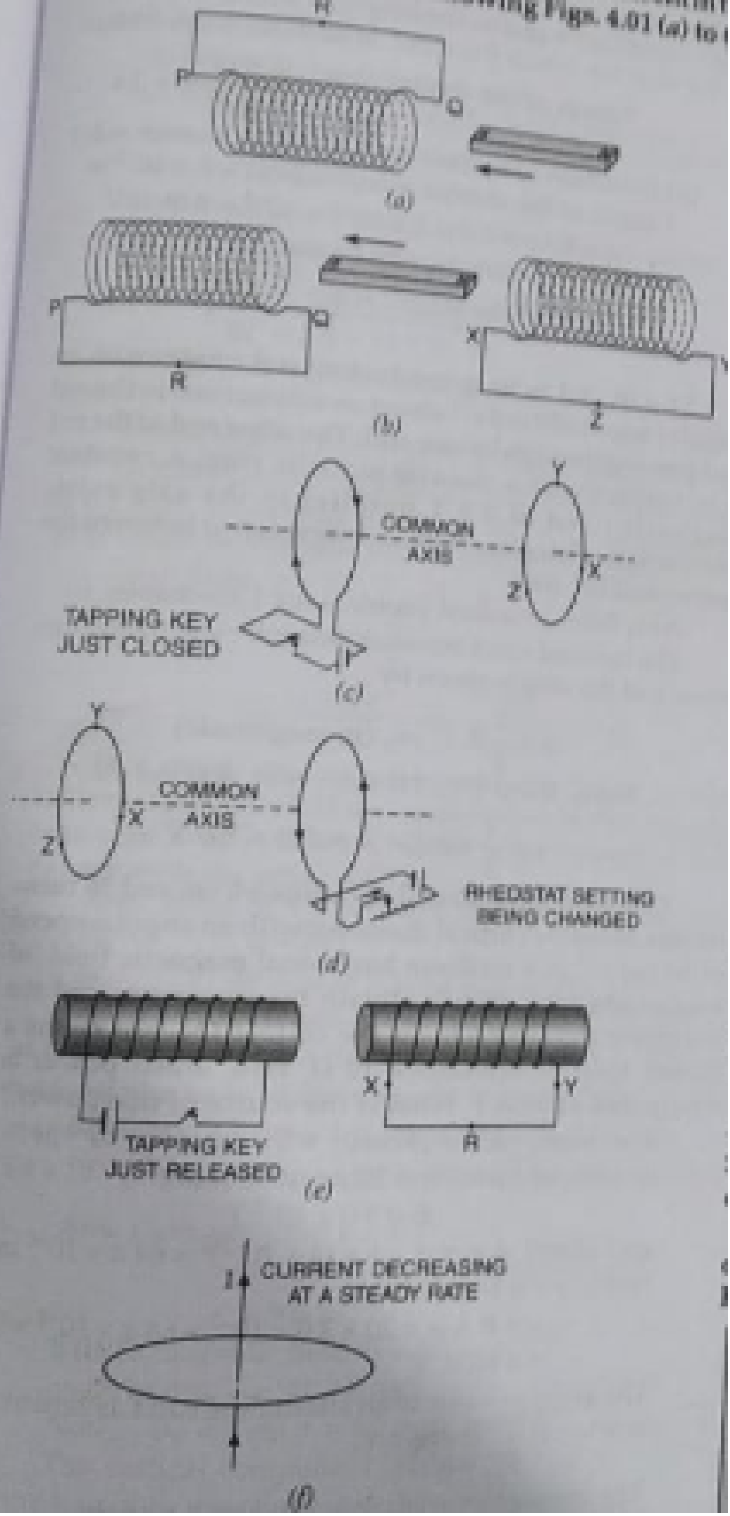
159. Predict the direction of induced current in the situations described by the following figures.

...wing Figs. 4.01 (a) to (...



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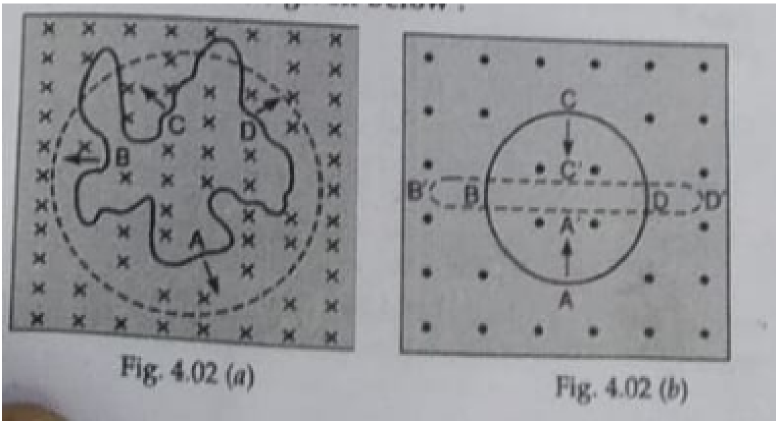
160. Use Lenz's law to deterine the direction of induced current in the situation described by the figures.



A wire of irregular shape turning into a circular shape. The cross(x) indicates magnetic field into the paper and the dot (.) indicates magnetic field out of the paper.

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161. A long solenoid with 15 turns per cm has a small loop of area $2.0 cm^2$ placed inside the solenoid normal to its axis. If the current carried by the solenoid changes steadily from 2.0 A to 4.0 A in 0.1 s, what is the induced emf in the loop while the current is changing?

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162. A rectangular wire loop of sides 8 cm and 2 cm with a small cut is moving out of a region of uniform magnetic field of magnitude 0.3 T directed normal to the loop. What is the emf developed across the cut if the velociy of the loop is $1cms^{-1}$ in a direction normal to the: longer side of the loop? for how long does the induced voltage last in each case?

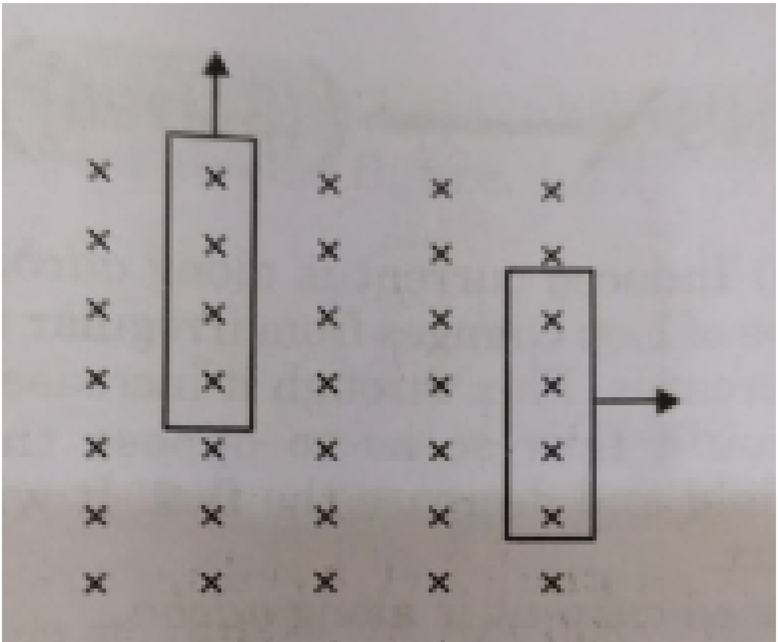

Fig. TBQ 6.4

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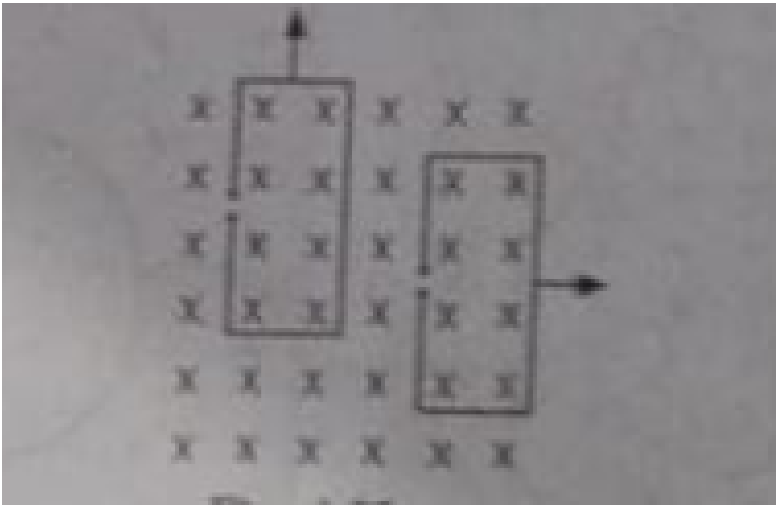
163. A rectangular loop of sides 8 cm and 2 cm with a small cut is moving out of a region of uniform magnetic field of magntude 0.3 T directed normal to the loop. What is the voltage developed acros the cut, if the velocity of the loop is $1 cms^{-1}$ in a diretion normal to the 

shorter side of the loop. For how long does the induced voltage last in each case?

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164. A 1.0 m long metallic rod is rotated with an angular frequency of $400rads^{-1}$ about an axis normal to the rod passing through its one end. The other end of the rod is in contact with a circular metallic ring. A constant and uniform magnetic field of 0.5 T parallel to the axis exists everywhere. Calculate the emf developed between the centre and the ring.

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165. A circular coil of radius 8.0 cm and 20 turns is rotated about its vertical diameter with an angular speed of $50 rad s^{-1}$ in a uniform horizontal magnetic field of magnitude 3.0×10^{-2}. Obtain themaximum and average emf induced in the coil. If the coil forms a closed loop of resistance 10Ω, calculate the maximum value of current in the coil. Calculate the average power loss due to Joule heating. Where does this power come from?

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166. A horizontal straight wire 10 m long extending from east to west is falling with a speed of $5.0ms^{-1}$, at right angles to the horizontal component of the earth's magnetic field, $0.30 \times 10^{-4} Wbm^{-2}$, What is the instantaneous value of the emf induced in the wire?

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167. A horizontal straight wire 10 m long extending from east to west is falling with a speed of $5.0ms^{-1}$, at right angles to the horizontal component of the earth's magnetic field, $0.30 \times 10^{-4}Wbm^{-2}$, What is the direction of the emf?

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168. A horizontal straight wire 10 m long extending from east to west is falling with a speed of $5.0ms^{-1}$, at right angles to the horizontal component of the earth's magnetic field, $0.30 \times 10^{-4}Wbm^{-2}$, Which end of the wire is at the higher electrical potential?

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169. Current in a circuit falls from 5.0 A to 0.0 A in 0.1 s. If an average emf of 200 V induced, give an estimate of the self-inductance of the circuit.

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170. A pair of adjacent coils has a mutual inductance of 1.5 H. If the current in one coil changes from 0 to 20 A in 0.5 s, what is the change of flux linkage with the other coil?

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171. A jet plane is travelling towards west at a speed of $1800 km / h$. What is the voltage difference developed between the ends of the wing 25 m long, If the Earth's magnetic field at the location has a magnitude of $5 \times 10^{-4} T$ and the dip angle is 30°.

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172. A rectangular loop of sides 8 cm and 2 cm with a cut is stationary between the pole pieces of an electromagnet. The magnetic field of the magnet is normal to the loop. The current feeding the electromagnet is reduced so that the field decreases from its initial value of 0.3 T at the rate of $0.02 T s^{-1}$. If the cut is joined and the loop has a resistance of 1.6Ω , how much power is dissipated by the loop as heat? What is the source of this power?

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173. A square loop of side 12 cm with its sides parallel to X and Y axes is moved with a velocity of $8cms^{-1}$ in the positive x-direction in an environment containing a magnetic field in the positive z-direction. The field is neither uniform in space nor constant in time. It has a gradient of $10^{-3} T cm^{-1}$ along the negative x-direction (that is it increases by $10^{-3} T cm^{-1}$ as one moves in the negative x-direction), and it is decreasing in time at the rate of $10^{-3} T cm^{-1}$. Determine the direction and magnitude of the induced current in the loop if its resistance is $4.50 m\Omega$.

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174. It is desired to measure the magnitude of field between the poles of a powerful loud speaker magnet. A small flat search coil of area $2cm^2$ with 25 closely wound turns, is positioned normal to the field direction, and then quickly snatched out of the field region. Equivalently, one can give it a quick 90° turn to bring its plane parallel to the field direction). The total charge flown in the coil (measured by a ballistic galvanometer connected to coil) is 7.5 mC. The combined resistance of the coil and the galvanometer is 0.50Ω. Estimate the field strength of magnet.

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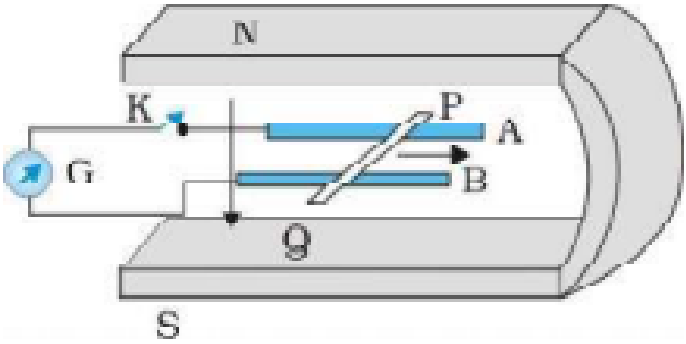
175. Figure shows a metal rod PQ resting on the smooth rails AB and positioned between the poles of a permanent magnet. The rails, the rod, and the magnetic field are in three mutual perpendicular directions. A galvanometer G connects the rails through a switch K. Length of the rod =15 cm, B = 0.50 T, resistance of the closed loop containing the $rod = 9.0m\Omega$ Assume the field to be uniform. What is the retarding force on the rod when K is closed? :



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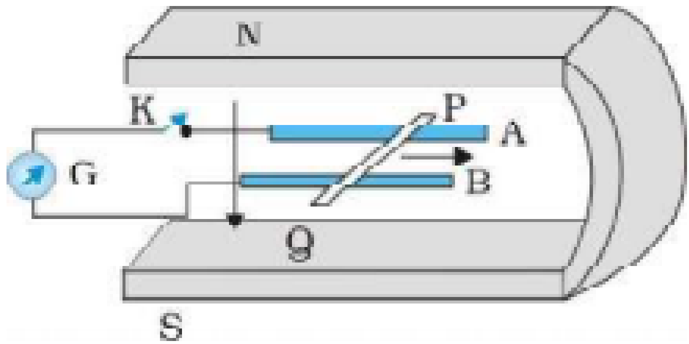
176. Figure shows a metal rod PQ resting on the smooth rails AB and positioned between the poles of a permanent magnet. The rails, the rod, and the magnetic field are in three mutual perpendicular directions. A galvanometer G connects the rails through a switch K. Length of the rod =15 cm, B = 0.50 T, resistance of the closed loop containing the $rod = 9.0 m\Omega$ Assume the field to be uniform. What is the retarding force on the rod when K is closed? :



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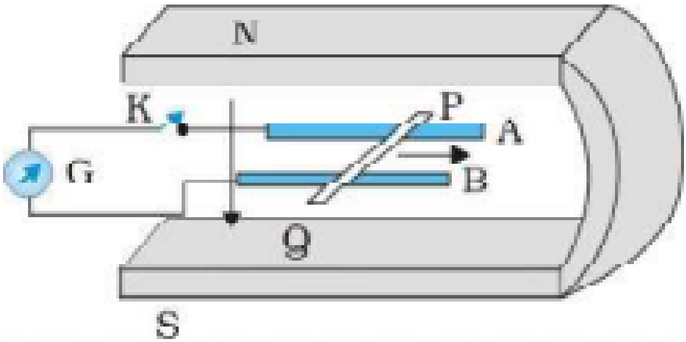
177. Figure 6.20 shows a metal rod PQ resting on the smooth rails AB and positioned between the poles of a permanent magnet. The rails, the rod, and the magnetic field are in three mutual perpendicular directions. A galvanometer G connects the rails through a switch K. Length of the rod =15 cm, B = 0.50 T, resistance of the closed loop containing the $rod = 9.0 m\Omega$ Assume the field to be uniform. With K open and the rod moving uniformly, there is no net force on the electrons in the rod PQ even though they do experience magnetic force due to the motion of the rod.

Explain. :



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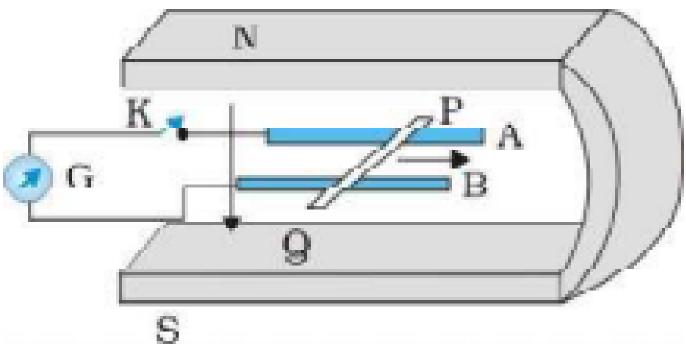
178. Figure shows a metal rod PQ resting on the smooth rails AB and positioned between the poles of a permanent magnet. The rails, the rod, and the magnetic field are in three mutual perpendicular directions. A galvanometer G connects the rails through a switch K. Length of the rod =15 cm, B = 0.50 T, resistance of the closed loop containing the $rod = 9.0 m\Omega$ Assume the field to be uniform. What is the retarding force on the rod when K is closed? :



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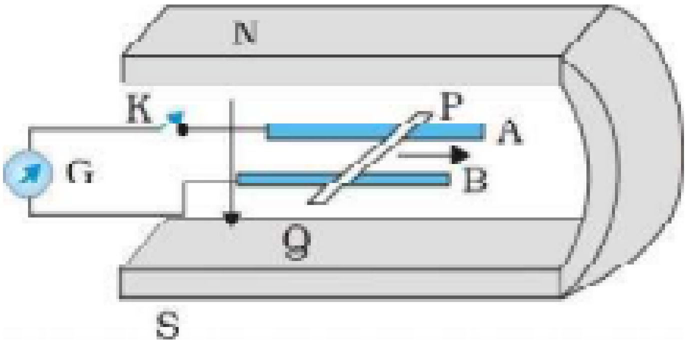
179. Figure shows a metal rod PQ resting on the smooth rails AB and positioned between the poles of a permanent magnet. The rails, the rod, and the magnetic field are in three mutual perpendicular directions. A galvanometer G connects the rails through a switch K. Length of the rod =15 cm, B = 0.50 T, resistance of the closed loop containing the $rod = 9.0 m\Omega$ Assume the field to be uniform. How much power is required (by an external agent) to keep the rod moving at the same speed (=$12 cm s^{-1}$) when K is closed? How much power is required when K is open? :



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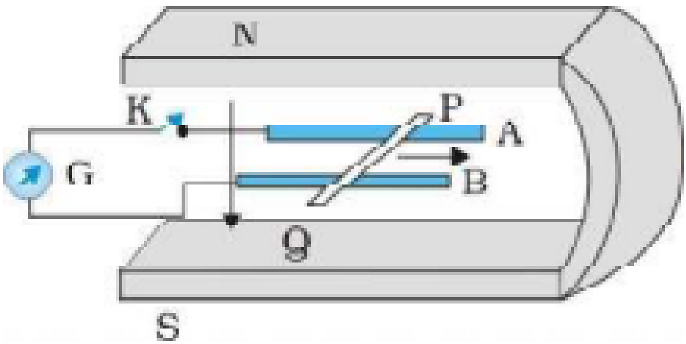
180. Figure shows a metal rod PQ resting on the smooth rails AB and positioned between the poles of a permanent magnet. The rails, the rod, and the magnetic field are in three mutual perpendicular directions. A galvanometer G connects the rails through a switch K. Length of the rod =15 cm, B = 0.50 T, resistance of the closed loop containing the $rod = 9.0 m\Omega$ Assume the field to be uniform. How much power is dissipated as heat in the closed circuit? What is the source of this power? :



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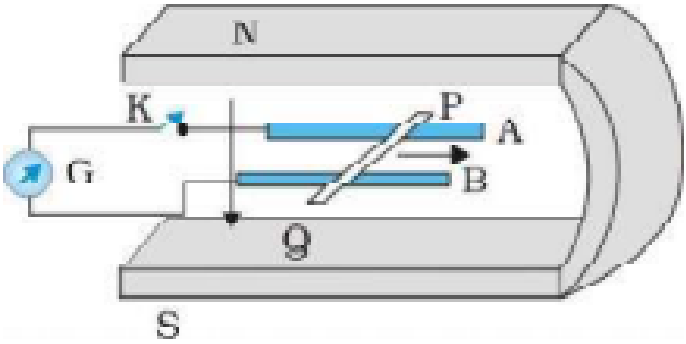
181. Figure shows a metal rod PQ resting on the smooth rails AB and positioned between the poles of a permanent magnet. The rails, the rod, and the magnetic field are in three mutual perpendicular directions. A galvanometer G connects the rails through a switch K. Length of the rod =15 cm, B = 0.50 T, resistance of the closed loop containing the $rod = 9.0 m\Omega$ Assume the field to be uniform. What is the retarding force on the rod when K is closed? :



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182. An air-cored solenoid with length 30 cm, area of cross-section $25 cm^2$ and number of turns 500, carries a current of 2.5 A. The current is suddenly switched off in a brief time of $10^{-3} s$. How much is the average back emf induced across the ends of the open switch in the circuit? Ignore the variation in magnetic field near the ends of the solenoid.

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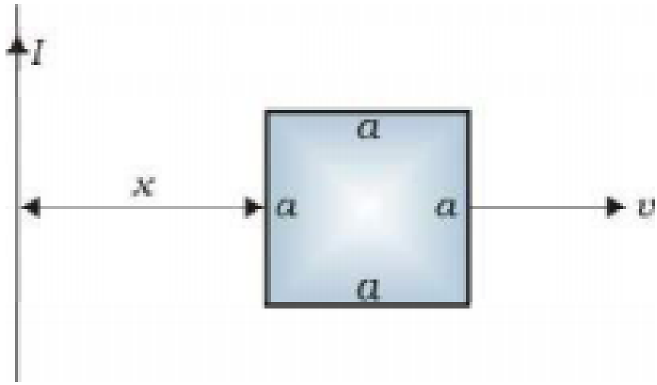
183. Obtain an expression for the mutual inductance between a long straight wire and a square loop of side a as shown in Fig. 6.21. :



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184. Now assume that the straight wire carries a current of 50 A and a loop is moved to the right with a constant velocity, $v = 10ms^{-1}$. Calculate the induced e.m.f. in the loop at the

instant when x = 0.2 m. Take a = 0.1 m and assume that the loop has a large resistance.

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185. A 100Ω resistor is connected to a 220 V, 50 Hz ac supply. What is the rms value of current in the circuit?

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186. A 100Ωresistor is connected to a 220 V, 50 Hz ac supply. What is the net power consumed over a full cycle?

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187. The peak voltage of an ac supply is 300 V. What is the rms voltage?

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188. The peak voltage of an ac supply is 300 V. The rms value of current in an ac circuit is 10 A. What is the peak current?

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

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190. A $60\mu F$ capacitor is connected to a 110 V, 60 Hz ac supply. Determine the rms value of the current in the circuit.

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191. (A) A 44 mH inductor is connected to 220 V, 50 Hz ac supply. (B) A 60 microF capacitor is connected to 110 V, 60 Hz ac supply. What is the net power absorbed by each circuit (A) and (B) over a complete cycle. Explain your answer.

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192. Obtain the resonant frequency or of ω_r series LCR circuit with L = 2.OH, $C = 32\mu F$ and $R = 10\Omega$. What is the Q-value of this circuit?

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193. A charged $30\mu F$ capacitor is connected to a 27 mH inductor. What is the angular frequency of free oscillations of the circuit?

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194. A charged 30 micro Farad capacitor is connected to a 20 mH inductor. Suppose the initial charge on the capacitor is 6 mC. What is the total energy stored in the circuit initially? What is the total energy at later time?

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195. A series LCR circuit with $R = 20\Omega$,L=1.5H and $C = 35\mu F$ is connected to a variable-frequency 200 V ac supply. When the frequency of the supply equals the natural frequency of the circuit, what is the average power transferred to the circuit in one complete cycle?

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196. A radio can tune over the frequency range of a portion of MW broadcast band: (800 kHz to 1200 kHz). If its LC circuit has an effective inductance of $200\mu H$, what must be the range of its variable capacitor?

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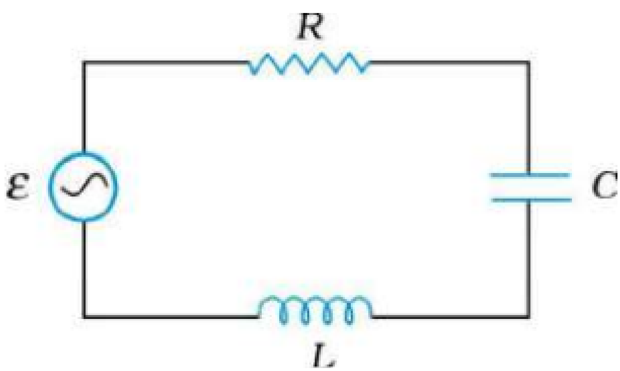
197. Figure 7.21 shows a series LCR circuit connected to a variable frequency 230 V source. L = 5.0 H, $C = 80 \mu F$, $R = 40 \Omega$. Determine the source frequency which drives the circuit in resonance. :



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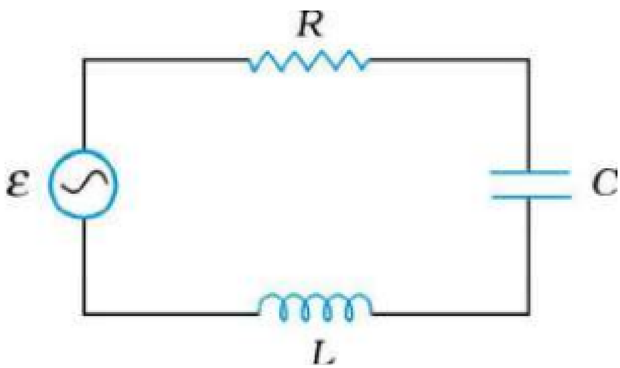
198. Figure shows a series LCR circuit connected to a variable frequency 230 V source. L = 5.0 H, $C = 80\mu F$, $R = 40\Omega$. Obtain the impedance of the circuit and the amplitude of current at the resonating frequency. :



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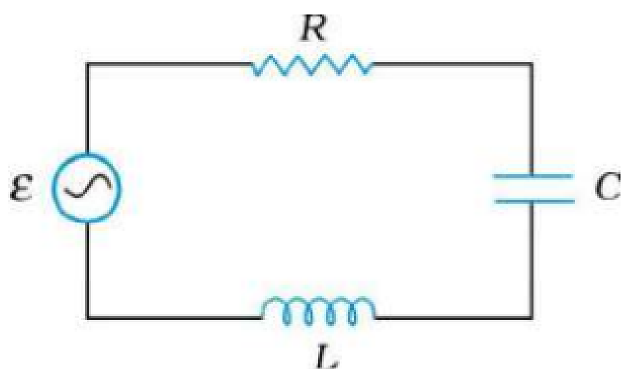
199. Figure shows a series LCR circuit connected to a variable frequency 230 V source. L = 5.0 H, $C = 80 \mu F$, $R = 40 \Omega$. Determine the rms potential drops across the three elements of the circuit. Show that the potential drop across the LC combination is zero at the resonating frequency. :



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200. An LC circuit contains a 20 mH inductor and a $50\mu F$ capacitor with an initial charge of 10 mC. The resistance of the circuit is negligible. Let the instant the circuit is closed be t = 0. What is the total energy stored initially? Is it conserved during LC oscillations?

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201. An LC circuit contains a 20 mH inductor and a $50\mu F$ capacitor with an initial charge of 10 mC. The resistance of the circuit is negligible. Let the instant the circuit is closed be t = 0. What is the total energy stored initially? What is the natural frequency of the circuit?

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202. An LC circuit contains a 20 mH inductor and a $50\mu F$ capacitor with an initial charge of 10 mC. The resistance of the circuit is negligible. Let the instant the circuit is closed be t = 0. At what time is the energy stored completely magnetic (i.e., stored in the inductor)?

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203. An LC circuit contains a 20 mH inductor and a $50\mu F$ capacitor with an initial charge of 10 mC. The resistance of the circuit is negligible. Let the instant the circuit is closed be t = 0. At what times is the total energy shared equally between the inductor and the capacitor?

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204. An LC circuit contains a 20 mH inductor and a $50\mu F$ capacitor with an initial charge of 10 mC. The resistance of the circuit is negligible. Let the instant the circuit is closed be t = 0. If a resistor is inserted in the circuit, how much energy is eventually dissipated as heat?

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205. A coil of inductance 0.50 H and resistance 100Ω is connected to a 240 V, 50 Hz ac supply. What is the maximum current in the coil?

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206. A coil of inductance 0.50 H and resistance 100Ω is connected to a 240 V, 50 Hz ac supply. What is the time lag between the voltage maximum and thecurrent maximum?

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207. A coil of inductance 0.50 H and resistance 100 ohm is connected to a high frequency supply (240 V, 10 kHz). (a) Obtain the maximum current in the coil. (b) what is the time lag between voltage maximum and the current maximum. Hence, explain the statement that at very high frequency, an inductor in a circuit nearly amounts to an open circuit. How does an inductor behave in a dc circuit after the steady state?

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208. A $100\mu F$ capacitor in series with a 40Ω resistance is connected to a 110 V, 60 Hz supply. What is the maximum current in the circuit?

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209. A $100\mu F$ capacitor in series with a 40Ω resistance is connected to a 110 V, 60 Hz supply. What is the time lag between the current maximum and the voltage maximum?

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210. A 100 micro F capacitor in series with a 40 ohm resistance is connected to a 110 V, 12 kHz supply? (a) What is the maximum current in the circuit? (b) What is time lag between the current maximum and voltage maximum? Hence, explain the statement that a capacitor is a conductor at very high frequencies. Compare this behaviour with that of a capacitor in a dc circuit after the steady state.

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211. A circuit containing a 80 mH inductor and a $60\mu F$ capacitor in series is connected to a 230 V, 50 Hz supply. The resistance of the circuit is negligible. Obtain the current amplitude and rms values.

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212. A circuit containing a 80 mH inductor and a $60\mu F$ capacitor in series is connected to a

230 V, 50 Hz supply. The resistance of the circuit is negligible. Obtain the rms values of potential drops across each element.

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213. A circuit containing a 80 mH inductor and a $60\mu F$ capacitor in series is connected to a 230 V, 50 Hz supply. The resistance of the circuit is negligible. What is the average power transferred to the inductor?

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214. A circuit containing a 80 mH inductor and a $60\mu F$ capacitor in series is connected to a 230 V, 50 Hz supply. The resistance of the circuit is negligible. What is the average power transferred to the capacitor?

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215. A circuit containing a 80 mH inductor and a $60\mu F$ capacitor in series is connected to a 230 V, 50 Hz supply. The resistance of the circuit is negligible. What is the total average power absorbed by the circuit? ['Average' implies 'averaged over one cycle'.]

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216. A series LCR circuit with L=0.12H, C = 480 nF, $R = 23\Omega$ is connected to a 230 V variable frequency supply. What is the source frequency for which current amplitude is maximum. Obtain this maximum value.

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217. A series LCR circuit with L=0.12H, C = 480 nF, $R = 23\Omega$ is connected to a 230 V variable frequency supply. What is the source frequency for which average power absorbed by the circuit is maximum. Obtain the value of this maximum power.

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218. A series LCR circuit with L=0.12H, C = 480 nF, $R = 23\Omega$ is connected to a 230 V variable frequency supply. For which frequencies of the source is the power transferred to the circuit half the power at resonant frequency? What is the current amplitude at these frequencies?

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219. A series LCR circuit with L=0.12H, C = 480 nF, $R = 23\Omega$ is connected to a 230 V variable frequency supply. What is the Q-factor of the given circuit?

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220. Obtain the resonant frequency and Q-factor of a series LCR circuit ith L = 3.0 H, $C = 27 \mu F$, and $R = 7.4 \Omega$. It is desired to improve the sharpness of the resonance of the circuit by reducing its 'full width at half maximum' by a factor of 2. Suggest a suitable way.

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221. Answer the following questions: In any ac circuit, is the applied instantaneous voltage equal to the algebraic sum of the instantaneous voltages across the series elements of the circuit? Is the same true for rms voltage?

Watch Video Solution

222. Answer the following questions: A capacitor is used in the primary circuit of an induction coil.

Watch Video Solution

223. Answer the following questions: An applied voltage signal consists of a superposition of a dc voltage and an ac voltage of high frequency. The circuit consists of an inductor and a capacitor in series. Show that the dc signal will appear across C and the ac signal across L.

Watch Video Solution

224. Answer the following questions: A choke coil in series with a lamp is connected to a dc line. The lamp is seen to shine brightly. Insertion of an iron core in the choke causes no change in the lamp's brightness. Predict the corresponding observations if the connection is to an ac line.

Watch Video Solution

225. Answer the following questions: Why is choke coil needed in the use of fluorescent tubes with ac mains? Why can we not use an ordinary resistor instead of the choke coil?

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226. A power transmission line feeds input power at 2300 V to a stepdown transformer with its primary windings having 4000 turns. What should be the number of turns in the secondary in order to get output power at 230 V?

Watch Video Solution

227. At a hydroelectric power plant, the water pressure head is at a height of 300 m and the water flow available is $100m^3s^{-1}$. If the turbine generator efficiency is 60%, estimate the electric power available from the plant $(g = 9.8ms^{-2})$.

Watch Video Solution

228. A small town with a demand of 800 kW of electric power at 220 V is situated 15 km away from an electric plant generating power at 440 V. The resistance of the two wire line carrying power is 0.5Ω per km. The town gets power from the line through a 4000-220 V step-down transformer at a sub-station in the town. Estimate the line power loss in the form of heat.

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229. A small town with a demand of 800 kW of electric power at 220 V is situated 15 km away from an electric plant generating power at 440 V. The resistance of the two wire line carrying power is 0.5Ω per km. The town gets power from the line through a 4000-220 V step-down transformer at a sub-station in the town. Flow much power must the plant supply, assuming there is negligible power loss due to leakage?

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230. A small town with a demand of 800 kW of electric power at 220 V is situated 15 km away from an electric plant generating power at 440 V. The resistance of the two wire line carrying power is 0.5Ω per km. The town gets power from the line through a 4000-220 V step-down transformer at a sub-station in the town. Characterise the step up transformer at the plant.

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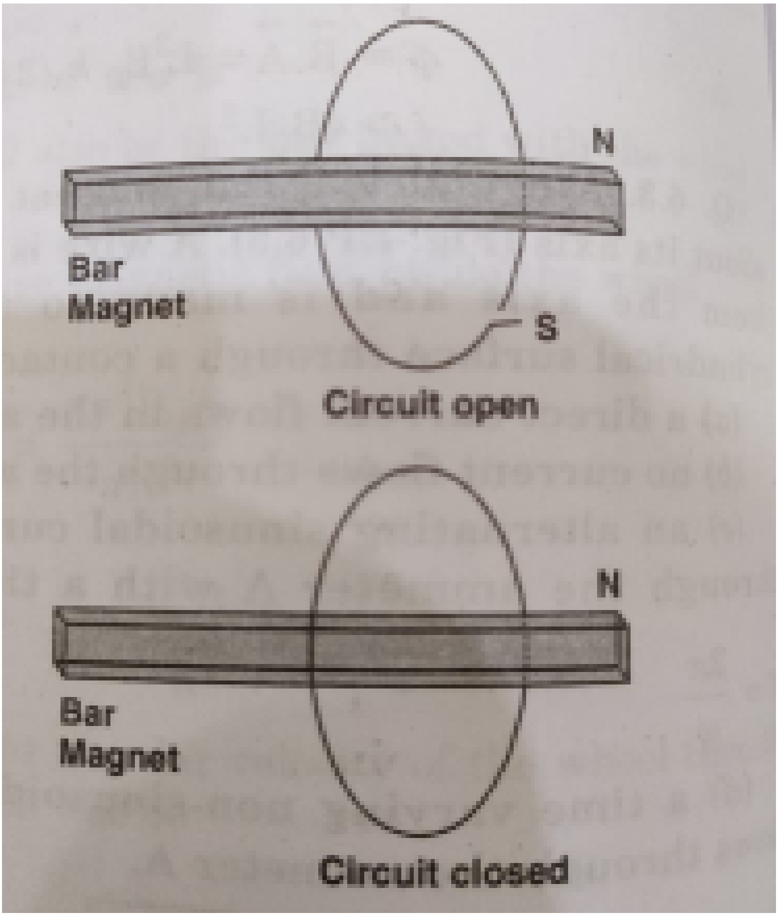
231. Consider a magnet surrounded by a wire with an on/off switch S (Fig. EP 6.11). If the switch is thrown from the off position (open circuit) to the on position (closed circuit), will a current flow in the circuit? Explain.



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232. A wire in the form of a tightly wound solenoid is connected to a DC source, and carries a current. If the coil is stretched so that there are gaps between successive elements of the spiral coil, will the current increases or decrease? Explain.

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233. A solenoid is connected to a battery so that a steady current flows through it. If an iron core is inserted into the solenoid, will the current increase or decrease ? Explain.

Watch Video Solution

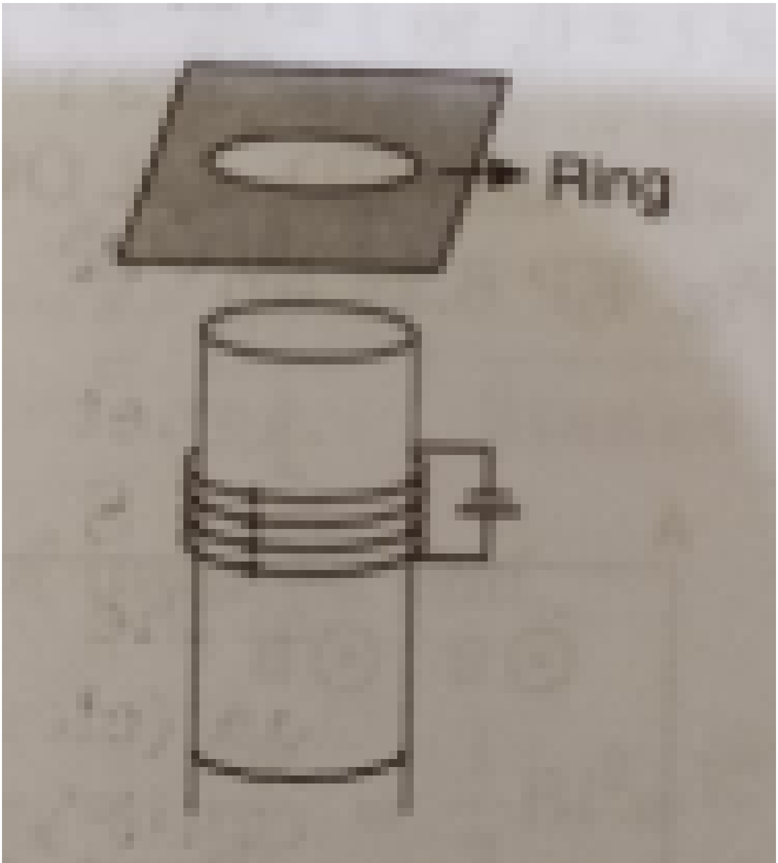
234. Consider a metal rign kept on top of fixed solenoid carrying a current as shown in the figure . The centre of the ring coincides with the axis of the solenoid. If the current is suddenly switched off, what will happen to the ring? 

Fig. EP 6.14

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235. Consider a metal ring kept on the top of a fixed solenoid (say on a cardboard) (Fig. EP 6.14). The centre of the ring coincides with the axis of the solenoid. If the current is suddenly switched on, the metal ring jumps up. Explain.

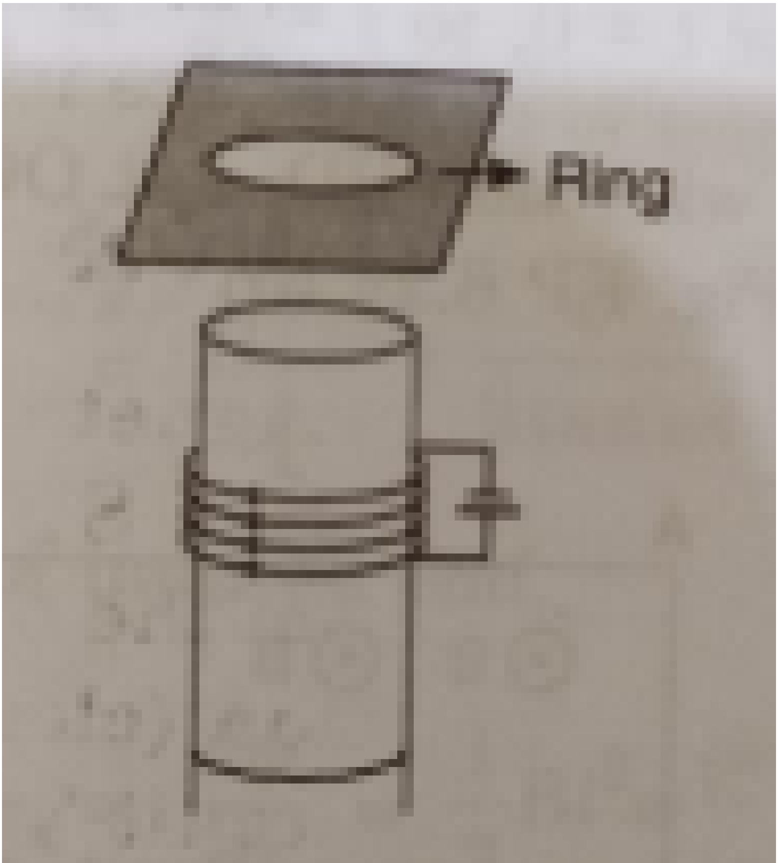

Fig. EP 6.14

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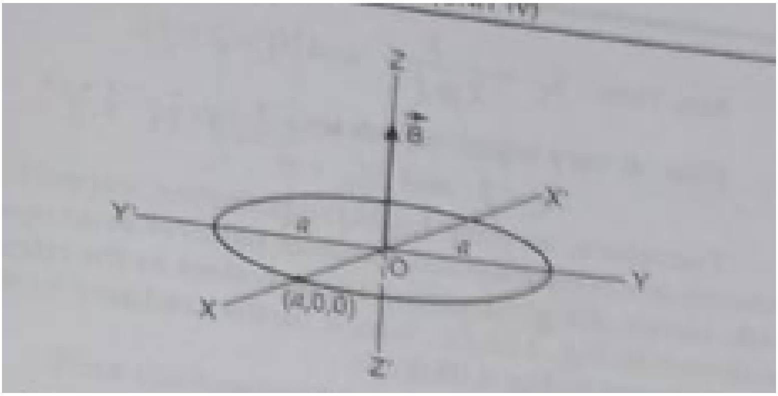
236. Consider a metallic pipe with an inner radius of 1 cm. if a cylindrical bar magnet of radius 0.8 cm is dropped through the pipe, it takes more time to come down that it takes for a similar unmagnetised cylindrcial iron bar dropped through the metallic pipe. explain.

Watch Video Solution

237. A magnetic field in a certain region is given by bar $B = B_0 \cos \omega t \hat{k}$and a coil of radius a with resistanc R is placed i the XY-plane with its centre at the origin in the magnetic field as shown in the figure. Find the magnitude and direction of current at (a,0,0) at $t = \pi / 2\omega$



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238. Consider a closed loop C in a magnetic field (Fig. EP 6.18). The flux passing through the loop is defined by choosing a surface whose edge coinides with the loop and using the formula

$\phi = B_1 dA_1 + B_2 . dA_2 + \dots\dots\dots\dots\dots$ Now if we choose two differnet surfaces S_1 and S_2 having as thier edge, would we get the same answer for flux. Justify your answer.

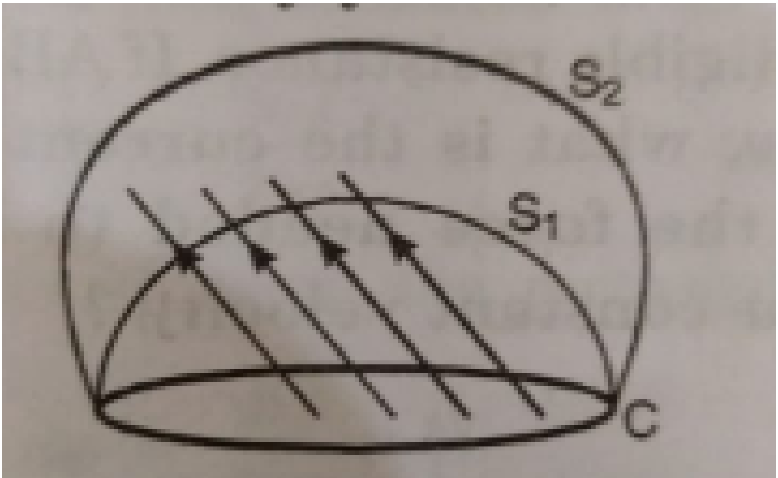

Fig. EP 6.18

Watch Video Solution

239. Find the current in the wire for the configuration shown in Fig. EP 6.19. Wire PQ has negligible resistance. B is the magnetic field is coming out of the paper θ is a fixed angle made by PQ travelling smoothly over two conducting paralel wire separated by a distance d.

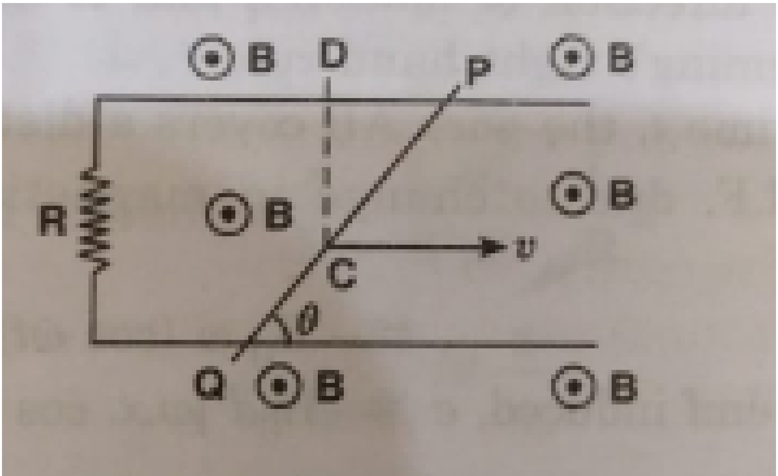

Fig. EP 6.19

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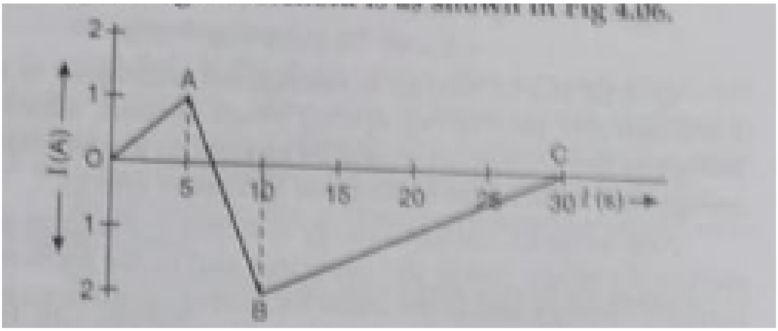
240. A current versus time grpah for the current passign through a solenoid is as shown in the figure. For which time is the black electromotive force (ε) a maximum. If the back e.m.f. at t = 3 s is e, find the back e.m.f. at t = 7s, 15 s and 40 s. OA, AB and BC are straight linge segments.



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241. There are two coils A and B separated by some distance. If a current of 2A flows through A, a magnetic flux of $10^{-2} Wb$ passes through B(no current through B). If no current passes through A and a current of 1A passes through B, what is the flux through A?

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242. If a LC circuit is considered analogous to a harmonically oscillating spring block system, which energy of the LC circuit would be analogous to potential energy and which one analogous to kinetic energy?

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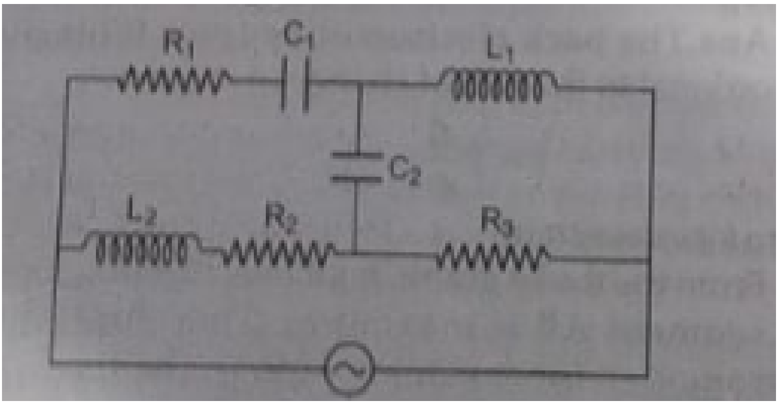
243. Draw the effective equivalent circuit of the circuit shown in the figure



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244. Study the circuits (a) and (b) shown in Fig. EP 7.16 and answer the following questions.

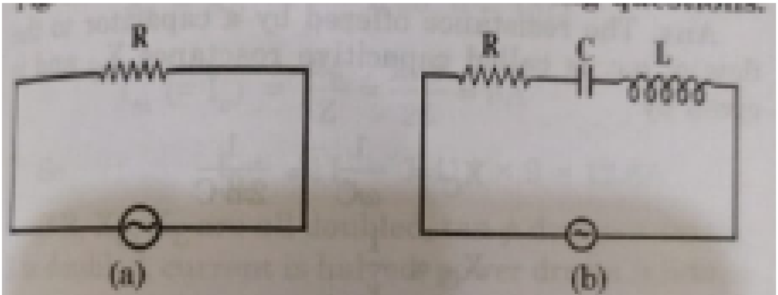

Fig. EP 7.16

Under which conditions would the rms currents in the two circuits be the same?

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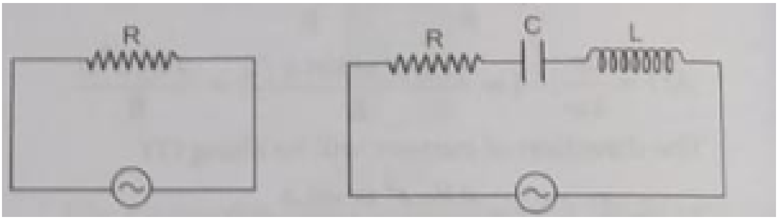
245. Study the circuits shown in the figure . Answer the following questions



Can the r.m.s. current circuit be b large than that a

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246. Can the instantaneous power output of an a.c. source ever be negative? Can the average power output be negative?

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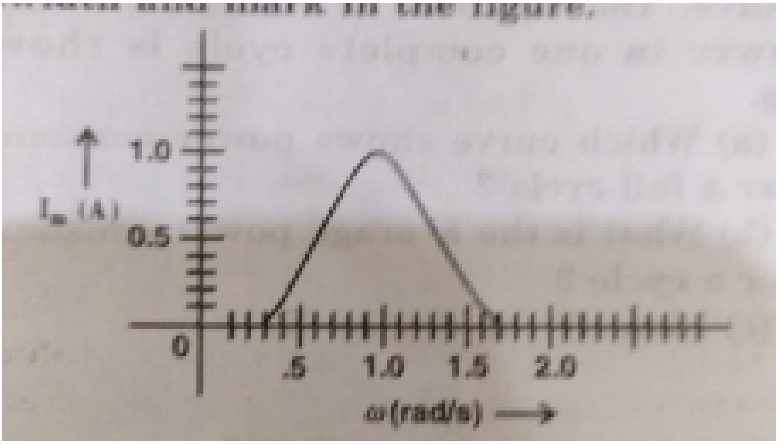
247. In series LCR circuit, the plot of $I_{\max} vs \omega$ is shown in Fig. EP 7.18 (a). Find the bandwidth and mark in the figure.



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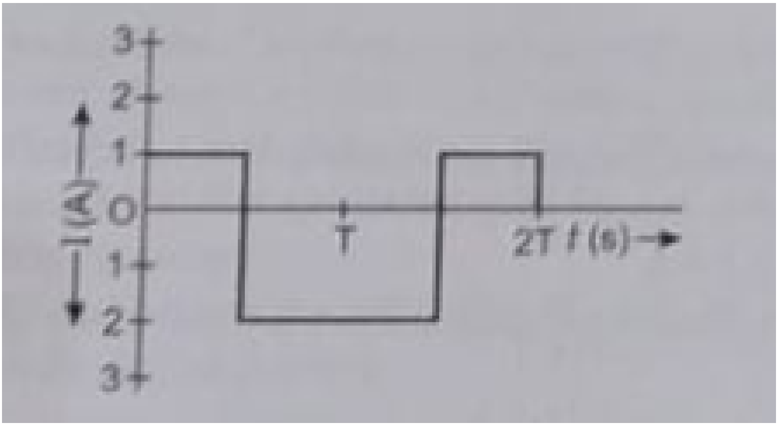
248. The alternating current in the circuit is described by the graph as shown in the figure. Show r.ms. Current in the graph.



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249. How does the sign of the phase angle ϕ, by which the supply voltage leads the current in an LCR series circuit, change as the supply frequency is gradually increased from very low to very high values?

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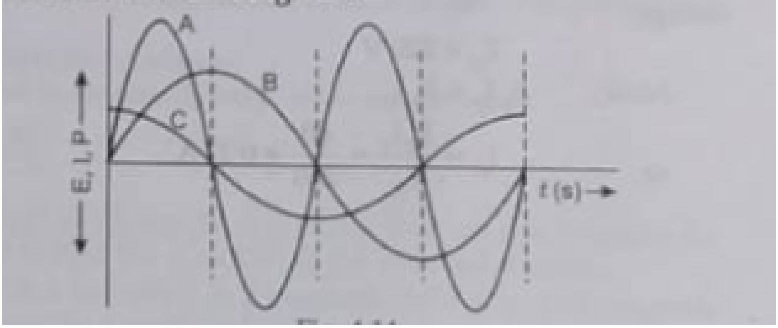
250. A device X is connected to an a.c. sourc.e The variation of voltage, current and power in one complete cycle is as shown in the fig.



Which curve shows power consumption over a cycle?

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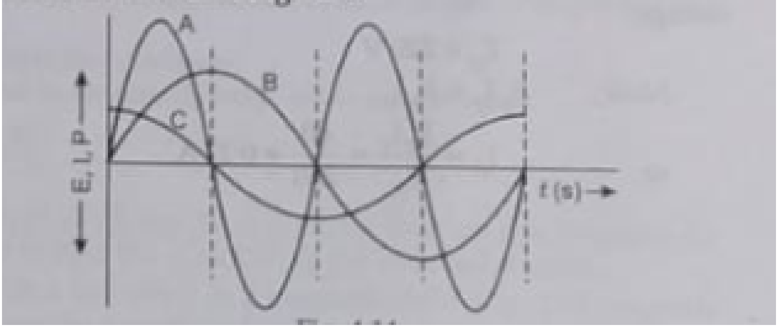
251. A device X is connected to an a.c. source.e The variation of voltage, current and power in one complete cycle is as shown in the fig.



What is the average power consumption over a cycle?

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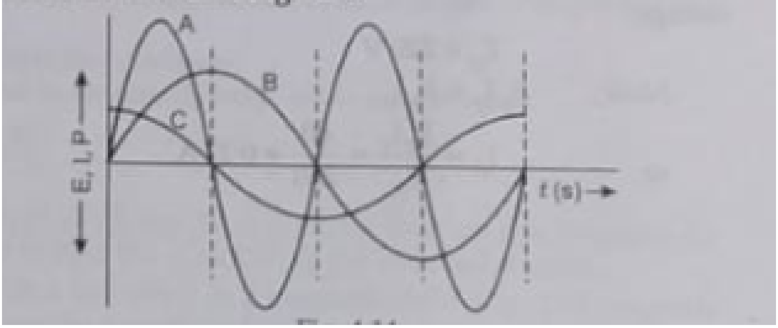
252. A device X is connected to an a.c. sourc.e The variation of voltage, current and power in one complete cycle is as shown in the fig.



Identify the device X.

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253. Both alternating current and direct current are measured in amperes. But how is the ampere defined for an alternating current?

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

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255. A 60 W load is connected to the secondary of a transformer whose primary draws line voltage. If a current of 0.54 A flows in the load, what is the current in the primary coil?

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256. Explain why the reactance provided by a capacitor to an alternating current decreases with increasing frequency.

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257. Explain why the reactance offered by an inductor increases with increasing frequency of an alternating voltage.

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258. A boat is moving due east in a region, where the earth's magnetic field is $5.0 \times 10^{-5} NA^{-1}m^{-1}$ due north amd horizontal. The boat carries a vertical aerial 2 m long. If the speed of the boat is $1.5ms^{-1}$, the magnitude of the induced e.m.f. in the aerial is

A. 1 mV

B. 0.75 mV

C. 0.50 mV

D. 0.15 mV

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259. 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 B_1 wber to B_2 Weber. The induced current in the circuit is:

A. $\dfrac{B_2 - B_1}{5Rnt}$

B. $-\dfrac{n(B_2 - B_1)}{5Rt}$

C. $-\dfrac{B_2 - B_1}{Rnt}$

D. $-\dfrac{n(B_2 - B_1)}{Rt}$

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

A. $5 \mu V$

B. $50 \mu V$

C. 5 mV

D. 50 mV

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261. In a uniform magnetic field of induction B, a wire in the form of semicircle of radius r rotates about the diameter of the circle with angular frequency omega. If the total resistance of the circuit is R, the mean power generated per period of rotation is:

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

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

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

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

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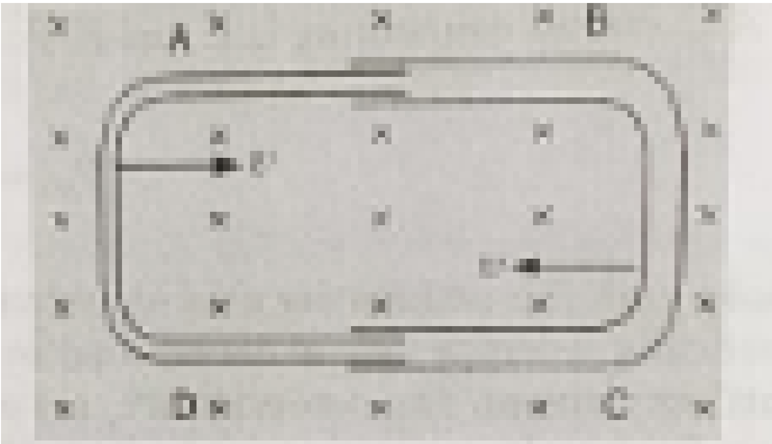
262. One conducting U-tube cam slide inside another as shown in figure maintaining electrical contacts between the tubes. The megnatics field B is perpendicular to the plane of the figure.



If each tube moves towards the others at a constant speed v, then the e.m.f. induced in the circuit in terms of B, l and v, where l is the width of each tube, will be

A. B lv

B. $-Blv$

C. zero

D. 2 B lv

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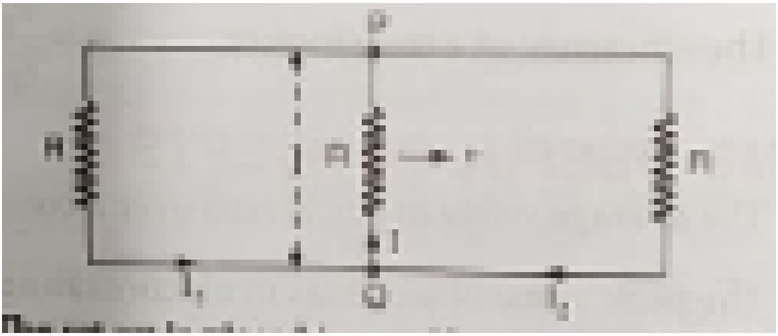
263. A rectangular loop has a sliding connector PQ of length l and resistance R. It is moving with a speed v as shown in the figure.



The set up is placed in a uniform magnetic field goping into the plane of the paper. The three currents I_1, I_2 and I are

A. $I_1 = I_2 = \frac{Blv}{6R}, I = \frac{Blv}{3R}$

B. $I_1 = -I_2 = \frac{Blv}{R}, I = \frac{2Blv}{R}$

C. $I_1 = I_2 = \frac{Blv}{3R}, I = \frac{2Blv}{3R}$

D. $I_1 = I_2 = I = \frac{Blv}{R}$

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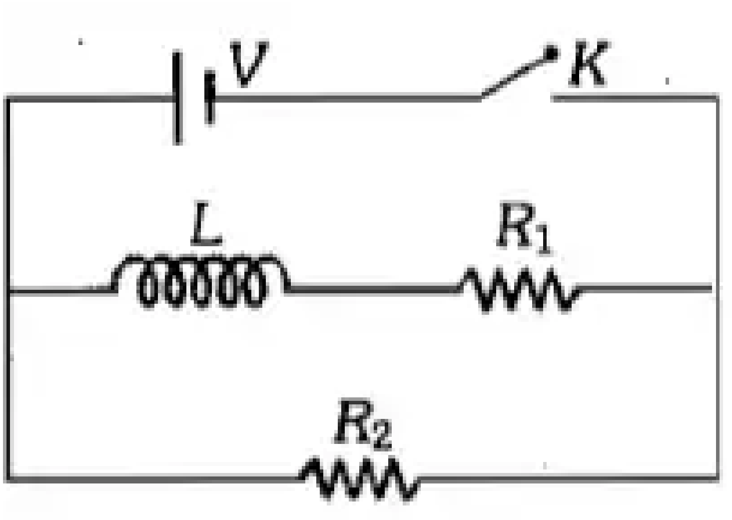
264. In the circuit shown below, the key K is closed at t=0.



The current though the bettery is

A. $\frac{V(R_1 + R_2)}{R_1 R_2}$ at t=0 and $\frac{V}{R_2}$ at $t = \infty$

B. $\frac{V(R_1 + R_2)}{\sqrt{(R_1^2 + R_2^2)}}$ at t=0 and (V)/(R_2)

$att = \infty$

C. $\frac{V}{R_2}$ at t = 0 and $\frac{V(R_1+R_2)}{R_1 R_2}$

D. $\frac{V}{R_2}$ at t = 0 and $\frac{V(R_1+R_2)}{\sqrt{R_1^2+R_2^2}}$ at $t=\infty$

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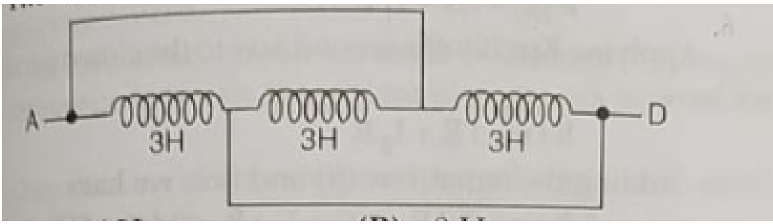
265. The inductance between A and D is



A. 3.66 H

B. 9 h

C. 0.66 H

D. 1 H

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266. When the current changes fro +2A to -2A in 0.05 s, an e.m.f. of 8 V is induced in the coil. The coefficient of self-indution of the coil is

A. 0.2 H

B. 0.4 H

C. 0.8 H

D. 0.1 H

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267. A fully charged capacitor C with intial charge q_0 the connected to a coil of self-indcutance L at t = 0. The time at which, the energy is stored equally between the electric and magnetic field is

A. $\sqrt{LC}$

B. $\frac{\pi}{4}\sqrt{(LC)}$

C. $\pi(\sqrt{LC})$

D. $2\pi\sqrt{LC}$

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

A. $4\mu F$

B. $8\mu F$

C. $1\mu F$

D. $1\mu F$

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269. Two coils are placed closed 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 oreintation of the two coils.

C. the material of the wires of the coils

D. the currents in the two coils.

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270. Two coaxial solenoids are made by winding thin insulated wire over a pipe of cross sectional area $10cm^2$ and length = 20 cm. If one of the solenoids has 300 turns and the other 400 turns, their mutual inductance is

A. $2.4\pi \times 10^{-5}H$

B. $4.8\pi \times 10^{-5}H$

C. $2.4\pi \times 10^{-4} H$

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

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271. In an a.c. generator, coil of N turns and area A is rotated at v revolutions per second in a uniform magnetic field B. Write the expression for e.m.f. produced.

A. N A B R

B. $NAB\omega$

C. $NABR\omega$

D. NAB

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272. Alternating current cannot be measured by d.c. ammeter because:

A. a.c. cannot pass through a.c. ammeter

B. a.c. changes direction

C. average value of current of complete cycle is zero

D. a.c. ammeter will get damaged.

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273. The phase difference between the alternating current and e.m.f. is $\pi/2$ which of the following cannot be the constituent of the circuit?

A. C alone

B. L alone

C. L,C

D. R,L

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274. In an LCR-series a.c. circuit, the voltage across each of the components L,C and R is 50

V. The voltage across the LC-combination will be

A. 50 V

B. $50\sqrt{2}V$

C. 100V

D. zero

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275. In an LCR-circuit, capacitance is changed from C to 2 C. For the resonant frequency to remain unchanged, the inductance should be changed form L to

A. 4 L

B. 2 L

C. L/2

D. L/4

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276. In a series LCR circuit $R = 200\Omega$ and the voltage and the frequency of the main supply is 220 V and 50 Hz respectively. On taking out the capacitance from the circuit the current lags behind the voltage by 30°. On taking out the inductor from the circuit the current leads the voltage by 30°. The power dissipated in the LCR circuit is

A. zero

B. 210 W

C. 242 W

D. 305 W

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277. In an oscillating LC circuit, the maximum charge on capacitor is Q. The charge on capacitor when the energy is equally distributed between the electric and magnetic fields is

A. Q/2

B. $Q / \sqrt{3}$

C. $Q / \sqrt{2}$

D. Q

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278. In an a.c. circuit, the votlage applied is $E = E_0 \sin \omega t$. The resultig current in the circuit is $I = I_0 \sin(\omega t - \pi / 2)$. The power consumption in the circuit will be

A. $E_0 I_0 / 2$

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

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

D. P=0

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279. A circuit has a resistance of 12 ohm and an impedance of 15 ohm. The power factor of the circuit will be

A. 0.8

B. 0.4

C. 1.25

D. 0.125

Watch Video Solution

280. The power factor of an a.c. circuit having resistance R and indctace L (connected in series) and an angular velocity ω

A. $R/\omega L$

B. $R/\left(R^2+\omega^2L^2\right)^{1/2}$

C. $\omega L/R$

D. $R/\left(R^2-\omega^2L^2\right)^{1/2}$

Watch Video Solution

281. In a transformer, number of truns in the primary is 140 and that in th secondary is 280. If current is primary is 4 A, then that in the secondary is

A. 4A

B. 2A

C. 6A

D. 10A

Watch Video Solution

282. Why is the core of a transformer laminated? explain.

A. reduce the energy loss due to eddy currents

B. make it light weight

C. make it robust and strong

D. increase the secondary voltage.

Watch Video Solution

283. A rectangular, a square, a circular and an elliptical loop, all in the x-y plane, are moving out of a uniform magnetic field with a constant velocity $\overrightarrow{V} = v_0 \hat{i}$. The magnetic field is directed along the negative z-axis direction. The induced emf, during the passage of these loops, out of the field region, will not remain constant for

A. the rectangular, the circular and the elliptical loops

B. the circular and the elliptical loops

C. only the elliptical loop

D. any of the four loops.

Watch Video Solution

284. A magnetic field of $2 \times 10^{-2} T$ acts at right angles to a coil of area $100 cm^2$ with 50 turns. The average e.m.f. induced in the coil is 0.1 V, When it is removed form the field in the time t. The value of t is

A. 0.1 s

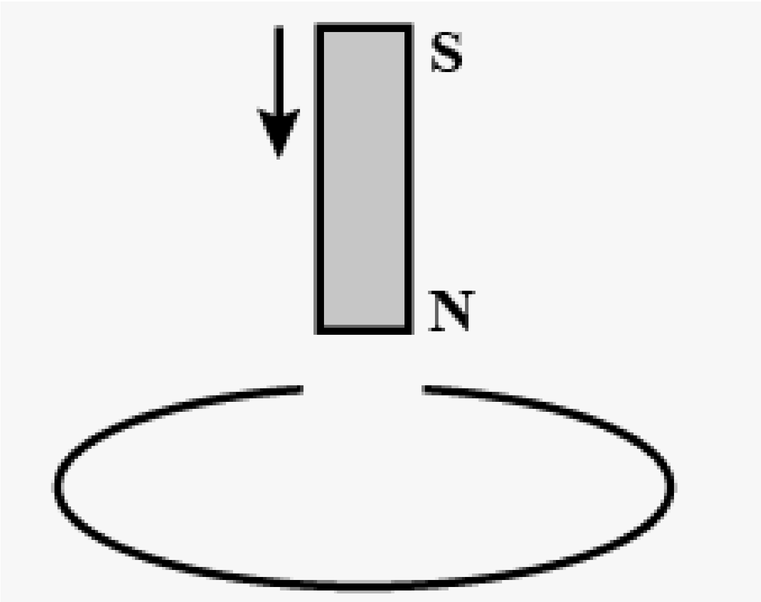
B. 0.01 s

C. 1 s

D. 10 s

Watch Video Solution

285. A copper ring is held horizontally and a bar magnetic is dropped through the ring with its length along the axis of the ring (shown in the figure) will the acceleration of the falling magnet be equal to , greater than or less than that due to gravity?



A. equal to g

B. less than g

C. more than g

D. either (A) or ©

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286. A straight line conductor of length 0.4 m is moved with a speed of $7ms^{-1}$ perpendicular to magnetic field of intensity 0.9 Wb m^{-2}. The induced e.m.f. across the conductor is

A. 1.26 V

B. 2.52 V

C. 5.24 V

D. 25.2 V

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287. 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

2 cm is

A. $\pi\mu V$

B. $2\pi\mu V$

C. $\pi/2\mu V$

D. $2\mu V$

Watch Video Solution

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

A. QV

B. 2QV

C. QV/2

D. zero

Watch Video Solution

289. The current in a self-inductance L = 40 mH is to be increased uniformly from 1 A to 11 A in

4 millisecond. The e.m.f. induced in the inductor during to process is

A. 100 V

B. 0.4 V

C. 40 V

D. 440V

Watch Video Solution

290. If N is the number of trns in a coil, the value of self-inductance varies as

A. N^0

B. N

C. N^2

D. N^{-2}

Watch Video Solution

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

A. 4 s

B. 3 s

C. 2 s

D. 1 s

Watch Video Solution

292. A long solenoid has 500 turns. When a current of 2 A 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. 1 H

B. 2 H

C. 3 H

D. 4 H

Watch Video Solution

293. How is energy stored in an inductor and where does this energy reside? Obtain an expression for this energy and give an example, where this energy is made use of.

A. its electric field

B. its coils

C. its magnetic field

D. both in electric and magnetic fields.

Watch Video Solution

294. A 100 mH coil carries a current of 1 ampere energy stored in it is:

A. 0.5 J

B. 1 J

C. 0.05 J

D. 0.1 J

Watch Video Solution

295. Two coils have a mutual inductance 0.005 H. The current changes in the first coil according to the equation $I = I_0 \sin \omega t$ "where" $I_0 = 10A$ and $\omega = 100\pi rads^{-1}$. The maximum value of emf induced in the second coil is

A. 2π

B. 5π

C. 6π

D. 12π

Watch Video Solution

296. Two coils of self-inductance 2mH and 8 mH are placed so close together that the effective flux in one coil is completely linked with the other. The mutual inductance between these coil is

A. 16 mH

B. 10 mH

C. 6 mH

D. 4 mH

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297. In a region of a uniform magnetic induction $B = 10^{-3} T$, a circular coil of raidus 40cm and resistance $\pi^{3} \Omega$ is rotated about an axis which is perpendicular to the direction of $\overrightarrow{B}$ and which forms a diameter of the coil. If the coil rotates at 400 r.p.m., the amplitude of the alternating current induced in the coil is

A. $4\pi^2 mA$

B. 30 mA

C. 0.68 mA

D. 200 mA

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298. The reactance of a capacitor of capacitance C is X. If both the frequency and capacitance be doubled, then new reactance will be

A. X

B. 2X

C. 4X

D. X/4

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299. In an a.c. circuit, an alternating voltage $E = 200\sqrt{2}\sin 100t$(in volt) is connected to a capacitor of capacitance $1\mu F$. The r.m.s. value of the current in the circuit is

A. 10 mA

B. 20 mA

C. 100 mA

D. 200 mA

Watch Video Solution

300. 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. $\pi / 6$

B. $\pi / 4$

C. $\pi / 2$

D. zero

Watch Video Solution

301. What is the value of inductance L, for which the current is maximum in a series LCR circuit with $C = 10\mu F$ and $\omega = 1,000 rads^{-1}$?

A. Cannot be calculated, unless R is known

B. 100 mH

C. 10 mH

D. 1 mH

Watch Video Solution

302. An indcutor L having resistance R and a capacitor of capacitance C are connected to an alternating soure of e.m.f. the qualtity factor of the circuit is

A. $R/\omega_0 LC$

B. $(\omega_0 L/CR)^{1/R}$

C. $(1/LCR)^{1/R}$

D. $\omega_0 L/R$

Watch Video Solution

303. A current $I = I_0 \sin(\omega t + \pi/2)$ flows in a circuit across which an alternating potential $E = E_0 \sin \omega t$ is applied. The power consumed in the circuit is

A. $E_0 I_0/2$

B. $E_0 I_0$

C. E

D. zero

Watch Video Solution

304. In an a.c. circuit, with phase voltage V and current I, the power dissipated is

A. VI/2

B. $VI / \sqrt{2}$

C. VI

D. depends on the phase angle between V and I

Watch Video Solution

305. The primary winding of transformer has 500 turns whereas its secondary has 5000 turns. The primary is connected to an ac supply of 20V,50Hz. The secondary will have an output of

A. 20 V - 50 Hz

B. 200 V - 50 Hz

C. 2 V - 50 Hz

D. 2 V - 5 Hz

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306. A transformer is used to light a 100 W - 110 V lamp from a 220 V mains. If the main current is 0.5 A, the efficiency of the transformer is approximately

A. 0.1

B. 0.3

C. 0.5

D. 0.9

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

A. 2.5 A

B. 2.9A

C. 3.6 A

D. 5.0 A

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308. Why is the core of a transformer laminated? explain.

A. rusting of the core may be prevented

B. energy losses due to eddy currents may be minimised

C. ratio of votlage in primary and secondary may be increased

D. the weight of the transformer may be reduced.

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309. According to Faraday's law, does induced e.m.f. depend upon resistance?

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

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311. The radius of a coil s changing at the rate of 10^{-2} units in a normal magnetic field of

10^{-3} units and the induced e.m.f. is $1\mu V$. Find the final radius of the coil.

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312. A coil of 500 turns and area $0.04m^2$ is placed in a region of transverse magnetic field of field of $0.25Wbm^{-2}$. The coil is roated through 90° about its diameter with a particular angular velocity in 0.2 s. The coil is connected to a galvanometer in series having a resistance of 25 ohm. Calculate the total change flow through the galvanometer.

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313. Current changes in time interval 5 s from 7 A to 2 A in a coil of self inductance 0.1 H. Find the value of induced e.m.f. and the direction of induced current in the coil.

Watch Video Solution

314. A capacitor of capacitance 6muF is charged by a 6V battery. The charged capacitor is now connected to an indcutor of inductance 2 mH. Find the current I the circuit, when one-third energy stored in the capacitor converts into the energy stored in the inductor.

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315. A coil has resistance 30 ohm and inductive reactance 20 ohm at 50 Hz frequency. If an a.c.

source of 200 V, 100 hz is connected across the coil, the current in the coil? Find the current of the coil

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316. Inductive resistance 25 ohm and capacitive resistance 75 ohm are connected across 250 V mains in series. Find the r.m.s. potential difference across inductor and capacitor.

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317. An LCR series circuit having 220 V ac source, inductance L = 25 mH and resistance R = 100 Omega. If voltage across inductor is just double of voltage across resistor then find out frequency of source.

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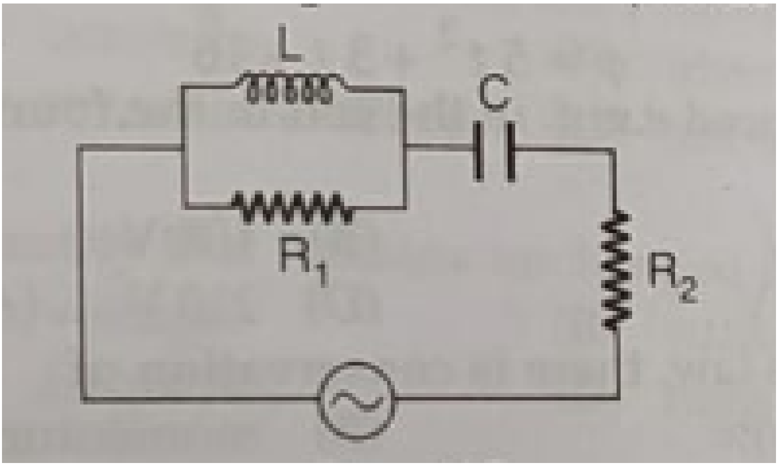
318. In a series LCR-circuit, what is the potential drop across resistance at resonance, when the operating is 220V?

Watch Video Solution

319. In the circuit show it the figure

Find the phase difference between the currents through L and R.



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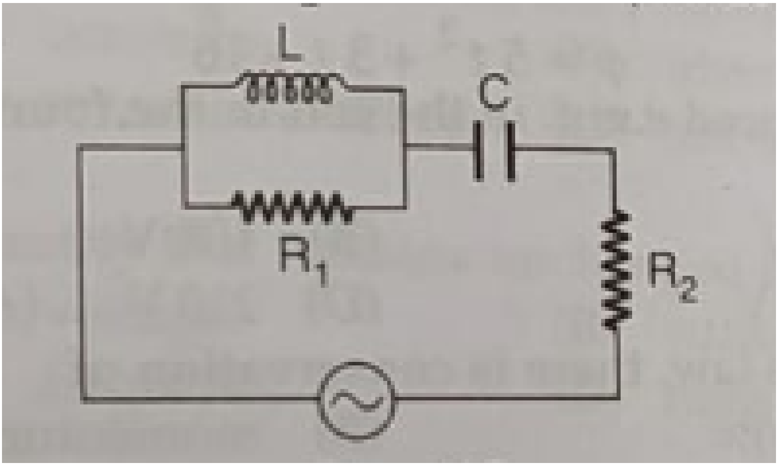
320. In the circuit show it the figure

Find the phase difference between potential differences across C and R2



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321. What is the power factor of an LCR series circuit at resonance?

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322. In a resonant circuit, at which angular frequency, potential difference leads the current?

Watch Video Solution

323. Efficiency of a transformer is 80% and primary and secondary coils hae 30 and 120 turns respectively. Current in the secondary coil is 0.25 A. Find out the current in primary coil.

Watch Video Solution

324. In electromgnetic induction, the induced e.m.f. in a coil is independent of

A. the strength of the nagnetic field.

B. the speed with which, the magnet is moved

C. the number of turns in the coil.

D. the resistance of the coil.

Watch Video Solution

325. The magnetic flux linked with a coil (in Wb) is given by the equation $\phi = 5t^2 + 3t + 16$ The induced e.m.f in the coil in the fourth second will be

A. 10 V

B. 108 V

C. 145 V

D. 210 V

Watch Video Solution

326. Show that Lenz's law obeys the law of conservation of energy.

A. charge

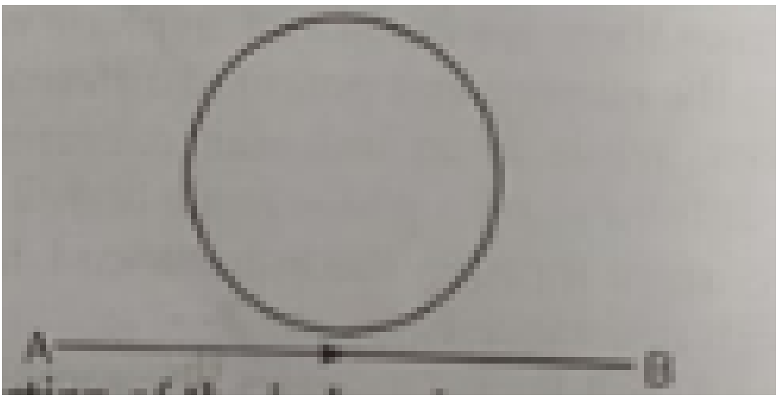
B. momentum

C. energy

D. current.

Watch Video Solution

327. The current flows form A and B as shown in the figure. The direction of the indueced current in the loop is



A. clockwise

B. anticlockwise

C. straight line

D. none of these

Watch Video Solution

328. A wheel with 10 metallic spokes each 0.5 m long, is rotated with a speed of 120 rpm. Please of the wheel is normal to earth's magnetic field at that place. If the magnitude of the field is 0.40 G, what is the induced emf between the axle and rim of the wheel?

A. $1.256 \times 10^{-3} V$

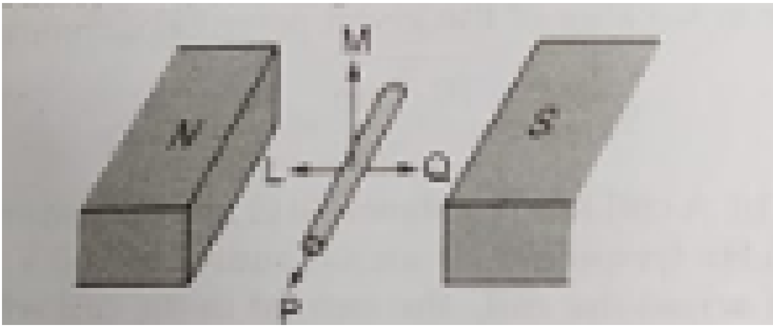
B. $1.256 \times 10^{-4} V$

C. $6.28 \times 10^{-4} V$

D. $6.28 \times 10^{-5} V$

Watch Video Solution

329. A potential difference will be induced between the ends of the conductor shown in the figure, when the condutors moves along.



A. P

B. Q

C. L

D. M

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330. In a coil of self-induction 5 H, the rate of change of current is $2As^{-1}$. Then, e.m.f. induced in the coil is

A. 10 V

B. $-10V$

C. 5 V

D. $-5V$

Watch Video Solution

331. A coil is wound on a frame of rectangular cross - section. If all the linear dimensions of the frame are increased by a factor 2 and the number of turns per unit length of the coil remains the same, self - inductance of the coil increases by a factor of

A. 2

B. 4

C. 8

D. 16

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332. Dynamo works on the principle of

A. heating effect of current

B. magnetic effect of current

C. chemical effect of current

D. electromagnetic induction.

Watch Video Solution

333. If the speed of rotation of a dynamo is doubled, then the induced e.m.f. will

A. become half

B. become double

C. beome four times

D. remain unchanged

Watch Video Solution

334. If an a.c. main supply is given to be 220V, the average e.m.f. during a positive half cycle will be

A. 198 V

B. 220 V

C. 240 V

D. $220\sqrt{2}V$

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

A. only R

B. only L

C. only C

D. R and C

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336. Show mathematically that in an a.c. circuit only containing capacitance, the current leads e.m.f by a phase angle $\frac{\pi}{2}$.

A. leads voltage by 180°

B. remains in phase with voltage

C. leads voltage by 90°

D. $lagsvo < a \geq by90^{\circ}$

Watch Video Solution

337. A coil is wound on a frame of rectangular cross - section. If all the linear dimensions of the frame are increased by a factor 2 and the number of turns per unit length of the coil remains the same, self - inductance of the coil increases by a factor of

A. $30^{\circ}, 1A$

B. $45^{\circ}, 0.5A$

C. $60^{\circ}, 1.5A$

D. none of these

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338. Simple capacitor filters are good for

A. low voltage supply

B. low current supply

C. high current supply

D. low voltage and high current supply.

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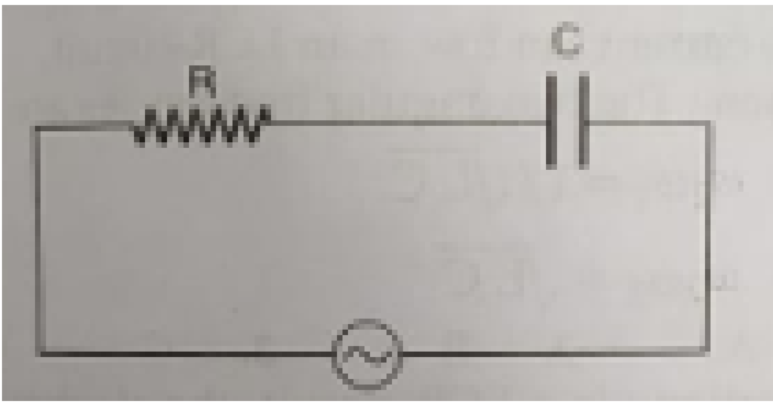
339. A 50 Hz a.c. source of 20 V is connected across R and C as shown in figure. The voltage across R is 12 V. The voltage across C is



A. 8V

B. 16V

C. 10V

D. not possible to determine, unless values of R and C are given.

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340. An a.c. source of angular frequency ω is fed across a resistor R and a capacitor C in series. The current registered is I. If you the frequency of source is changed to $\omega/3$, maintaining the same voltage, current in the circuits is found to be halved. Caculate the ratio of reactance to resistance at the original frequencyω.

A. $\sqrt{1/5}$

B. $\sqrt{2/5}$

C. $\sqrt{3/5}$

D. $\sqrt{4/5}$

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341. In an ideal parallel LC-circuit, the capacitor is charged by connecting it to a d.c. source, which is then disconneted. The current in the circuit.

A. becomes zero instantaneously

B. grows monotonically

C. decays monotonically

D. oscillates intantaneously.

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342. The power factor varies between

A. 2 and 25

B. 3.5 to 5

C. 0 to 1

D. 1 to 2

Watch Video Solution

343. The coil of a choke in a circuit

A. increases the current

B. decreases the current

C. does not change the current

D. has high resistance to d.c. circuit.

Watch Video Solution

344. A choke coil has

A. low inductance and high resistance

B. high inductance and low resistance

C. low inductance and high resistance

D. high inductance and high resistance

Watch Video Solution

345. Transformer is based upon the principle of:

A. convertor

B. invertor

C. mutual-induction

D. self-induction

Watch Video Solution

346. Quantity that remains unchanged in a transformer is

A. voltage

B. current

C. frequency

D. none of these

Watch Video Solution

347. Trune ratio in a step up trnsfromer is 1:2, if a Lechlanche cell of 1.5 V is conneted across the input, what is the voltage across the output?

A. 1.5 V

B. 0V

C. 3 V

D. 0.75 V

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348. The primary winding of transformer has 500 turns whereas its secondary has 5000 turns. The primary is connected to an ac supply of 20V,50Hz. The secondary will have an output of

A. 200 V - 50 Hz

B. 200V - 500 Hz

C. 2V - 5 hz

D. 2V - 50 Hz

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349. The best material for the core of a transformer is

A. stainless steel

B. mild steel

C. hard steel

D. soft iron.

Watch Video Solution

350. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the

assertion.

(C) if assertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : Faraday's law are consequence of the conservation of energy Reason : In a purely resistive a.c. circuit, the current lags behind the e.m.f. in phase

A. A

B. B

C. C

D. D

Watch Video Solution

351. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the assertion.

(C) if assertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : When a bar magnet falls freely along the axis of a solenoid held vertically, its acceleration is less than the acceleration due to gravity

Reason: The falling magnet induces current in the solenoid and according to Lenz's law, the induced current opposes the falling motion of the magnet

A. A

B. B

C. C

D. D

Watch Video Solution

352. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the

assertion.

(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : When a coil is moved out of a magnet field acting normally to its plane, induced e.m.f. is produced in it.

Reason : The induced e.m.f. is produced in a coil. When it is placed inside the magnetic field

A. A

B. B

C. C

D. D

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353. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the assertion.

(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : The presence of large magnetic flux through a coil maintains a current in the coil, if the circuit is continous.

Reason : Only a change in magnetic flux will maintain an induced current in the coil

A. A

B. B

C. C

D. D

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354. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : An e.m.f. is induced in a closed loop, where magnetic flux is varied. Reason : The line integral $\overrightarrow{E}.\overrightarrow{dl}$ around the closed loop is non-zero.

A. A

B. B

C. C

D. D

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355. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but

reason if false, (D) if both assertion and reason are false

Assertion : If current is flowing through a machine of iron, eddy currents are produced.

Reason : Change in magnetic flux through an area causes eddy current.

A. A

B. B

C. C

D. D

Watch Video Solution

356. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of

the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : In electric circuits, wires carrying currents in opposite directions are often twisted together. Reason : If the wires are not twisted together, the combination of wires forms a current loop, the magnetic field generated by the loop, might affect adjecent circuits or components.

A. A

B. B

C. C

D. D

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357. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : The resistance offered by an inductor in a d.c. circuit is always constant. Reasons : Angular frequency of DC circuit is zero.

A. A

B. B

C. C

D. D

Watch Video Solution

358. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the

correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : The possibility of an electri bulb fusing is high at the time of switching ON and OFF. Reason : Inductive effects produce a surge at the time of switch -OFF and switch -

OFF and ON.

A. A

B. B

C. C

D. D

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359. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : A circuit contains two inductors in series with self-inductances L_1 and L_2 and mutual inductance M. The equivalent inductance in the circuit is given by $L = L_1 + L_2 + 2M$ Reason : The given relation is incorrect, as at a time the two inductors can either possess self-inductance or a mutual inductance.

A. A

B. B

C. C

D. D

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360. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and

reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : The quantity L/R posseses the dimension of time. Reason : In order to reduce the rate of increase of current through a solenoid, we hsould increase the time constant.

A. A

B. B

C. C

D. D

Watch Video Solution

361. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the

correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the assertion.

(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : When an iron rod is inserted into a coil connected to a bulb in an a.c. circuit, the glow in the bulb decreases.

Reason : The current in the coil increases, thereby decreasing current through the bulb

A. A

B. B

C. C

D. D

Watch Video Solution

362. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : A capacitor blocks d.c. Reason : The capacitive reactance is given by $X_C = \frac{1}{2\pi fc}$ and for d.c., f = 0

A. A

B. B

C. C

D. D

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363. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : At resonance, the inductive reactance equal and opposite to the capacitive reactance. Reason : In series LCR-circuit, the inductive reactance is equal and opposite to the capacitive reactance.

A. A

B. B

C. C

D. D

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364. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of

the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : In series LCR-circuits, the resonance occurs at one frequency only. Reason : At resonance, the inductive reactance is equal and opposite to the capacitve reactance.

A. A

B. B

C. C

D. D

Watch Video Solution

365. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are

true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : There are two values of angular frequency symmetrical about resonant angular frequency, for which same current can fow in an LCR-circuit. Reason : The two angular frequencies are given by $\omega_1 = 1/\sqrt{LC}$ and $\omega_2 = \sqrt{LC}$

A. A

B. B

C. C

D. D

Watch Video Solution

366. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : In a LCR-circuit, the algebraic sum of the potential drops across the circuit elements is always equal to the applied mains voltage. Reason : The potential drop across the resistane is equal to the sum of the potential drops across the inductor and capacitor.

A. A

B. B

C. C

D. D

Watch Video Solution

367. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the

assertion.

(C) if assertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : A practical choke coil always dissipate some electrical power. Reason : The choke coil is made by winding a wire made of some material and every material has got some resistivity.

A. A

B. B

C. C

D. D

Watch Video Solution

368. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the assertion.

(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : A transformers are used only with an a.c. source and not with the d.c. source.

Reason : Only a.c. can be stepped up or stepped down by means of transformers.

A. A

B. B

C. C

D. D

Watch Video Solution

369. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a

question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the assertion.

(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : A transformer can be used to increase/ decrease both voltage and the current.

Reason : In a transformer, $e_p I_p = e_s I_s$ and accordingly, if we gain in voltage, we lose in current and vice-versa.

A. A

B. B

C. C

D. D

Watch Video Solution

370. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the assertion.

(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : In a transformer, the number of turns in the primary and secondary coils are 500 and 1,250 respectively. If the current in primary coil is 2 A, then the current in secondary coil will be 5 A.

Reason : The current in secondary coil is given by $I_s = Ip \times \frac{N_s}{N_P}$

A. A

B. B

C. C

D. D

Watch Video Solution

371. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a

question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the assertion.

(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : We use a thick wire in the secondary of a step down transformer to reduce the production of heat.

Reason : When the plane of the armature is parallel to the lines of force of magnetic field, the magnitude of induced e.m.f. is maximum.

A. A

B. B

C. C

D. D

Watch Video Solution

372. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the

assertion.

(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : An alternating voltage of 220V is more dangerous than a d.c. supply of 220 V.

Reason : The peak value of 220V a.c. is about 311 V.

A. A

B. B

C. C

D. D

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373. Lenz's law is a consequence of the law of conservation of:

A. charge

B. momentum

C. energy

D. mass

Watch Video Solution

374. Use of eddy currents is done in the following, except

A. induction motor

B. moving coil gavanometer

C. electric brakes

D. dynamo

Watch Video Solution

375. Eddy currents are produced in

A. induction furnance

B. electromagnetic brakes

C. speedometer

D. all of these

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376. The number of turns of a coil is doubled.

How will its self-inductance be effected?

A. half

B. doubled

C. 1/4 times

D. quadruped.

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377. When the number of turns and length of a solenoid are doubled keeping the area of cross-section same, the inductance.

A. remains the same

B. becomes four times

C. is doubled

D. is halved

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378. A closely wound coil of 100 turns and area of cross-section $1cm^3$ has a coefficient of self-induction 1 mH. The magnetic induction in the centre of the core of the coil when a current of 2A flows in it, will be

A. 0.01 C

B. 0.02 C

C. 0.04 C

D. 0.08 C

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379. Dynamo works on the principle of

A. electromagnetic induction

B. induced current

C. induced magnetism

D. Faraday's effect

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380. Electric fan works on the principle of

A. a)electric dynamo

B. b)electric motor

C. c) both of the above

D. d)none of these

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381. The reactance of a coil, when used on an a.c. 220 V - 50 HZ supply is 50 ohm the inductance of the coil is

A. 0.16 H

B. 0.22 H

C. 1.6 H

D. 2.2.H

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382. An electric lamp is connected to 220 V - 50 Hz supply. The peak voltage in the circuit is

A. 110 V

B. 220V

C. 311v

D. 320 v

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383. A 100 W-200 V bulb is connected to a 160 V supply. The actual power consumption would be

A. 54 W

B. 64 W

C. 100 W

D. 185 W

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384. The dimensions of self inductance are

A. $MLT^{-2}A^{-3}$

B. $ML^2T^{-1}A^{-2}$

C. $ML^2T^{-2}A^{-2}$

D. $ML^2T^{-2}A^{-1}$

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385. The aveage power dissipation inpure indctance is

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

B. $\frac{1}{4}LI^2$

C. $2LI^2$

D. zero

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386. In a LCR series circuit, the potential difference between the terminals of the inductance is 60 V, between the terminals of the capacitor is 30 V nd that across the resistance is 40 V. Then, then supply voltage will be equal to

A. 10 V

B. 50 V

C. 70 V

D. 130 V

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387. In an LCR-series a.c. circuit, the voltage across each of the components L,C and R is 50 V. The voltage across the LC-combination will be

A. 0V

B. 50V

C. $50\sqrt{2}V$

D. 100V

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388. If a capacitor of capacitance C is connected in series with an inductor of inductance I, then the angular frequency is

A. $\sqrt{LC}$

B. LC

C. $\sqrt{L/C}$

D. $1/\sqrt{LC}$

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389. The current flowing in a coil 3 A and the power consumed is 108 W. If the a.c. source is of 120 V-50 Hz, the resistance in the circuit is

A. 24 ohm

B. 36 ohm

C. 12 ohm

D. 6 ohm

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390. A choke is preferred to a resistance for limiting the current in ac. Circuit, because

A. choke is cheap

B. there is no wastage of power

C. choke is a good absorber of heat

D. choke is compact in size.

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391. Radio frequency choke has core of

A. air

B. iron

C. air and iron

D. none of these

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392. Transformer is based upon the principle of:

A. self induction

B. mutual induction

C. eddy current

D. none of these

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393. When power is drawn form the secondary coil of a transformer, the dynamic resistance.

A. increases

B. decreases

C. remains contant

D. changes drastically

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394. An electric power station transmits 100 MW power through log and thin cable. If the transmission is at 20,000V and at 200V, in which case the power loss would be lesser?

A. In (i) only

B. In (ii) only

C. In each case, power loss is zero

D. Data is insufficient

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395. If 2.2 kW power is transmitted through a 10 ohm line at 22,000 V, the power loss in the form of heat will be

A. 0.1 W

B. 1 W

C. 10 W

D. 100 W

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396. Core of transformer is made up of

A. soft iron

B. steel

C. iron

D. alnico

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397. The core of transformer is laminated to reduced the effect of

A. copper losses

B. hysteresis loss

C. eddy current

D. flux leakage

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398. A circular loop of radius R, carrying current I, lies n XY-plane with its centre at origin. The total magnetic flux through XY-plane is

A. directly proportional to I.

B. directly proportional to R

C. inversely proportional to R

D. zero

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399. An infinitely long cyliner is kept parallel to a uniform magnetic field B directed along positive Z-axis. The direction of induced current as seen from the Z-axis will be

A. clockwise of the +ve Z-axis

B. anticlockwise of the +ve Z-axis

C. zero

D. along the magnetic field.

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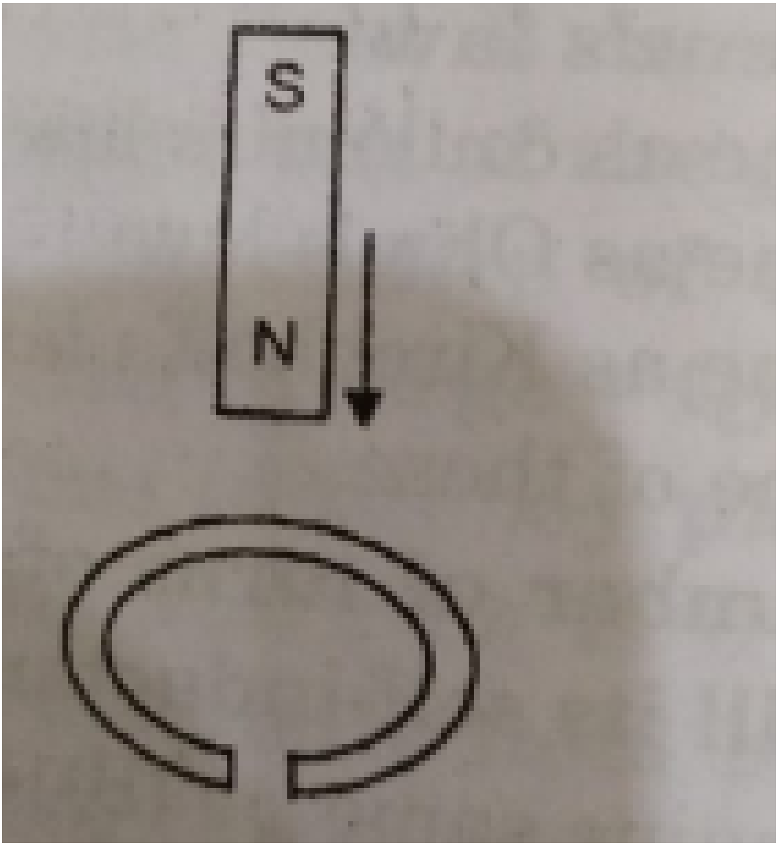
400. A copper ring having a cut such as not to form a complete loop is held horizontally and a bar magnet is dropped through the ring with its length along the axis of the ring. Then acceleration of the falling magnet is:



A. equal to that due to gravity

B. less than that due ot gravity

C. more than that due to gravity

D. depends on the diameter of the ring and the length of the magnet.

Watch Video Solution

401. A straight line conductor of length 0.4 m is moved with a speed of $7ms^{-1}$ perpendicular to magnetic field of intensity 0.9 Wb m^{-2}. The induced e.m.f. across the conductor is

A. 5.04 V

B. 1.26 V

C. 2.52 V

D. 25.2 V

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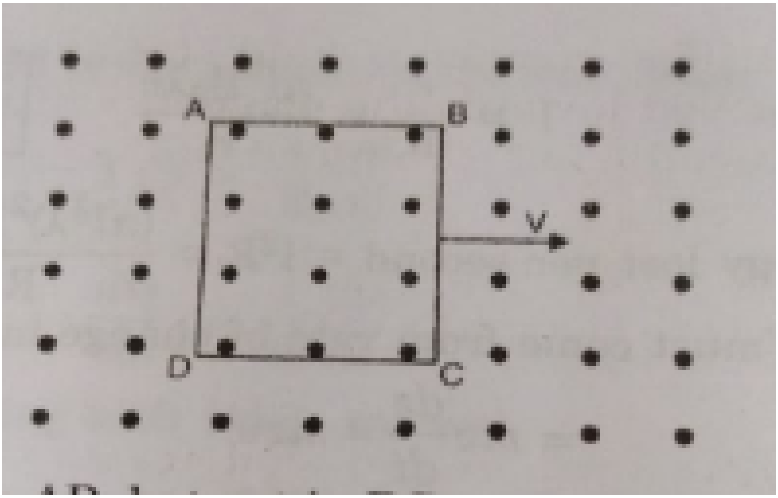
402. A metallic square loop ABCD is moving in its own plane with velocity v in a uniform magnetic field perpendicular to its plane as shown in the figure. An electric field is induced.



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: A conducting square loop of side L

and resistance R moves in its plane with a unifrom velocity v perpendicular to one of its sides. A magnetic induction B constant in time and space, pointing perpendicular and into the plane of the loop exists every where. the current induced in the loop is

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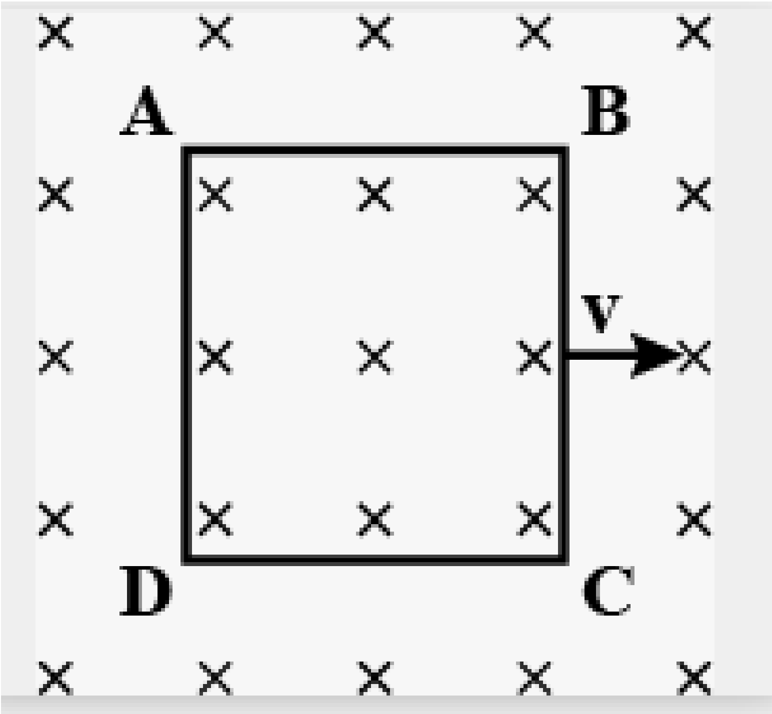
403. A conducting square loop of side L and resistance R moves in its plane with a unifrom velocity v perpendicular to one of its sides. A magnetic induction B constant in time and space, pointing perpendicular and into the plane of the loop exists every where. the current induced in the loop is



A. $\dfrac{Blv}{R}$ clockwise

B. $\dfrac{Blv}{R}$ anticlockwise

C. $\dfrac{2Blv}{R}$ anticlockwise

D. zero

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404. 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 $180 km / hours$ 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. $10^{-2} V$

B. 10 mV

C. 1 V

D. 1 mV

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405. 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 eletric field in the rod.

C. The electric potential is highest at the centre of the rod and decreases towards its ends.

D. The electric potential is lowest at the centre of the rod and increases towards its ends.

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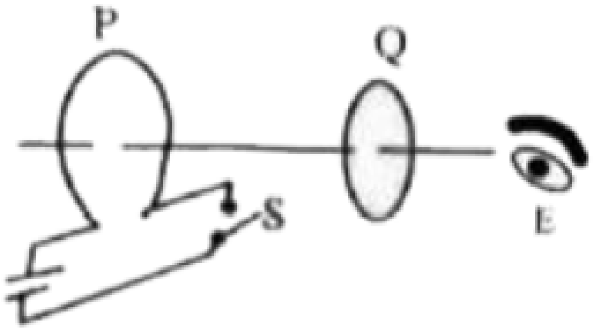
406. As shown in the figure P and Q are two coaxial conductint loops separated by some distance. When the switch S is clossed, a clockwise currrent I_p flows in P (As seen by e) and an induced current I_{Q1} flows in Q. The switch remains closed for a long time. When S is opened, a current I_{Q2} flows in Q



Then the direction of I_{Q1} and I_{Q2} (as seen by E) are

A. both clockwise

B. both anticlockwise

C. respectively clockwise and anticlockwise

D. respectively anticlockwise and clockwise

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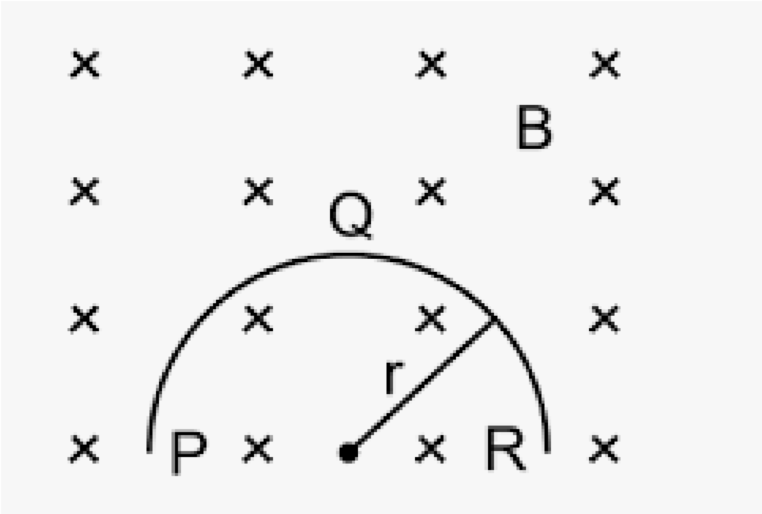
407. A thin semicircular conducting ring of radius R is falling with its plane vertical in a horizontal magnetic induction $\overrightarrow{B}$ as shown in the figure



At the position PQR, the speed of the ring is v. Then, the potential difference developed across the ring is

A. zero

B. $\frac{1}{2}BvR^2$ and M is at higher potential

C. 2RBV and Q is at higher potential

D. zero

Answer: 2RBV and Q is at higher potential.

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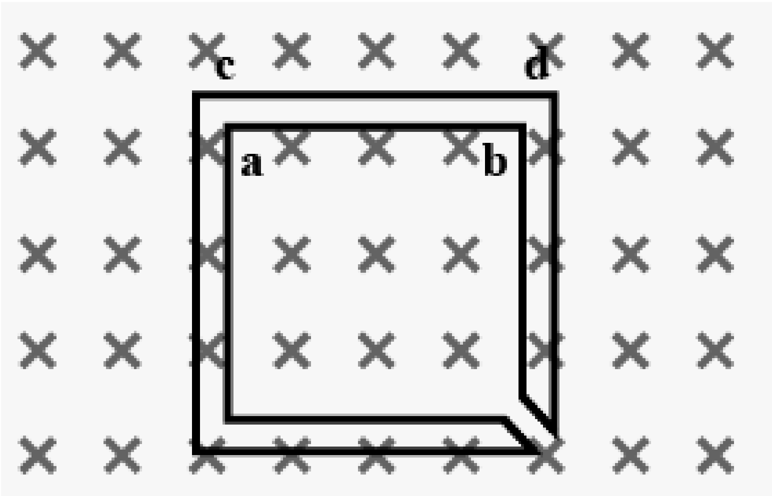
408. The figure shows certain wire segments joined together to form a coplanar loop. The loop is placed in a perpendicular magnetic field in the direction going into the plane of the figure.

The magnitude of the field increases with time

I_1 and I_2 are the currents in the segments ab and cd. Then,



A. $I_1 > I_2$

B. $I_1 < I_2$

C. I_1 is in the direction ba and I_2 is in the direction cd

D. I_1 is in the direction ab and I_2 is in the direction dc

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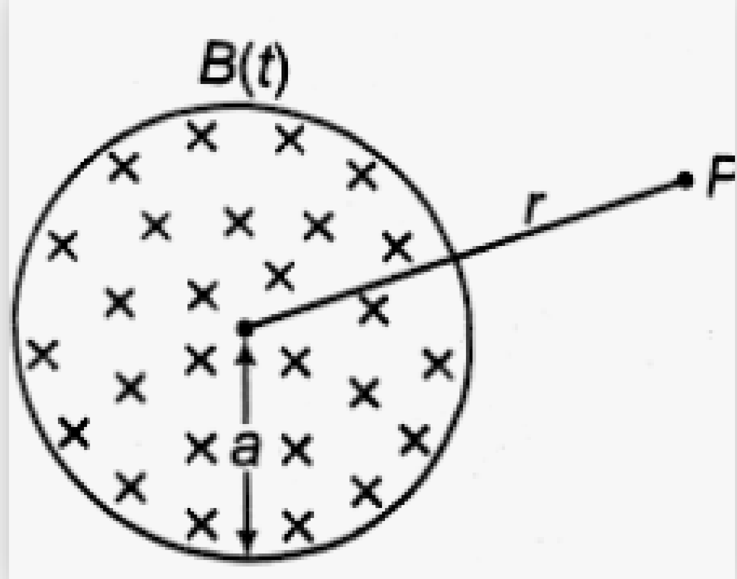
409. A uniform but time-varying magnetic field B(t) exists with in a circular region of radius a and is directed in to the plane of the paper as shown in the figure.



The magnitude of the induced electric field at the point P at a distance r from the centre of the circular region

A. is zero

B. decreases as 1/r

C. increases as r

D. decreases as $1/r^2$

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410. 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, loop B

A. remains stationary

B. is attracted by the loop A

C. is repelled by the loop-A

D. rotates about its CM. with C.M. fixed.

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411. A short-circulated coil is placed ina time varrying magnetic field. Electrical power is dissipated due to the current induced in the coil. If the number of turns were to be quadrupled and the wire radius halve,d the electrical power dissipated would be

A. halved

B. the same

C. doubled

D. quadrupled

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412. The unit of inductance is

A. weber $ampere^{-1}$

B. volt second $ampere^{-1}$

C. joule $ampere^{-2}$

D. ohm second.

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413. When the current in a coil changes from 2 A to 4 A in 0.05 s, an e.m.f. of 8 V is induced in the coil. The coefficient of self-induction of the coil is

A. 0.1 H

B. 0.2 H

C. 0.4 H

D. 0.8 H

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414. Two circular coils can be arranged in any of the three situations shown in the figure Their mutual inductance will be

A. maximum in situation (a)

B. maximum in situation (b)

C. maximum in situation (c)

D. the same in all situations

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415. The current through a solenoid increases at a constant rate, then induced current:

A. is constant and is in the direction of inducing current

B. is constant and is opposite to the direction of the inducing current

C. increases with time and is in the direction of the inducing current

D. increases with time and opposite to the direction of the inducing current

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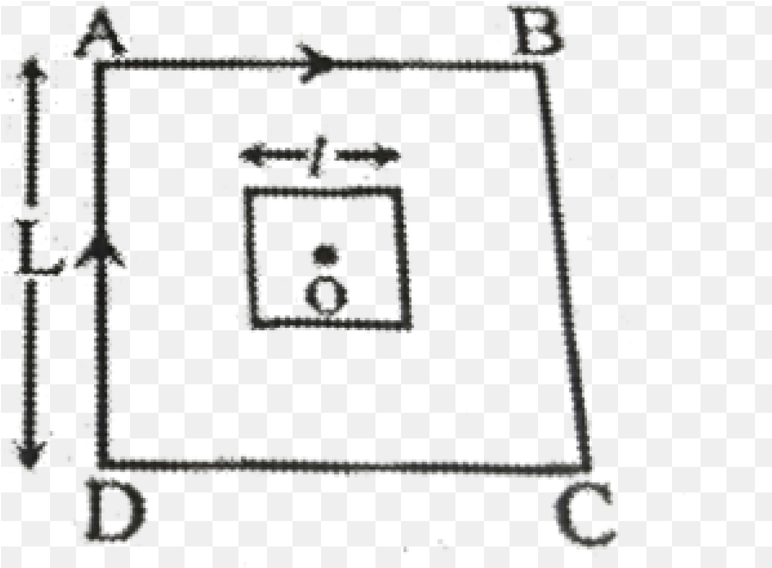
416. A small square loop of wire of side l is placed inside a large square loop of wire of side L(L>>l) .The loops are coplanar and their centers coincide.The mutual inductance of the system



A. l/L

B. l^2 / L

C. L/l

D. L^2 / l

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417. An a.c. 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.

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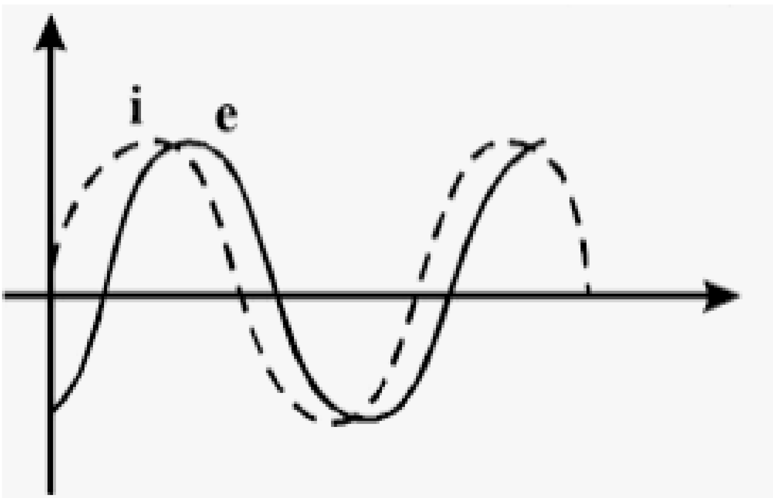
418. When an a.c. source of e.m.f. $E = E_0$ sin 100 t is connected across a cricuit, the phase difference between the e.m.f E and the current I in the cirucit is observed to be $\pi / 4$, as shown in the figure.



If the circuit consists possibly only of RC or RL or LC in series, find the relationship between the two elements

A. $R = 1k\Omega, C = 10\mu F$

B. $R = 1k\Omega, C = 1\mu F$

C. $R = 1k\Omega, L = 10H$

D. $R = 1k\Omega, L = 1H$

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419. SI unit of magnetic flux is :

A. gauss

B. oersted

C. tesla

D. weber

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420. In electromgnetic induction, the induced e.m.f. in a coil is independent of

A. change of flux

B. time

C. number of turns in the coil

D. resistance of the coil.

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421. Magnitude of e.m.f. produced in a coil, when a magnet is inserted into it, does not depend upon

A. number of turns in the coil

B. resistance of the coil

C. speed of the magnet

D. magnetic moment of magnet.

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422. A magnet is moved towards a coil. What is the source of electric current induced in the coil?

A. larger in first case

B. smaller in first case

C. equal in both cases

D. larger or smaller, depending upon resistance of the coil.

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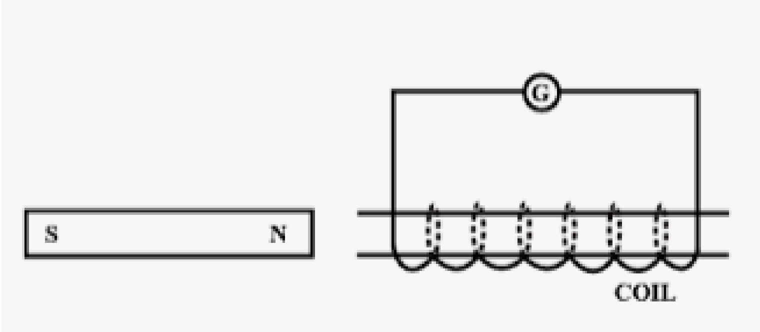
423. Refer to the figure. Deflection in the galvanometer (G) occurs, when.



A. the magnet is pushed into the coil

B. the magnet is rotated into the coil

C. the magnet is stationary at the centre of the coil

D. the number of trns in the coil is reduced

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424. Faraday's law of electromagnetic induciton is related to the law of conservation of

A. charge

B. angualr momentum

C. mass

D. energy

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425. The magnetic flux ϕ (in weber) in a closed circuit of resistance 10 ohm varies with time t (in seconds) according to the equation : $\phi = 5t^2 - 4t + 1$. At t = 0.2 s, the magnitude of the induced e.mf. In the circuit is

A. 0.4 V

B. $-0.4V$

C. $-2V$

D. 2V

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426. Lenz's law is a consequence of the law of conservation of:

A. charge only

B. momentum only

C. energy only

D. eneryg and momentum

Watch Video Solution

427. Fill ups

The direction of induced e.m.f is such that it always ....the change which ....it.

A. Fleming's left hand rule

B. Fleming's right hand rule

C. Lenz's law

D. Biot-Savart's law

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428. In electromgnetic induction, the induced e.m.f. in a coil is independent of

A. time

B. change of flux

C. resistane of the coil

D. none of the above

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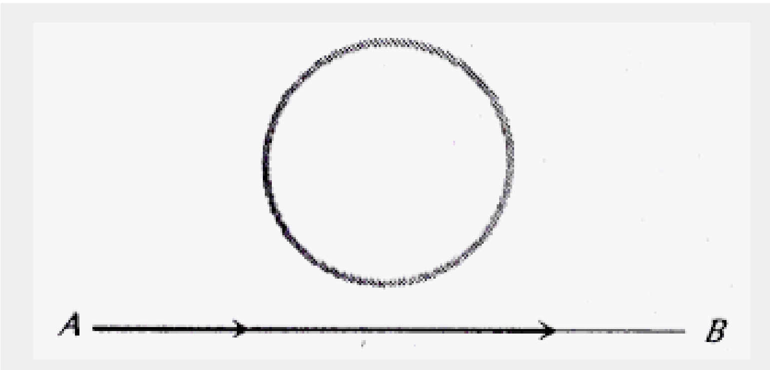
429. An electron moves along the line AB, which lies in the same lane as a circular loop of conducting wires. What will be the direction of the current induced in the loop, if any?



A. No current will be induced

B. The current will be clockwise

C. The current will be anticlockwise

D. The current will change direction as the electron passes by

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430. A magnetic NS is suspended from a spring and while it oscillates, the magnet moves in and out of the coil C. The coil is connected to a galvanoeter G. Then, as the magnet oscilates

A. a)G shows deflection to the left and right with constant amplitude

B. b)G shows deflection on one side

C. c)G shows no deflection

D. d)G shows deflection to the left and right, but the amplitudes steadily decreases.

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431. A square shpaed coil of side 10 cm and number of turns 500 is placed perpendicular to magnetif flux lines, which is chaniging at the rate of $1.0 T s^{-1}$. The e.m.f induced in the coil is

A. 0.1 V

B. 0.5 V

C. 1.0 V

D. 5.0 V

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432. A piece of wire is passed thorugh the gap between the poles of a magnet in 0.1 s. An e.m.f. of $4 \times 10^{-3} V$ is induced in the iwre. The magnetic flux between the poles of the magnet is

A. 10 Wb

B. $4 \times 10^{-4} Wb$

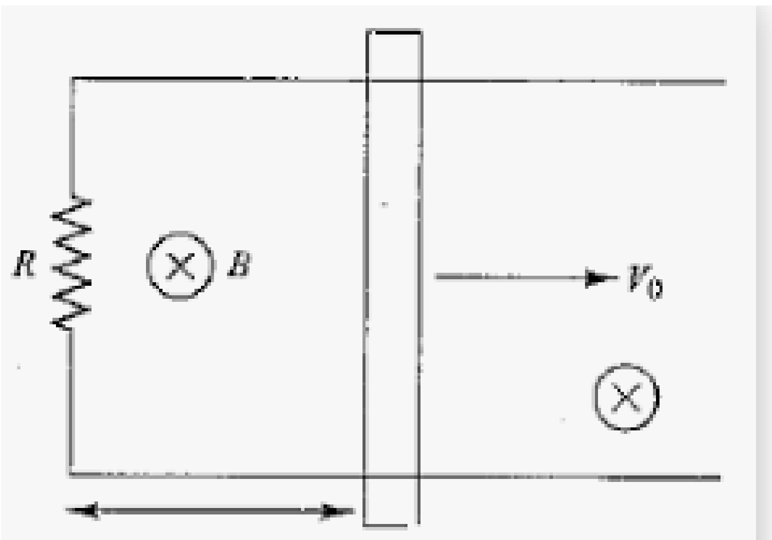
C. $4 \times 10^{-2} Wb$

D. 0.1 Wb

Watch Video Solution

433. A conductor of length l is moved perpendicular to uniform magnetic field B with velocity v as shown in the figure

The e.m.f. induced across the length of the conductor is



A. zero

B. Blv

C. Blv/2

D. $Bl^2v/2$

Watch Video Solution

434. An aeroplane in which the distance between the tips of wings is 50 m is flying horizontal with a speed of $360km/hr$over a place where the verticle components of earth magnetic field is $2.0 \times 10^{-4} webr / m^2$. The potential different between the tips of wings would be

A. 0.1 V

B. 1.0 V

C. 0.2 V

D. 0.01V

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435. A car moves on a plane road. The induced e.mf. In the axle connecting the two wheels is maximum, when it moves

A. eastwards at the equator

B. westwards at the equator

C. eastwards in the latitude 45°

D. at the poles

Watch Video Solution

436. 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 $180 km/hours$ 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. 4 mV

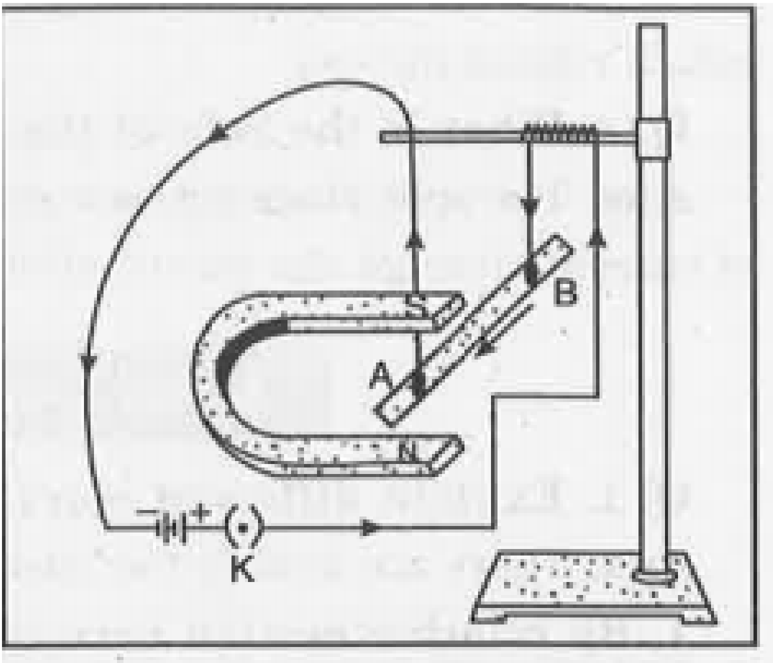
B. 0.4 mV

C. zero

D. 10 mV

Watch Video Solution

437. In activity shown, how do you think the displacement of rod AB will be affected :if the current in rod ab is increased,



A. Normally into the plane of the paper

B. Vertically downward

C. Vertcally upwards

D. none of the above

Watch Video Solution

438. Eddy currents are produced in

A. induced currents due to a changing magnetic flux

B. induced currents due to a high magnetic flux.

C. induced currents in a non-homogenous material

D. unstable currents in a conductor.

Watch Video Solution

439. A metal sheet is placed in fron t of the pole of a very strong magnet. A force is needed to

A. hold the sheet in its position, if the metal is magnetic

B. hold the sheet in its position, if the metal is non-magnetic

C. move the sheet away with a uniform velocity, if the metal is magnetic.

D. move the sheet away with a uniform velocity, if the metals is non-magnetic

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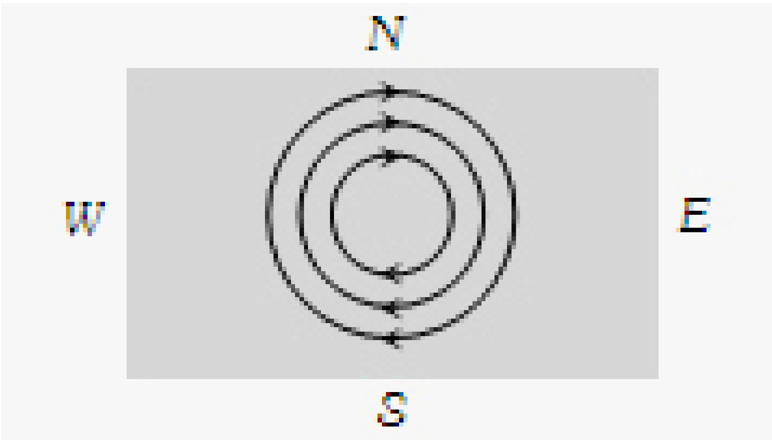
440. When a sheet of metals is placed in magnetic field, which changes from zero to a maximum value, induced currents are set up in the direction shown in the diagram.



What is the direction of the magnetic field?

A. Into the plane of paper

B. Out of the plane of the paper

C. East to west

D. North to south

Watch Video Solution

441. An induction furnance works on the principle of

A. eddy currents

B. Faraday's laws

C. self-induction

D. mutual induction

Watch Video Solution

442. Dimensions of oefficient of self-induction is

A. $[ML^2T^2A^{-2}]$

B. $[ML^2T^{-3}A^{-2}]$

C. $[ML^2T^{-3}]$

D. none of the above

Watch Video Solution

443. The self-inductance of a straight conductor is

A. zero

B. infinity

C. very large

D. very small

Watch Video Solution

444. Two pure inductors each of self-inductance L are connected in parallel but are well separated form each other. Then, the total inductance is

A. L

B. 2L

C. L/2

D. L/4

Watch Video Solution

445. A constant current is passed through, a solenoid. If a iron rod is inserted along the axis of the solenoid, If a iron rod is inserted along the axis of the solenoid, which of the following quantities will increases?

A. Rate of production of heat due to Joule heating

B. Magnetic field at the centre of the solenoid

C. self-induction of the solenoid

D.

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446. A solenoid has 2,000 turns wound over a length of 0.3m. the area of its cross-section is $1.2 \times 10^{-3} m^2$. Around its central part, coil of

300 is wound. If a initial current of 2A is reversed in 0.25 s, the induced e.m.f. produced in the coil is

A. $6 \times 10^4 V$

B. $4.8 \times 10^{-2} V$

C. $6 \times 10^{-2} V$

D. 48 V

Watch Video Solution

447. The mutual inductance between two coils depends on

A. medium between the coils only

B. separation between two coils only

C. both (A) and (B)

D. none of (A) and (B).

Watch Video Solution

448. The essential difference between an a.c. dynamo and d.c. dynamo is that

A. a.c. dynamo has an electromagnet, but d.c. dynamo has a permanent magnet

B. a.c. dynamo has slip rings, but d.c. dynamo has commutators

C. a.c. dynamo has coil would on soft iron, but the coil in d.c. dynamo is wound on copper

D. a.c. dynamo generates much high voltage

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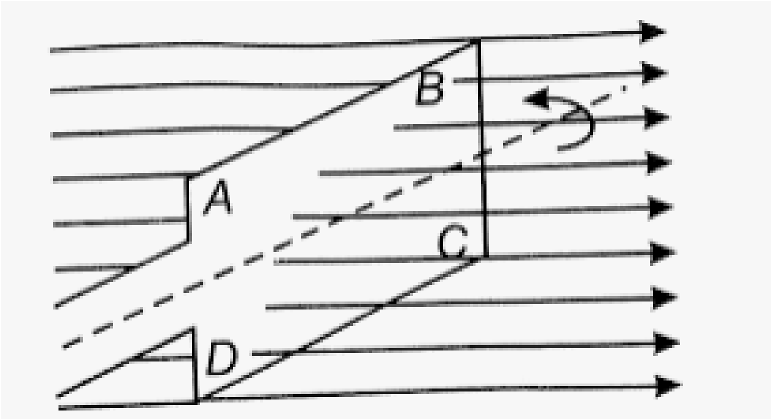
449. A rectangular ABCD is roated anticlockwise with a uniform angular velocity about the axis shown in the figure. The axis of rotation of the coil as well as the magnetric field B are horizontal. The induced e.m.f. in the coil would be maximum, when the plane of the coil



A. is parallel to the magnetic field

B. is vertical

C. makes an angle of 45° with the magnetic field

D. makes an angle of 30° with the magnetic field.

Watch Video Solution

450. Split ring commutators are used in which of the following device?

A. a.c. dynamo

B. d.c. dynamo

C. a.c. motor

D. In all the above

451. A dynamo develops 0.5 ampere at 6 volt. The power produced is

A. 3 watt

B. 12 watt

C. 0.083 watt

D. none of these

452. A dynamo is sometimes said to generate electricity. It actually acts as a source of

A. charge

B. magnetism

C. e.m.f.

D. energy

Watch Video Solution

453. As the speed of an eletric fan ncreases, current

A. increases

B. decreases

C. remains the same

D. becomes maximum, when speed is maximum

Watch Video Solution

454. A motor

A. converts electrical energy into mechanical energy

B. converts mechanical energy into electrical energy

C. converts electrical energy into magnetic energy

D. produces mechanical energy.

Watch Video Solution

455. In an induction coil, the coefficient of mutual induction is 4 H. If a current of 5 A in primary coil is cut-off in 1/1500 s, the emf at the terminals of secondary coil will be

A. 15 kV

B. 60 kV

C. 10 kV

D. 30 kV

Watch Video Solution

456. n an induction coil, the secondary e.m.f. is

A. zero during break of the circuit

B. very high during make of the circuit

C. very high during the break of the circuit

D. zero during make of the circuit.

Watch Video Solution

457. The device that does not work on the principle of mutual induction is

A. induction coil

B. tesla coil

C. transformer

D. motor.

Watch Video Solution

458. As motion of an armature increases, back e.mf.

A. increases

B. decreases

C. remains the same

D. may increase and decrease, depending on the nature of the armature.

Watch Video Solution

459. A motor starter is a

A. fixed resistance

B. a variable resistance

C. variable inductance

D. variable capacitor

Watch Video Solution

460. A normal domestic electric supply is an alternating current, whose average value is

A. zero

B. half the peak value

C. the peak value multiplied by $\pi/2$

D. the peak value divided by $\pi/2$

Watch Video Solution

461. The mean value of a.c. is related the peak vlaue of a.c. by the equation

A. $I_m = \sqrt{2} I_0$

B. $I_0 = \sqrt{2} I_m$

C. $I_m = 2I_0 / \pi$

D. $I_0 = 2I_m / \pi$

Watch Video Solution

462. The equation of an a.c. voltage is $V = 200 \sin 50\pi t$ Then, the r.m.s. value of voltage is

A. $100\sqrt{2}V$

B. $200\sqrt{2}V$

C. 100 V

D. 400 V

Watch Video Solution

463. In an a.c circuit, the a.c. metres measures?

A. r.m.s. vlaues

B. peak values

C. mean vlaues

D. mean square values

Watch Video Solution

464. Hot wire ammeters are used for measuring

A. both a.c. and d.c.

B. only a.c.

C. only d.c.

D. neither a.c. nor d.c.

Watch Video Solution

465. In an electricla circuit carrying an alternating current, a moving coil gavanometer cannot be used, because

A. the net magnetic field is too high

B. the net magnetic field is zero

C. there is too much energy loss.

D. the voltage is too high.

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466. Ohm's law (E=IR)

A. can never be applied to ac.

B. can be applied to a.c. in the same manner as to d.c.

C. can be applied to ac circuits after replacing R with Z

D. none of above

Watch Video Solution

467. An electric bulb rated 22V is connected to 220 V-5Hz source. Then, the bulb

A. does not glow

B. glows intermittentlly

C. glows continuously

D. fuses

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468. An inductor

A. allows a.c. to pass, but blocks d.c.

B. allows d.c. to pass, but bloks a.c.

C. allows both a.c. and d.c. to pass

D. blocks d.c.

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469. In an a.c. circuit containing inductance

A. current lags the voltage by 90°

B. current lags the voltage by 180°

C. current leads the voltage by 90°

D. none of the above

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470. The inductive reactance of an inductance of $1/\pi$ H at 50 Hz is

A. 100 ohm

B. $50 / \pi \Omega$

C. $\pi / 50 \Omega$

D. $50 \pi \Omega$

Watch Video Solution

471. The reactance of an inductance of 0.01 H to a 50 Hz a.c. is

A. 6.28 ohm

B. 3.14 ohm

C. 1.04 ohm

D. 0.59 ohm

Watch Video Solution

472. An alternating em.f is applied to a pure indutance such that inductive reactance is 10 ohm. If the frequency of a.c. Is doubled, the reactance will become

A. 5 ohm

B. 10 ohm

C. 15 ohm

D. 20 ohm

Watch Video Solution

473. When a.c passes through a capacitor, the current.

A. leads e.m.f. by $\pi / 2$

B. lags e.m.f by $\pi / 2$

C. is in phase with e.m.f.

D. none of the above

Watch Video Solution

474. A capacitor of capacitance 6muF is charged by a 6V battery. The charged capacitor is now connected to an indcutor of inductance 2 mH. Find the current I the circuit, when one-third energy stored in the capacitor converts into the energy stored in the inductor.

A. offers easy path to a.c., but blocks d.c.

B. offers easy path to d.c., but blocks a.c.

C. offers eas path to both a.c. and d.c.

D. blocks a.c.

Watch Video Solution

475. An alternating e.m.f. is applied to a pure capacitance such that the capacitive reactance is 10 ohm. If the frequency of a.c. is doubled,the reactance will become

A. 5 ohm

B. 10 ohm

C. 15 ohm

D. 20 ohm

Watch Video Solution

476. In an a.c. circuit, an alternating voltage $E = 200\sqrt{2}\sin 100t$(in volt) is connected to a capacitor of capacitance $1\mu F$. The r.m.s. value of the current in the circuit is

A. 10 mA

B. 20 mA

C. 40 mA

D. 80 mA

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477. In an a.c. circuit, the current

A. is always in phase with the e.m.f

B. always leads the e.m.f

C. always lags the e.m.f.

D. any of the above, depending upon the elements (L,C or R) of the circuit.

Watch Video Solution

478. A 220V-50hz a.c. source is connected to an inductance of 0.2 henry and a resistance of 20 ohm in series What is the current in the circuit?

A. 10A

B. 5A

C. 33.3A

D. 3.33A

Watch Video Solution

479. In an LCR-series a.c. circuit, the current

A. is always in phase with the voltage

B. always leads the voltage

C. always leads the generator voltage

D. may lag behind or lead the voltage

Watch Video Solution

480. For the current in LCR circuit to be maximum.

A. $\omega^2 = LC$

B. $\omega^2 = 1/LC$

C. $\omega = 1/LC$

D. $\omega = LC$

Watch Video Solution

481. A 1 mH inductance and $10\mu F$ capacitance, when connected in series to an a.c. source, possess equal reactance. The angular freqency of the a.c. source

A. 10^4

B. 100

C. 10

D. 200π

Watch Video Solution

482. An a.c. circuit using an inductor and a capacitor in series has a maximum current. If L = 0.5 H and $C = 8\mu F$, the the angular frequency of a.c. voltage will be

A. 500

B. 5×10^5

C. 4000

D. 5000

Watch Video Solution

483. In an LCR-circuit, capacitance is changed from C to 2 C. For the resonant frequency to remain unchanged, the inductance should be changed form L to

A. 2 L

B. L/2

C. 4 L

D. L/4

Watch Video Solution

484. An LCR-circuit is connected to a source of a.c. current under resonant condition. The phase difference between the applied voltage and the current it the circuit is

A. $\pi / 4$

B. $\pi / 2$

C. π

D. zero

Watch Video Solution

485. For the current in LCR circuit to be maximum.

A. $X_L = 0$

B. $X_C = 0$

C. $X_L = X_C$

D. $R = X_L + X_C$

486. Derive an expression for average power is an A.C. circuit containing resistor only.

A. $E_v I_V$

B. $E_v I_v \cos \phi$

C. $E_v I_v \sin \phi$

D. zero

Watch Video Solution

487. The aveage power dissipation inpure indctance is

A. zero

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

C. $\left(\frac{1}{2}LI^2\right)^2$

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

Watch Video Solution

488. In an a.c. circuit, E and I are given by $E = 100\sin(100t)$ (in volt), and $I = 100\sin(100t + \pi/3)$(in mA) The power dissipated in the ciruit is

A. $10^4 W$

B. 10 W

C. 2.5W

D. 5.0 W

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489. The minimum and maximum values of power factor in an a.c. circuit are

A. 0 and 1

B. $1 \text{ and } \infty$

C. $0 \text{ and } \infty$

D. 0.1 and 1

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490. An a.c. supply may be used directy for all these except for one. Identify the one, for which it cannot be used

A. heating

B. lighting

C. Transforming voltage

D. Electroplating.

Watch Video Solution

491. When 100" volt" dc is applied across a coil, a current of 1 amp flows through it, when 100 V ac of 50 Hz is applied to the same coil, only 0.5 amp flows. Calculate the resistance and inductance of the coil.

A. 200 ohm and 0.55 H

B. 100 ohm and 0.86 H

C. 200 ohm and 1.0 H

D. 100 ohm and 0.93 H.

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492. The reactance of an a.c. circuit is zero. Then, the circuit contains

A. an indcutor, but no capacitor

B. a capacitor, but no inductor

C. both an inductor and a capacitor

D. neither an inductor nor a capacitor.

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

A. 20 V

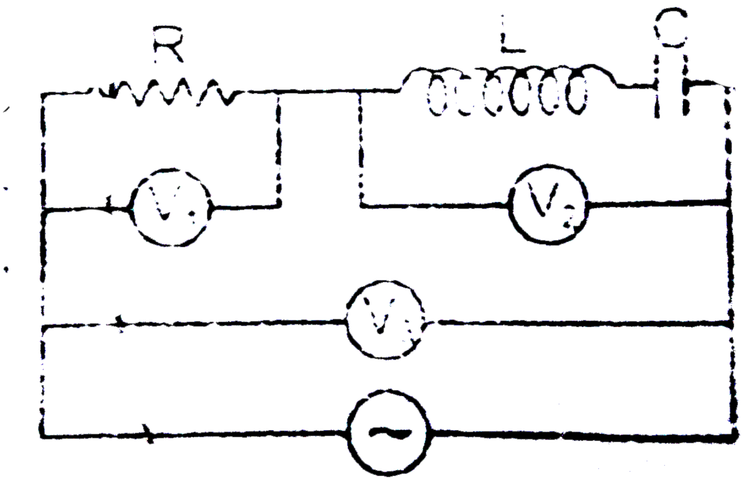
B. 10 V

C. 5 V

D. 25 V

Watch Video Solution

494. A resistor R, an inductor L, a capacitor C and voltmeters V_{1}, V_{2} and V_{3} are connected to an oscillator in the circuit as shown in the adjoining diagram.When the frequency of the oscillator is increased, upto resonance frequency, the voltmeter reading (at resonance frequency) is zero in the case of:



A. that of V_1

B. that of V_2

C. both of V_1 and V_2

D. neither of V_1 nor of V_2

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495. An inductor is connected to an a.c. source of e.m.f. if the energy stored inside the inductor in the form of magnetic field changes form maximum to minimum value in 5 ms, then the frequency of the source is

A. 20 hz

B. 50 Hz

C. 200 Hz

D. 500 Hz

Watch Video Solution

496. An LC-circuit cannot produce oscillations, when

A. capacitance is large

B. inductance is large

C. resistane is large

D. none of the above

Watch Video Solution

497. L,C and R represent the physical quantities inductances, capacitance and resistance respectivley. The combination, which have the dimensions of frequency are

A. 1/RC

B. R/L

C. R/LC

D. C/L

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498. In an oscillating circuit, the resttoring force is must. In and LC-circuit, the restoring force is provided by

A. a capacitor

B. an inductance

C. a resistance

D. none of the above

Watch Video Solution

499. In a.c. circuit, the power is consumed only in

A. inductance

B. capacitance

C. resistance

D. all the given above

Watch Video Solution

500. What is the power factor of an LCR series circuit at resonance?

A. zero

B. 1

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

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

Watch Video Solution

501. Power is transmitted form a power station at a very high a.c. voltage, because

A. the rate of transmission from a power station at a very high

B. it is more economical due to less power loss

C. power can not be generated at low voltage

D. theft of power is not possible at high voltage

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502. Wattlesscurrent is possible, only in

A. resistive circuit

B. non-resistive circuit

C. LR-circuit

D. LCR-circuit

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503. Radio frequency choke is stored to

A. keep frequency low.

B. Keep frequency high

C. keep inductive reatance low

D. keep inductive reactance high

Watch Video Solution

504. A coil and an electric bulb are connected in series with an ac. Source. On introducing a soft iron bar inside the coil, the intensity of the bulb will

A. increases

B. decreases

C. fluctuate

D. remain the same

Watch Video Solution

505. A stepdown transformer is used to change

A. high voltage d.c. into low voltage d.c.

B. high voltage a.c. into low voltage a.c.

C. mechanical energy into electrical energy

D. electrical energy into mechanical energy.

Watch Video Solution

506. A transformer steps up or steps down

A. a.c. only

B. d.c. only

C. either a.c. or d.c.

D. a.c. mixed with d.c.

Watch Video Solution

507. A transformer has 200 windings in the primary and 400 windings in the secondary. The primary is connected to an a.c. supply of 110 V and a current of 10 A flows in it The voltage across the secondary and the current in its respectively are

A. 55 V, 20 A

B. 440 V, 5 A

C. 220V,10A

D. 220 V, 5A

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508. A step-down transformer is used to reduce 220V supply to 11V. The primary draws 5 A of current, while th secondary 90 A. The efficiency of the transformer is

A. 0.2

B. 0.4

C. 0.7

D. 0.9

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509. The number of turns in the primary and secondary coils of a transformer are 1000 and 3000 respectively. If a 80 V, a.c. supply is applied to the primary coil of the transformer, then the P.D. Per turn of the secondary will be

A. 240 V

B. 2400 V

C. 0.24 V

D. 0.08 V

Watch Video Solution

510. The magnitude of the e.m.f across the secondary of a transformer does not deepnd upon

A. the magntiude of the e.m.f. applied across the primary

B. the number of turns in the primary

C. the number of turns in the secondary

D. the resistance of the primary and the secondary.

Watch Video Solution

511. Soft iron is used in many parts of electrical machines for

A. low hysteresis loss and low permeability

B. low hysteresis loss and high permeability

C. high hysteresis loss and low permeability

D. high hysteresis loss and high permeability

Watch Video Solution

512. The core used in trasformers and other electromagnetic devices is laminated, so as

A. to reduce the magnetism in the core

B. to reduce eddy current losses in the core

C. to increase the magnetic field

D. to increase the magnetic flux.

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EXERCISE

1. For current entering at A, the electric field E(r at a distance r form A

A. $\dfrac{\rho I}{r^2}$

B. $\rho \dfrac{I}{2\pi r^2}$

C. $\dfrac{\rho I}{4\pi r^2}$

D. $\dfrac{\rho I}{8\pi r^2}$

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2. A material 'B' has twice the specific resistance of 'A'. A circular wire made of 'B' has twice the diameter of a wire made of 'A'. Then for the two wires to have the same resistance, the ratio l_B / l_A of their respective lengths must be

A. $\frac{1}{4}$

B. 2

C. 1

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

Watch Video Solution

3. The length of a given cylindrical wire is increased by 100%. Due to the consequent decrease in diameter, the change in the resistance of the wire will be

A. 200%

B. 100%

C. 50%

D. 300%

Watch Video Solution

4. If a wire is stretched to make it 0.1% longer, its resistance of will

A. increased by 0.05%

B. increase by 0.2%

C. decrease by 0.05%

D. decrease by 0.2%

Watch Video Solution

5. An electric current is passed through a circuit containing two wires of the same material, connected in parallel. If the lengths and radii are in the ratio of 4/3 and 2/3, then the ratio of the current passing through the wires will be

A. 3

B. $\frac{1}{3}$

C. $\frac{8}{9}$

D. 2

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6. By increasing the temperature, the specific resistance of a conductor and a semiconductor

A. increases for both

B. decreases for both

C. increases, decreases respectively

D. decreases, increases respectively.

Watch Video Solution

7. A strip of copper another of germanium are cooled from room temperature to 80 K. The resistance of

A. copper stripp decreases and that of germanium decreases

B. copper strip decreases and that of germanium increases

C. each of these increases

D. each of them decreases.

Watch Video Solution

8. The difference in the variation o resistance with temperature in a metal and a semiconductor arises essentally due to the difference in the

A. crystal structure

B. type of bonding

C. variation of scatteirng mechanism with temperature

D. variation of the number of charge carriers with temperature.

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9. The thermistors are usually made of

A. metals with lwo temperature coefficient of resistivity

B. metals with high temperature coefficient of resistivity

C. metals oxides with high temperature coefficient of resistivity

D. semiconducting materials having low temperature cfoefficient of resistivity.

Watch Video Solution

10. The resistance of a bulb filmanet is 100Ω at a temperature of $100^{\circ} C$. If its temperature coefficient of resistance be $0.005 per .^{\circ} C$, its resistance will become 200Ω at a temperature of

A. $500^{\circ} C$

B. $200^{\circ} C$

C. $300^{\circ} C$

D. $400^{\circ} C$

Watch Video Solution

11. The resistance of a wire is 5 ohm at $50^{\circ} C$ and 6 ohm at $100^{\circ} C$. The resistance of the wire at$0^{\circ} C$

A. 1Ω

B. 2Ω

C. 3Ω

D. 4Ω

Watch Video Solution

12. The resistance of hot tungsten filament is about 10 times the cold resistance. What will be the resistance of 100 W - 200 V lamp, when not in use?

A. 40Ω

B. 20Ω

C. 400Ω

D. 2Ω

Watch Video Solution

13. An electric bulb is rated 220 V and 100 W. when it is operated on 110 V, the power consumed will be

A. 25 W

B. 50 W

C. 75 W

D. 40 W

Watch Video Solution

14. An 220 volt-1000 watt bulb is connected across a 110 volt mains supply. The power consumed will be

A. 750 watt

B. 500 watt

C. 250 watt

D. 1,000 watt

Watch Video Solution

15. A heater coil is cut into two equal parts and only one part is now used in the heater. The heat generated will now be:

A. doubled

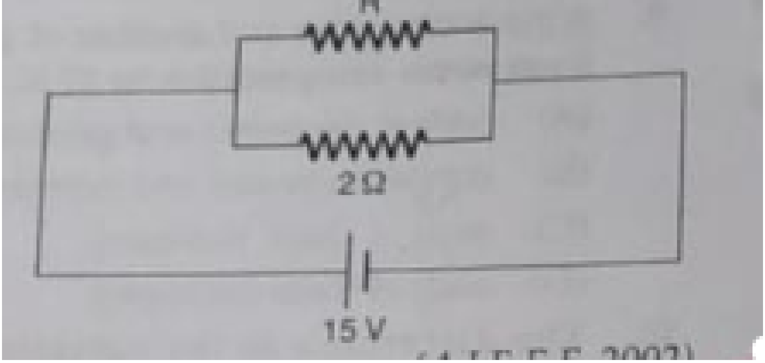
B. four times

C. one fourth

D. halved

Watch Video Solution

16. If in the circuit, power dissipation is 150 W, then R is



A. 2 ohm

B. 6 ohm

C. 5 ohm

D. 4 ohm

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17. A wire when connected to 220 V mains supply has power dissipation P_1. Now the wire is cut into two equal pieces which are connected in parallel to the same supply. Power dissipation in this case is P_2. Then $P_2 : P_1$ is

A. 1

B. 4

C. 2

D. 3

Watch Video Solution

18. The resistance of the series combination of two resistances is S. WHen they are joined in parallel, the tital resistance is P. If S=nP, then the minimum possible value of n is :

A. 4

B. 3

C. $8/9$

D. 2

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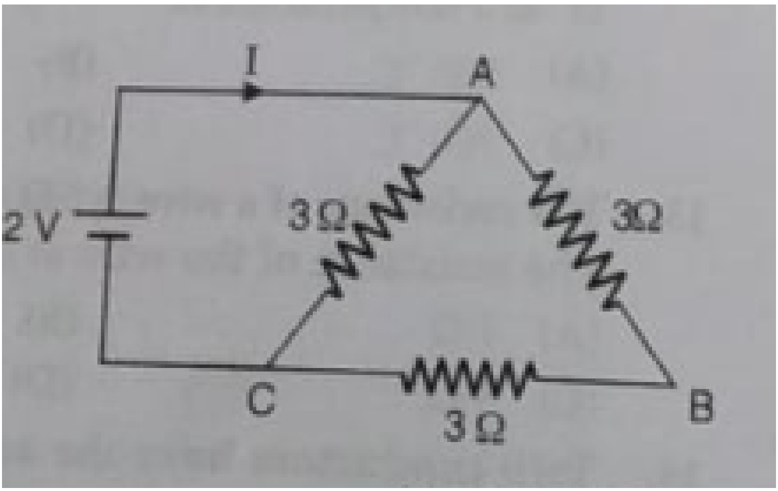
19. A 3 V battery with negligible internal resistance is connected in a circuit as shown in the figure. The current I in the circuit will be



A. $1A$

B. $2A$

C. $1/3A$

D.

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20. What will be the value of current through 2Ω resistance for the circuit shown in the

figure.

A. 5A

B. 2A

C. zero

D. 4A

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21. An energy soruce will supply a constant current into the laod, if its internal resistance is

A. equal to the resistance of the load

B. very large as compared to the load resistance

C. non-zero but less than the resistance of the load

D. zero

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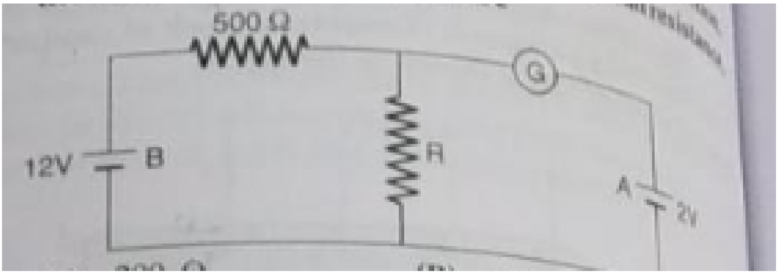
22. In the circuit , the galvanometer G shows zero deflection. If the batteries A and B have negligible internal resistance the value of othe resistor R will be



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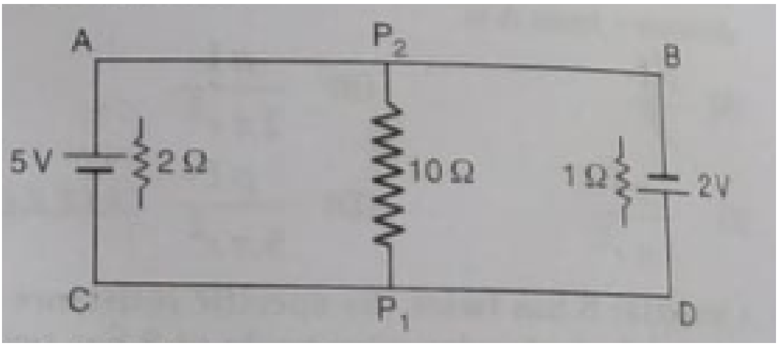
23. A 5V battery with internal resistance$2\Omega$and a 2V battery with internal resistance $1\Omega$are connected to a10Ω resistor as shown in the figure.



A. $0.27A(P_1 \rightarrow P_2)$

B. $0.27A(P_2 \rightarrow P_1)$

C. $0.03A(P_1 \rightarrow P_2)$

D. $0.03A(P_2 \rightarrow P_1)$

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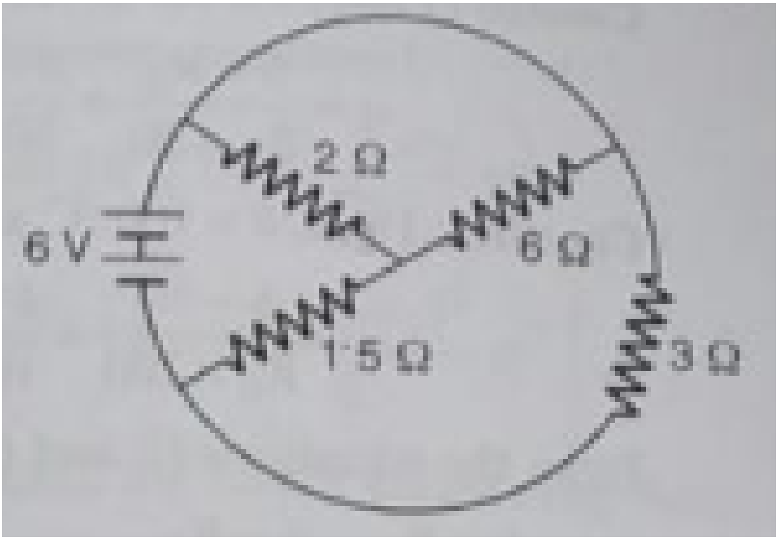
24. The total current supplied to the circuit by the battery is



A. $1A$

B. $2A$

C. $4A$

D. $6A$

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25. In a meter bridge experiment null point is obtained at 20 cm. from one end of the wire when resistance X is balanced against another resistance Y. If XltY, then where will be the new position of the null point from the same end, if one deicdes to balance a resistance of 4 X against Y?

A. 50 cm

B. 80 cm

C. 40 cm

D. 70 cm

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26. In a potentiometer experiment , the balancing with a cell is at length 240 cm. On shunting the cell with a resistance of 2Ω, the balancing length becomes 120 cm. Find the internal resistasnce of the cell.

A. 1 ohm

B. 0.5 ohm

C. 4 ohm

D. 2 ohm

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27. The length of a wire of a potentiometer is 100 cm, and the e.m.f. of its standard cell is E volt. It is employed to measure the e.m.f. of a battery whose internal resistance is 0.5Ω. If the balance point is obtained at I = 30 cm from the positive end, the e.m.f. of the battery is . Where I is the current in the in the potentiometer wire.

A. $\dfrac{30E}{100.5}$

B. $\frac{30E}{99.5}$

C. $\frac{30E}{100}$

D. $\frac{30(E - 0.51)}{100}$

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28. The mean free path of electrons in a metal is $4 \times 10^{-8} m$. eY energy to an electron in the metal will be

A. 5×10^{-11}

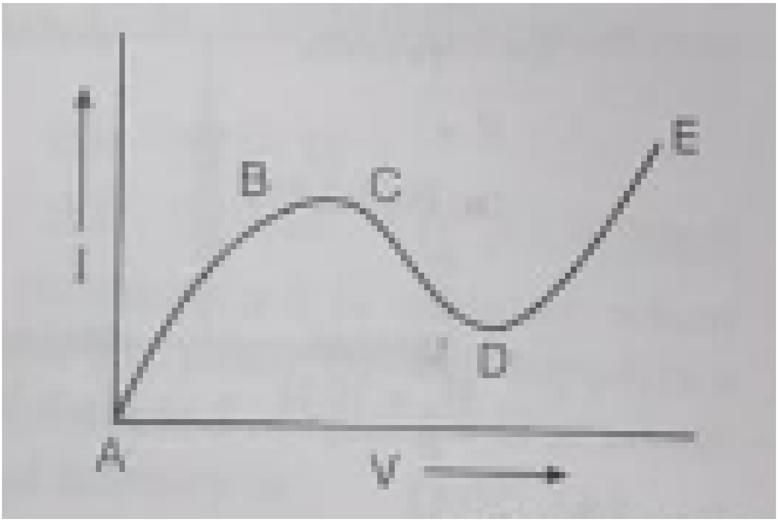
B. 8×10^{-11}

C. 5×10^{7}

D. 8×10^{7}

Watch Video Solution

29. From the graph between current (I) and voltage (V) as shown in the figure, identify the portion correspoindgin to negative resistance



A. AB

B. BC

C. CD

D. DE

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30. The electric resistance of a certain wire of ron is R. If its length and radius are both doubled, then

A. the resistance will be doubled and the specific resistance will be halved

B. the resistance will be halved and he secific resistance will remain unchanged

C. the resistance will be halved and the specfic resistance will be doubled.

D. the resistance and the specific will both remain unchanged.

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31. The copper wires of elngths and cross-sectional areas are (l,A), (2l,A/2) and (l/2, 2A). Resistance is minimum in

A. wire of cross-sectional area A/2

B. wire of cross-sectional area A

C. wire of cross-sectional area 2 A

D. same in all the three cases.

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32. A wire of resistance 10Ω is elongated by 10%. The resistance of the eleongated wire is

A. 10.1Ω

B. 11.1Ω

C. 12.1Ω

D. 13.1Ω

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33. A wire of certain material is stretched slowly by 10% its new resistance and specific resistance become respectively

A. both remain the same

B. 1.1 times, 1.1 times

C. 1.2 times, 1.1 times

D. 1.21 time,s same

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34. The specific resistance of a condutor increases with

A. increase in temperature

B. increase in cross-sectional area

C. decrease in length

D. decrease in cross-sectional area

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35. Si and Cu are cooled from 300 K to a temperative of 60 K. Then resistivity

A. for Si increases and for Cu decreases

B. for Cu increases and for Si decreases

C. decreases for both Si ad Cu

D. increases for both Si and Cu

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36. What is a fuse wire? What is its material? Give the characteristics of the material used.

A. both low resistance and low melting point

B. high resistance and low melting point

C. low resistance and high melting point

D. both high resistance and high melting point.

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37. 1 kW h is equal to

A. $36 \times 10^5 J$

B. $36 \times 10^3 J$

C. $36 \times 10^{-5} J$

D. $36 \times 10^{-3} J$

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38. An electric bulb marked 40W-200 V is used in a circuit of supply voltage 100V. Now its power is

A. 100 W

B. 40 W

C. 20 W

D. 10 W

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39. When three identical bulbs of 60 watt-200 volt rating are connected in series to a 200 volt supply, the power drawn by them will be

A. 60 watt

B. 180 watt

C. 10 watt

D. 20 watt

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40. In India electricity is supplied for domestic use at 220 V. It is supplied at 110 V in USA. If the resistance of a 60 W bulb for use in India is R, the resistance of a 60 W bulb for use in USA will be

A. R

B. 2R

C. R/4

D. R/2

Watch Video Solution

41. An electric kettle takes 4 A current at 220 V. How much time will it take to boil 1 kg of water from temperature $20^\circ C$? The temperature of boiling water is $100^\circ C$

A. 4.2 min

B. 6.3 min

C. 8.4 min

D. 12.6 min

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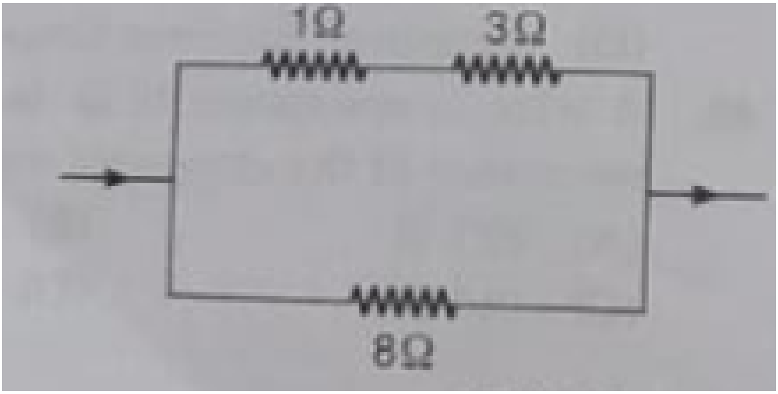
42. Power dissipated across the 8Ω resistor in the circuit shown here is 2 W. The power dissipated in the 3Ω resistor is



A. 3 W

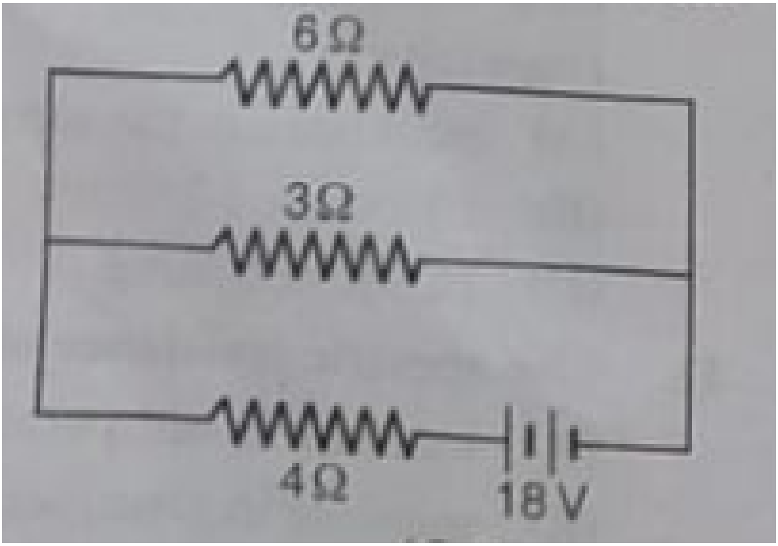
B. 2 W

C. 1 W

D. 0.5 W

Watch Video Solution

43. The total powe dissipated (in watt) in the cirucit shown is



A. 4

B. 16

C. 40

D. 54

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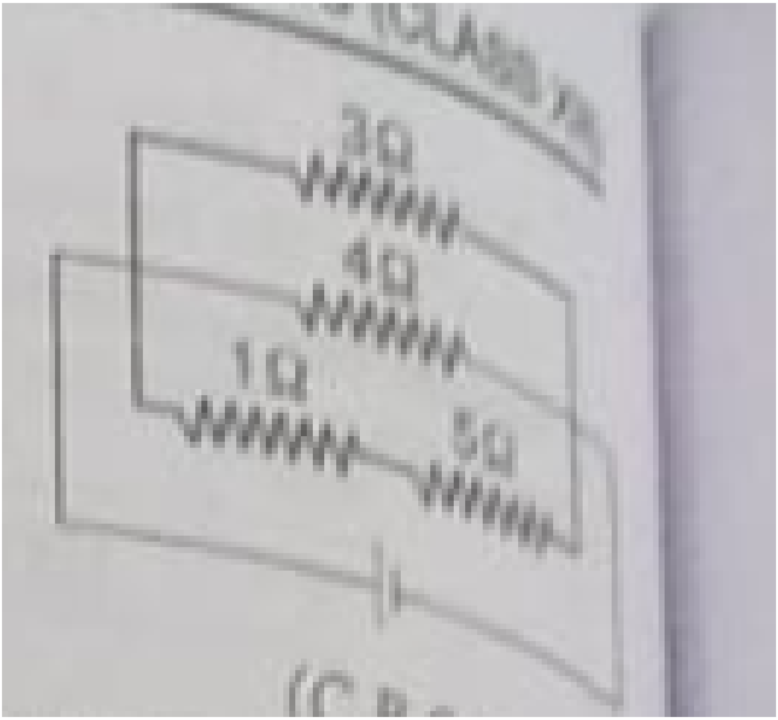
44. A current of 3 A flows through the 2Ω resistor shown in the circuit. The power dissipated in the 5Ω resistor is



A. 1 W

B. 2 W

C. 4 W

D. 5 W

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45. Resistance n, each of r ohm, when connected in parallel give an equivalent resistance of R ohm. If these resistances were connected series, the combination would have a resistance in ohm, equal to

A. $n^2 R$

B. R / n^2

C. R/n

D. nR

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46. When a wire of uniform cross-section a, length l and resistance R is bent into a complete circle, resistance between any two of diameterically opposite points will be

A. R/4

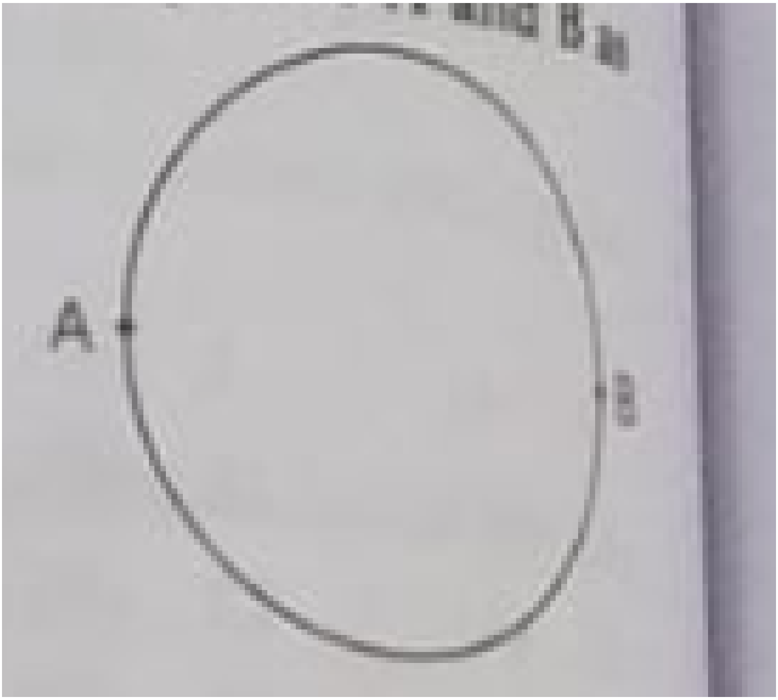
B. 4R

C. R/8

D. R/2

Watch Video Solution

47. A wire of resistance $12\Omega m^{-1}$ is bent to from a complete circle of radius 10 cm. The resistance between its two diametrically opposite points, A and B as shown in the figure, is



A. 3 ohm

B. 6 ohm

C. $6\pi ohm$

D. $0.6\pi ohm$

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48. Two wires of the same metal have the same length, but their cross-sections are in the ratio of 3:1. They are joined in series. The resistance of the thicker wire is 10Ω. The total resistance of the combinations will be

A. $5/2\Omega$

B. $40/3\Omega$

C. 40Ω

D. 100Ω

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49. Three resistances each of 4 ohm are connected in the form of an equilateral triangle. What is the effective resistance between two corners of the triangle?

A. 12Ω

B. 2Ω

C. 6Ω

D. $8/3\Omega$

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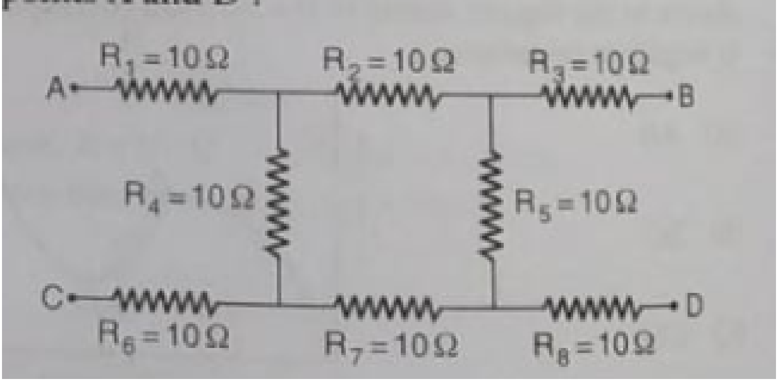
50. What will be the equivalent resistance between the points A and D?



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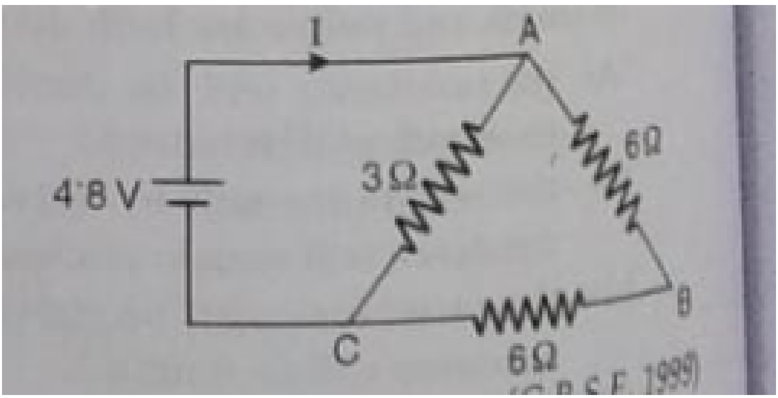
51. The current in the given circuit is



A. 8.31 A

B. 6.82 A

C. 4.92 A

D. 2A

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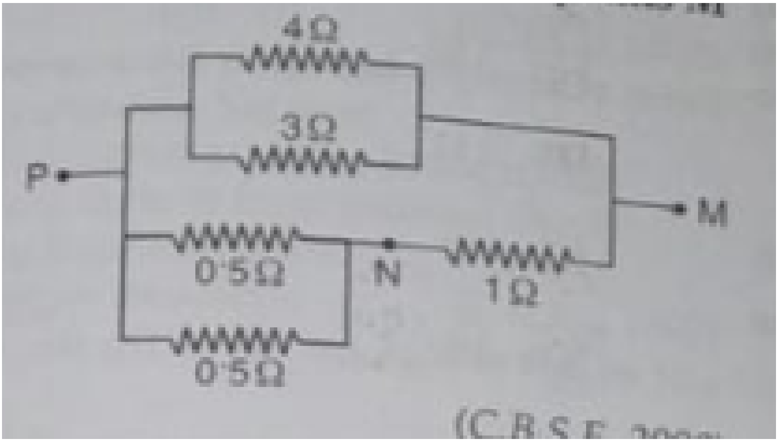
52. In the circuit shown, the current through the 4Ω resistor is 1 A, when the points P and M are connected to a d.c. source. The potential difference between the points M and N is



A. 0.5 V

B. 1.0 V

C. 1.5 V

D. 3.2 V

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53. You are given several identical resistors each of value 10Ω and each capable of carrying a maximum current of 1 A. It is required to make a suitable combination of these to resistances to produce a resistance of 5Ω which can carry a current of 4 A. The minimum number of resistors required for this job is

A. 4

B. 10

C. 8

D. 20

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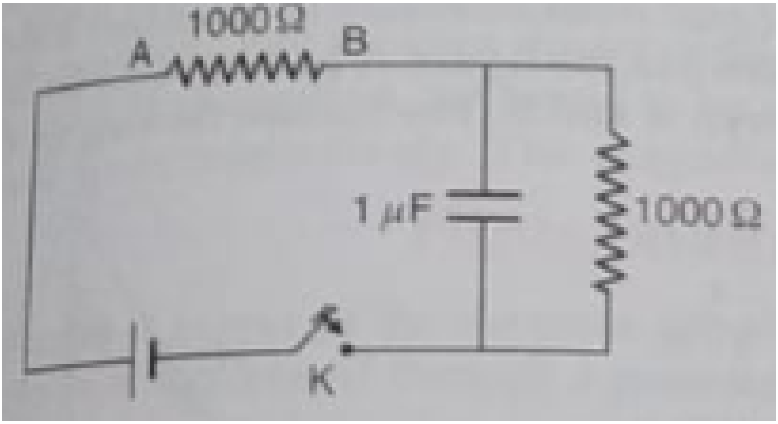
54. When the key K is pressed at time t 0, then which of the following statement about the current I in the resistor AB of the given circuit is true?



A. I = 1 mA at all t

B. I = 2 mA at all t

C. I oscillates between 1 mA and 2 mA

D. at t = 0, I = 2 mA and with time, it goes to

1 mA

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55. The internal resistance of a cell of e.m.f. 2 V is 0.1Ω. It is connected to a resistance of 3.9Ω. The voltage across the cell will be

A. 0.5 V

B. 1.5 V

C. 1.95 V

D. 2 V

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56. For a Cell, the terminal potential difference is 2.2 V when circuit is open and reduces to 1.8 V, when cell is connected to a resistance $R = 5\Omega$. The internal resistance of cell (r) is

A. $10 / 9\Omega$

B. $9 / 10\Omega$

C. $11 / 9\Omega$

D. $5 / 9\Omega$

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57. A current of 2A flows through a 2 ohm resistor when connected across a battery , the same battery supplies a current of 0.5A when connected across a 9 ohm resistor . the internal resistance of the battery is

A. 0.5Ω

B. $1/3\Omega$

C. $1/4\Omega$

D. 1Ω

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58. A student measures the terminal potential difference (V) of a cell (of emf E and internal resistance r) as a function of the current (I) flowing through it. The slope and intercept of the graph between V and I, then respectively, equal

A. $-r$ and E

B. r and $-E$

C. $-E$ and R

D. E and $-r$

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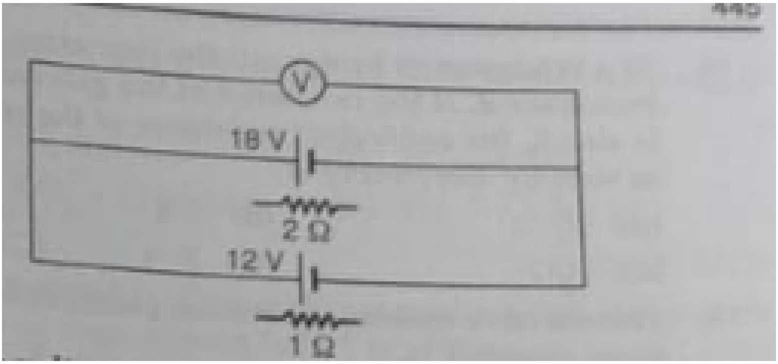
59. Two batteries , one of e.m.f. 18 V and internal resistance 2Ω and the toher of e.m.f. 12 V and internal resistane 1Ω, are connected as shown



The

voltmeter V will record a reading of

A. 30 V

B. 18 V

C. 15 V

D. 14 V

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60. A battery is charged at a potential of 15 V for 8 h when the current flowing is 10A. The battery on discharge supplies a current of 5A for 15h . The mean terminal voltage during discharge is 14V. The watt-hour efficiency of the battery is

A. 0.825

B. 0.8

C. 0.9

D. 0.875

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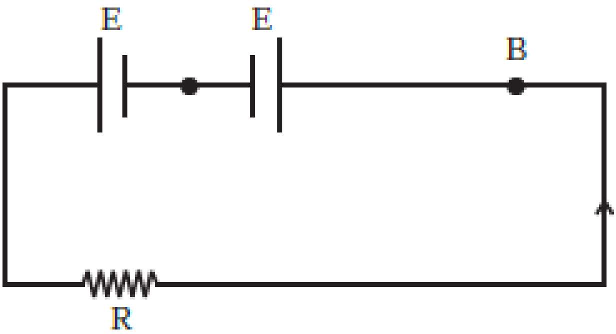
61. Two cells, having the same emf, are connected in series through an external resistance R. Cells have internal resistance r_1 and $r_2 (r_1 > r_2)$respectively. When the circuit is closed, the potentail difference across the first cell is zero the value of R shown in the figure



A. $r_1 + r_2$

B. $r_1 - r_2$

C. $(r_1 + r_2) / 2$

D. $(r_! - r_2) / 2$

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62. Kirchoff's first law is based on the law of conservation of ....

A. charge

B. energy

C. momentum

D. anguar momentum

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63. kirchoff's first and second laws are respectively based on law of conservation.

A. conservation of energy and electric charge respectively

B. conservation of energy

C. conservation of electric charge and energy respectively

D. conservation of electric charge

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64. In a Wheatstone's brigde all the four arms have equal resistance R. If the resistance of the galvanometer arm is also R, the equivalent resistance of the combination as seen b the battery is

A. R

B. 2R

C. R/2

D. R/4

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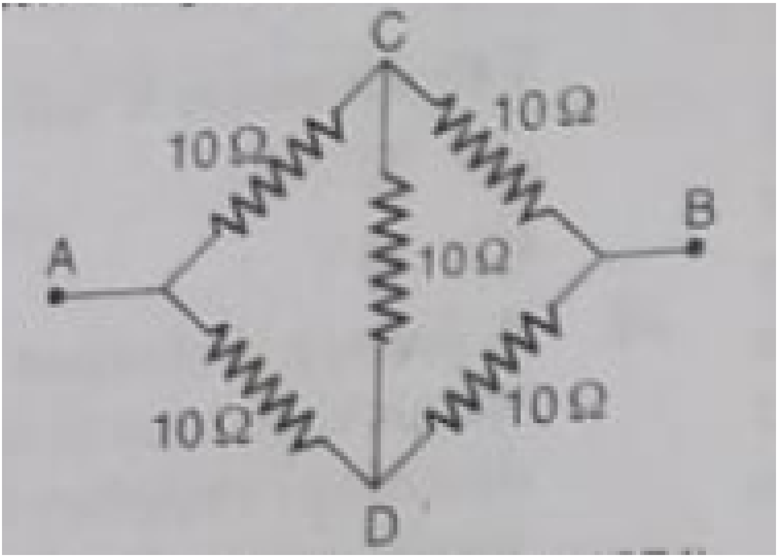
65. The effective resistance between points A and B in the given circuit A is



A. 10Ω

B. 20Ω

C. 40Ω

D. 50Ω

Answer: `

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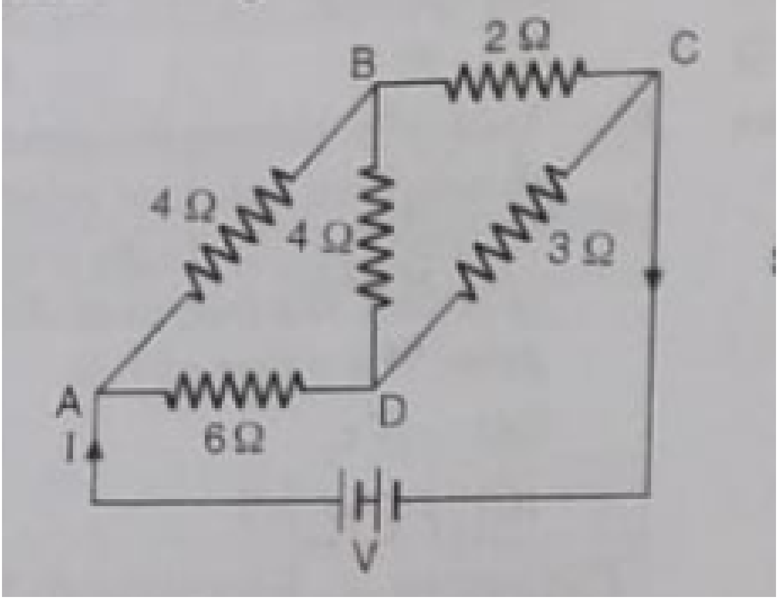
66. For the network shown in the figure , the value of the current I is



A. 9V/35

B. 18V/5

C. 5V/9

D. 5V/18

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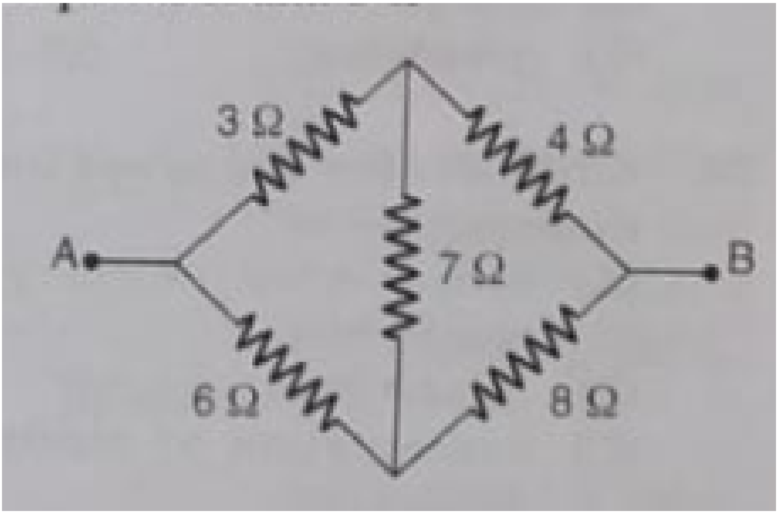
67. A bridge circuit is shown in the figure. The equivalent resistance between points A and B is



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68. The resistance of each arm of the wheat stone bridge is 10Ω. A resistance of $10\Omega$is connected in series with galvanometer then the equivalent resistance across the battery will be

A. 10Ω

B. 15Ω

C. 20Ω

D. 40Ω

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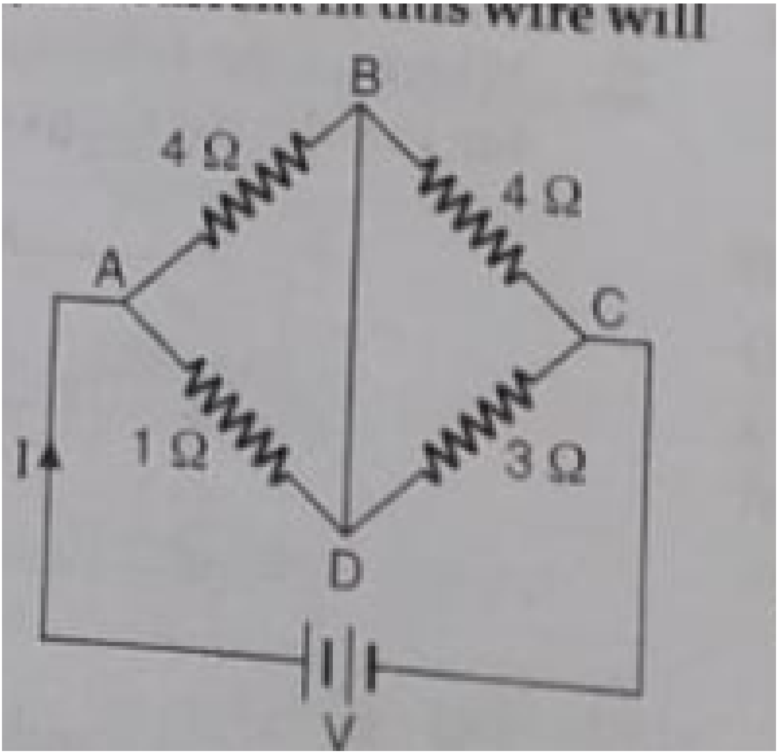
69. In the circuit shown, if a conducting wire is connected between the points B and D, the current in this wire will



A. flow from B to D

B. flow from D to B

C. flow in the direction which will be decided by the value of V

D. be zero

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70. In a metre bridge, the balancing length form the left end is focused to be 20 cm. The value of the unknown reistance is

A. 0.8Ω

B. 0.5Ω

C. 1.4Ω

D. 0.25Ω

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71. Three resistance P, Q, R each of 2 Omega and an unknown resistance S from the four amrs of a Wheatstone's bridge circuit. When a resistance of 6 Omega is connected in parallel to S the bridge gets balanced. What is the value of S ?

A. 1Ohm

B. 2 ohm

C. 3 ohm

D. 6 ohm

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72. An unknown resistanceR_1 is connected is series with a resistance of $10\Omega.$ This combination is connected to one gap of a meter bridge, while other gap is connected to another resistance R_2. The balance point is at 50 cm Now , when the 10 Omega resistance is removed, the balanced point shifts to 40 cm Then the value of $R_1$is.

A. 60

B. 40

C. 20

D. 10

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73. Why voltmeter less accurate in measuring potential difference than a potentionmeter?

A. It does not draw current from external circuit

B. it has a wire of high resistance

C. it has a wire of low resistance

D.

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74. The resistivity of potentiometer wire is 10^{-7} ohm m and its area of cross-section is $10^{-6}m^2$. When a current I = 0.1. A flows through the wire, its potential gradient is

A. $10^{-2}Vm^{-1}$

B. $10^{-4}Vm^{-1}$

C. $0.1 V m^{-1}$

D. $10 V m^{-1}$

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75. A 6 V battery is connected to the terminals of a 3 m long wire of uniform thickness and resistance of100Ω. The difference of potential between two points on the wire separated by a distance of 50 cm will be

A. 2 V

B. 3 V

C. 1 V

D. 1.5 V

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76. A cell can be balanced against 110 cm and 100 cm of potentiometer wire respectively, when open icrcuited and when short circuited through a resistance of 10 ohm. Find the internal resistance of the cell.

A. zero

B. 0.5 ohm

C. 1.0 ohm

D. 2.0 ohm

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77. A steady current flows in a metallic conductor of non-uniform cross-section. Which of the following quantities, current, current density and drift speed are constant along the conductors?

A. current, electric field and drift speed

B. current and drift speed

C. drift speed only

D. current only

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78. Which of the following relation is called as current density?

A. I/A

B. A/I

C. I^2 / A

D. I^3 / A^2

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79. Dimenstions of electrical resistance is

A. $\left[ML^2T^{-3}A^{-1}\right]$

B. $\left[Ml^2T^{-3}A^{-2}\right]$

C. $\left[ML^3T^{-3}A^{-2}\right]$

D. $\left[ML^2T^{-3}A^{-1}\right]$

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80. A wire of length l is drawn such that its diameter is reduced to half of its original diameter. If the initial resistance of the wire were 10Ω, its new resistance would be

A. 40 ohm

B. 80 ohm

C. 120 ohm

D. 160 ohm

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81. A wire of radius r has resistance R . If it is stretched to the wre of r/2 radius, then the resistance becomes

A. 2 R

B. 4 R

C. 16 R

D. zero

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82. An electric bulb marked 40W-200 V is used in a circuit of supply voltage 100V. Now its power is

A. 100 W

B. 40 W

C. 20 W

D. 10 W

Watch Video Solution

83. Ten identical wires each having a resistance of 1Ω are connected in parallel. The combination will have a resistance of

A. 10 ohm

B. 1 ohm

C. 0.1 ohm

D. 0.01 ohm

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84. Two resistance filaments of same length are connected first in series and then in parallel. Find the ratio of power dissipated in both cases assuming that equal current flows in the main circuit.

A. $1:4$

B. $4:1$

C. $1:2$

D. $2:1$

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85. The internal resistance of a cell of e.m.f. 2 V is 0.1Ω. It is connected to a resistance of 3.9Ω. The voltage across the cell will be

A. 0.5 V

B. 1.9 V

C. 1.95 V

D. 2 V

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86. Ten identical cells each of e.m.f. E and internal resistance r are connected in series to form a closed circuit. An ideal voltmeter connected across three cells, will read

A. 3 E

B. 7 E

C. 10 E

D. 13 E

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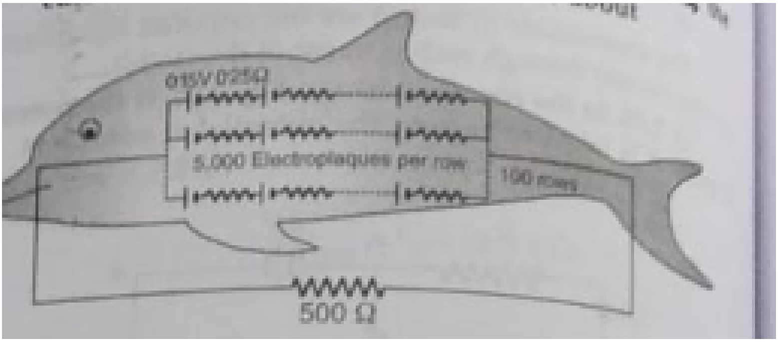
87. Eels are able to generate current with biological cells called electroplaques. The electroplaques in an eel are arranged in 100 rows, each row stretching horizontally along the body of the fish containing 5000 electroplaques. The arrangment is suggestively shown below. Each electroplaques has an emf of 0.15 V and internal resistance of 0.25 Ω

The water surrounding theeel completes a cricuit be ween the head and its tail. If the water surrounding it has a resistance of 500Ω, the current an eel can produce in water is about



A. 1.5 A

B. 3.0 A

C. 15 mA

D. 30 mA

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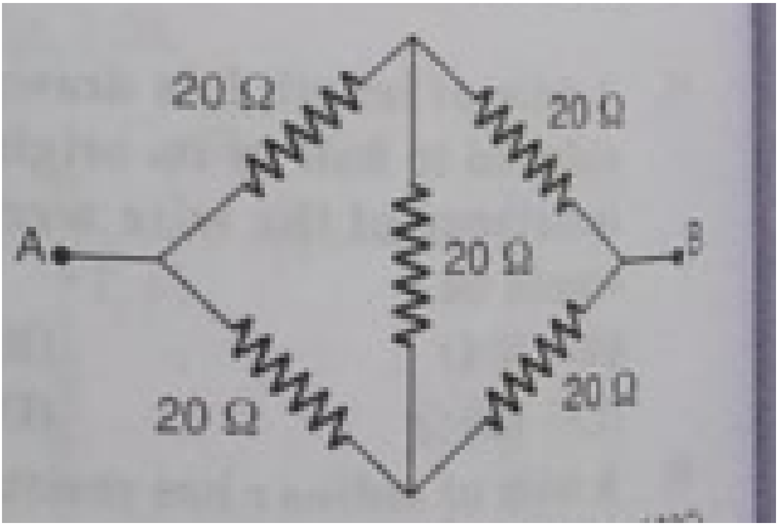
88. What is the equivalent resistance between A and B in the given figure



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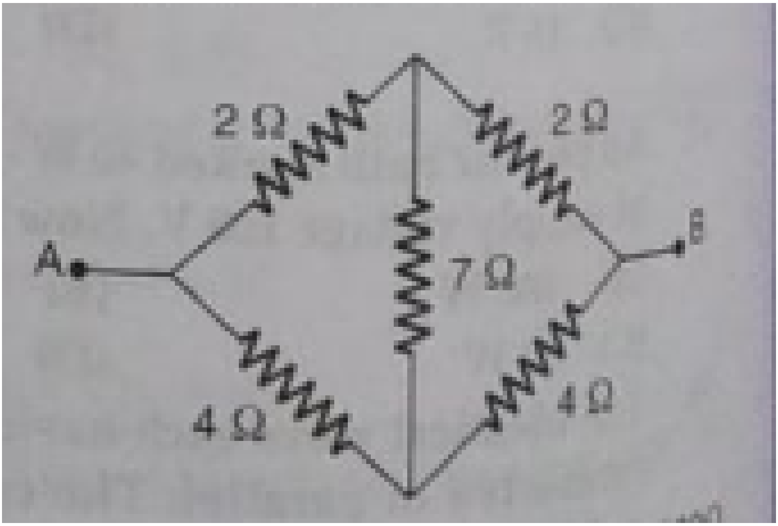
89. The equivalent resistance between A and B of the given figure circuit is



A. 13/12 ohm

B. 8/3 ohm

C. 8 ohm

D. 4/3 ohm

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90. The instrument for the accurate measurement of the e.m.f. of a cell is:

A. a slide wire of bridge

B. an ammeter

C. a potentiometer

D. a voltmeter

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91. When a balance point is obtained in a potentiometer for finding the internal resistance of a cell, the current through the potentiometer wire is due to

A. the cell, whose internal resistance is to be found

B. the auxiliary battery

C. both cell and the auxiliary battery

D. neither the cell nor the battery

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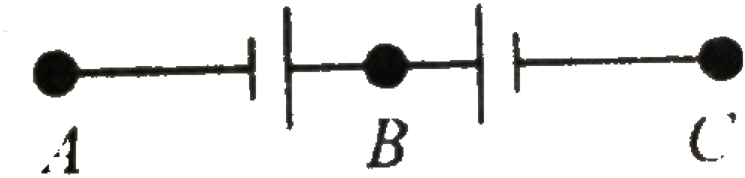
92. A potentiometer is connected between A and B and the balance point is obtained at 203.6cm. When the end of the potentiometer connected to B is shifted to C, then the balance point is obtained at 24.6cm. If now the potentiometer be connected between B and C, the balance point will



A. 179.0 cm

B. 197.2 cm

C. 212.0 cm

D. 228.0 cm

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93. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : Current and time both have direction as well as magnitude but still are not considered vector

Reason : They do not follows laws of vector addition

A. A

B. B

C. C

D. D

Watch Video Solution

94. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

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the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : the drift velocity of electrons in a conductor is very small, when its two ends are connected to a battery.

Reason : It is because, as the electrons accelerated , they get scattered or defleted on suffering collisions against the positive ions in the conductor

A. A

B. B

C. C

D. D

Watch Video Solution

95. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

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Assertion :the electric bulb glows immedicately, when switched on. Reason : The drift velocity of electrons in a metallic wire is very high.

A. A

B. B

C. C

D. D

Watch Video Solution

96. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the

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(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are are false

Assertion : Insulators do not allow flow current through themselves. Reason: They have no free charge carriers.

A. A

B. B

C. C

D. D

Watch Video Solution

97. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a

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(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : The resistivity of a semiconductor increases with temperature Reason: The atoms of a semiconductor vibrate with larger amplitude at higher temperatures there by increasing its resistivity

A. A

B. B

C. C

D. D

Watch Video Solution

98. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : Copper wires are used as the connecting wires in an electical circuit, as its resisitvity is low and condutivity is high. Reason: Copper can be easily drawn into wires

A. A

B. B

C. C

D. D

Watch Video Solution

99. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but

reason if false, (D) if both assertion and reason are false

Assertion : Manganin or constantan is used for making standard resistances. Reason : Their resistivity is high, while temperature coefficient is low.

A. A

B. B

C. C

D. D

Watch Video Solution

100. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of

the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : The resistance of a wire varies inversely as its area of cross-section. Reason : The resistance of a wire varies inversely as its radius.

A. A

B. B

C. C

D. D

Watch Video Solution

101. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are

true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : A cirlar wire has resistane R. Then its resistance between two diametrically opposite points will be R/4 . Reason : The two semicircular portions, each having resistance R/2, form a parallel combination

A. A

B. B

C. C

D. D

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102. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and

reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : The resistors are connected in parallel, when resistance in the circuit is to be decreased. Reason : On connecting the resistors in parallel, the potential difference across a resistor is proportional to its resistance.

A. A

B. B

C. C

D. D

103. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a

question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : An electric bulb becomes dim, when the electric heater in parallel circuit is switched on. Reason : Dimness decreases after sometime.

A. A

B. B

C. C

D. D

Watch Video Solution

104. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : A large dry cell has higher e.m.f.

Reason :The e.m.f. of a dry cell is proportional to its size.

A. A

B. B

C. C

D. D

Watch Video Solution

105. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : The e.m.f. of a cell is always greater than the terminal potential difference between its two pole. Reason: There is always some potential drop across the internal resistance of the cell.

A. A

B. B

C. C

D. D

Watch Video Solution

106. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of

the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : In a simple battery circuit, the point of the lowest potential is negative terminal of the battery. Reason : The current flows towards the point of the higher otential, as it does in such a circuit from the negative to the positive terminal.

A. A

B. B

C. C

D. D

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107. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and

reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : In a simple battery circuit, the point of the lowest potential is positive terminal of the battery. Reason : The current flows towards the point of the higher potential, as it does in such a circuit form the negative to the positive terminal.

A. A

B. B

C. C

D. D

Watch Video Solution

108. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a

question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : Electric appliances with metallic body e.g., heater,s presses etc, have three pin connections, whereas an electric bulb has two pin connection. Reason : Three pin connections reduce heating of connecting cables.

A. A

B. B

C. C

D. D

Watch Video Solution

109. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : A domestic electrical appliance, working on a three pin, will continue working even if the top pin in removed. Reason : The third pin is used only as a safety device.

A. A

B. B

C. C

D. D

Watch Video Solution

110. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but

reason if false, (D) if both assertion and reason are false

Assertion : Kirchhoff's first law for electrical circuits acounts for conservation of charge. While the second law conservation of energy.

Reason : Because charge ha discrete nature and the current supplied by the battery in the circuit comes at the expense of chemical energy stored in it.

A. A

B. B

C. C

D. D

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111. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and

reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : In a metre bridge experiment, the balance pont should be btained near the 50 cm mark. Reason : The instrument is based on Wheatstone bridge and it is most sensitive, when the ratio arms are nearly equal.

A. A

B. B

C. C

D. D

Watch Video Solution

112. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the

correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are are false

Assertion : A potentioeter is preferred over a voltmeter to measure potential difference.

Reason : Potentiometer is based on Wheatstone bridge.

A. A

B. B

C. C

D. D

Watch Video Solution

113. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a

question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : To compare the e.m.fs of two cells using a potentiometer, the e.m.f. of the cell in auxillary circuit must be greater than the e.m.fs of both the cells. Reason : The area of cross-section of the wire should be uniform and current through the wire should always be kept constant.

A. A

B. B

C. C

D. D

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114. In a hydrogen atube it is observed that through a given cross-section 3.13×10^{15} electrons per sec, moving from right to left and 3.12×10^{15} protons per sec are moving from left to right. The electric current in the discharge tube ad its direction is

A. 1 mA towards right

B. 1 mA towards left

C. 2 mA towards right

D. 2 mA towards left

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115. When current flows in a conductor, then the ratio of the intensity of electric field E at any point within the condutor and the current density at a point is called

A. resistance

B. conductance

C. specific resistance

D. inductance

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116. Ohm's law is not obeyed by:

A. electrolytes

B. discharge tubes

C. vaccum tubes

D. all of these

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117. Fill ups

The S.I unit of resistance is...............and is denoted by............... .

A. volt x ampere

B. $vo <^2 \times ampere$

C. volt/ampere

D. ampere/volt

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118. What is unit of resistance? Define it.

A. $10^{9} e. m. u$

B. $10^{15} e. m. u$

C. $10^{19} e. m. u$

D. none of these

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119. A solenoid is at potential difference of 60 V. current flowing through it is 15 A, then resistance solenoid will be

A. 4 ohm

B. 8 ohm

C. 0.25 ohm

D. 2 ohm

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120. The resistance of a discharge tube is

A. ohmic

B. non-ohmic

C. zero

D. both (A) and (B)

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121. A nichrome wire 1 m long and $1mm^2$ in cross-section area drawn 4A at 2 V. The resistivity of nichrome

A. $1.0 \times 10^{-7} \Omega m$

B. $2.0 \times 10^{-7} \Omega m$

C. $4.0 \times 106 - 7 \Omega m$

D. $5.0 \times 10^{-7} \Omega m$

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122. Reciprocal of resistance is called conductance.(True/False)

A. conductance

B. specific esistance

C. voltage

D. current

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123. Which of the following physical quantities possesses the dimensions of $M^{-1}L^{-3}T^{3}A^{2}$?

A. resistance

B. resistivity

C. electrical conductivity

D. electromotive force

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124. The filament of electric bulb is made of

....

A. merury

B. copper

C. tungsten

D. none of these

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125. The length of a wire is doubled. Its conductance will

A. remain unchanged

B. be quadupled

C. be doubled

D. be halved

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126. The length of a wire is doubled by pulling it.Find the new resistance.

A. 2 R

B. 4 R

C. R

D. 0.25 R

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127. Which of the following has negative temperature coefficient of resistance?

A. Germanium

B. Iron

C. Aluminium

D. Copper

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128. Which of the following has a negative temperature coefficient?

A. C

B. Fe

C. Mn

D. Ag

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129. A wire has a resistance of $3.1 \Omega at 30^{\circ} C$ and a resistance of $4.5 \Omega at 100^{\circ} C$. The temperature coefficient of the wire is equal to

A. $0.0012^{\circ} C^{-1}$

B. $0.0024^{\circ} C^{-1}$

C. $0.0032^{\circ} C^{-1}$

D. $0.0064^{\circ} C^{-1}$

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130. A wire has a resistance of 3.1Ω at $30^{\circ}C$ and a resistance of 4.5Ω at $100^{\circ}C$. The temperature coefficient of the wire is equal to

A. $0.0012^{\circ}C^{-1}$

B. $0.0024^{\circ}C^{-1}$

C. $0.0032^{\circ}C^{-1}$

D. $0.0064^{\circ}C^{-1}$

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131. Three bulbs of electric powers 40 W, 60 W and 100 W are connected in series with a 220 V supply. Which bulb has the minimum resistance?

A. 40 W

B. 60 W

C. 100 W

D. all the bulbs have the same resistance

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132. A 30 V . 90 W lamp is to be operated on a 120 V d.e. line for proper glow, a resistor of ..Ω should be connected in series with the lamp

A. 10

B. 20

C. 30

D. 40

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133. If a power of 100 W is being supplied across a potential difference of 200 V, current flowing is

A. 0.5 A

B. 0.041666666666667

C. 2A

D. 20A

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134. A 10Ω electric heater operates on a 110 V line. The rate at which it develops heat (in watt) will be

A. 670

B. 810

C. 1210

D. 1310

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135. On 220 V supply, a heater heats a volume of water in 5 minutes time. On the supply of 110 V, the same heater will heat the same volume of water in

A. 5 minutes

B. 8 minutes

C. 10 minutes

D. 20 minutes

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136. Two heater coils separately take 10 minutes and 5 minutes to boil a certain amount of water.Find the time taken by both the coils connected in series to boil the same amount of water.

A. 7.5 min

B. 15 min

C. 20 min

D. 25 min

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137. Five equal resistors, when connected in seires, dissipated 5 W power, if they are conneted in parallel, the power dissipated will be

A. 25 W

B. 50 W

C. 100 W

D. 125 W

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138. If a wire of resistance 20Ω is overed with ice and a voltage of 210 V is applied across the wires, then the rate of melting of ice is

A. $6.6gs^{-1}$

B. $4.2gs^{-1}$

C. $2.1gs^{-1}$

D. $1.1gs^{-1}$

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139. A wire is cut into 4 pieces, which are put together by sides to obtain one conductor. If the orginal resistance of wire was R, the resistance of the bundle will be

A. R/4

B. R/8

C. R/16

D. R/32

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140. A student has 10 resistors each of resistance r, From the given resistors, the minimum resistance made by him is

A. 10 r

B. r/10

C. r/100

D. r/5

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141. Which of the following is a secondary cell?

A. Voltaic cell

B. Daniel cell

C. Leclanche cell

D. Edison cell

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142. The internal resistance of a cell is the resistance of

A. material used in the cell

B. electrolyte used in the cell

C. electrodes of the cell

D. vessel of the cell

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143. The internal resistance of a cell of e.m.f. 2 V is 0.1Ω. It is connected to a resistance of 3.9Ω. The voltage across the cell will be

A. 0.52 V

B. 1.68 V

C. 1.95 V

D. 2.71 V

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144. A battery of e.m.f. 10V and internal resistance 3Ω is connected to a resistor. If the current in the circuit is 0.5 A, What is the resistance of the resistor? What is the terminal voltage of the battery when the circuit is closed?

A. 0 V

B. 1.5V

C. 8.5 V

D. 10 V

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145. The potential difference across the terminals of a battery is 50 V when 11 A is drawn and 60V when 1A is drawn . The emf and the internal resistance of the battery are

A. 61 V, 1 ohm

B. 62 V, 2 ohm

C. 63 V, 1 ohm

D. 64 V, 2 ohm

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146. The terminal voltage of a cell emf E on short circuiting will be

A. E

B. E/2

C. 2E

D. zero

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147. For driving current of 2A for 6 min in a circuit, 1,000 J of work is to be done. The e.m.f. of the source is

A. 1.38 V

B. 1.68 V

C. 2.03 V

D. 3.10 V

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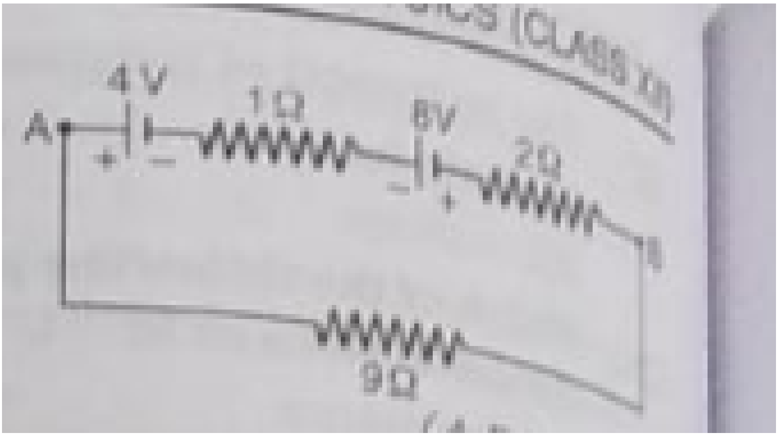
148. Two batteries of e.m.f. 4V and 8V with internal resistances 1Ω and 2Ω are connected in a circuit with a resistance of9Ω as shown in figure. The current and potential difference between the points A and B



A. 3 A and 3 V

B. 1 A and 6 V

C. 1 A and 9 V

D. 1 A and 12 V

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149. To draw maximum current from a combination of cells, how should the cells be grouped?

A. Series

B. Parallel

C. Mixed

D. Depends upon the relative values of external and internal resistance.

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150. Current provided by a battery is maximum, when

A. internal resistance is equal to external resistance

B. internal resistance is greater than external resistance

C. internal resistance is less than external resistance

D. none of these

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151. kirchoff's first and second laws are respectively based on law of conservation.

A. energy and charge

B. charge and energy

C. mass and charge

D. none of these

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152. The sensitivity of the potentiometer can be increased by

A. increasing the length of potentiometer wire

B. decreasing the length of poteniometer wire

C. increasing the e.m.f. of primary cell

D. increasing the potential gradient.

Watch Video Solution

153. The potentiometer consists of a wire of length 4 m and resistance of 10Ω. It is connected to a cell of e.m.f. 2 V. The potential difference per unti length of the wire will be

A. $0.5 Vm^{-1}$

B. $2 Vm^{-1}$

C. $5 Vm^{-1}$

D. $10 Vm^{-1}$

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154. In a potentiometer of one metre length, an unknown emf voltage source is balanced at 60 cm length of potentiometer wire, while a 3 volt battery is balanced at 45 cm length. The the emf of the unknown voltage source is.

A. 2.25 V

B. 3V

C. 4V

D. 4.5 V

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155. A 2Ω resistor is connected in series with $R\Omega$ resistor. This combination is connected across a cell. When the potential difference across 2Ω resistor is balanced on potentiometer wire, null point is obtained at length of 300cm. When the same procedure is repeated for $R\Omega$ resistor, null point is obtained at length 350cm, value of R is

A. 2.33 ohm

B. 3.53 ohm

C. 4.6 ohm

D. 5 ohm

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156. In Bohr's model of hydrogen atom, the electron moves around the nucleus in a circular orbit of radius 5×10^{-11} m. Its time period is 1.5×10^{-16}s. The current associated with the electron motion is

A. zero

B. $1.6 \times 10^{-19} A$

C. 0.17A

D. $1.07 \times 10^{-3} A$

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157. The potential difference applied to an X-ray tube is 5 kV and the current through it is 3.2 mA. Then the number of electrons striking the target per second is

A. 2×10^{16}

B. 5×10^{6}

C. 1×10^{17}

D. 4×10^{15}

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158. A strip of copper another of germanium are cooled from room temperature to 80 K. The resistance of

A. copper increases, germanium decreases

B. copper decreases and germanium increases

C. each of them increases

D. each of them decreases.

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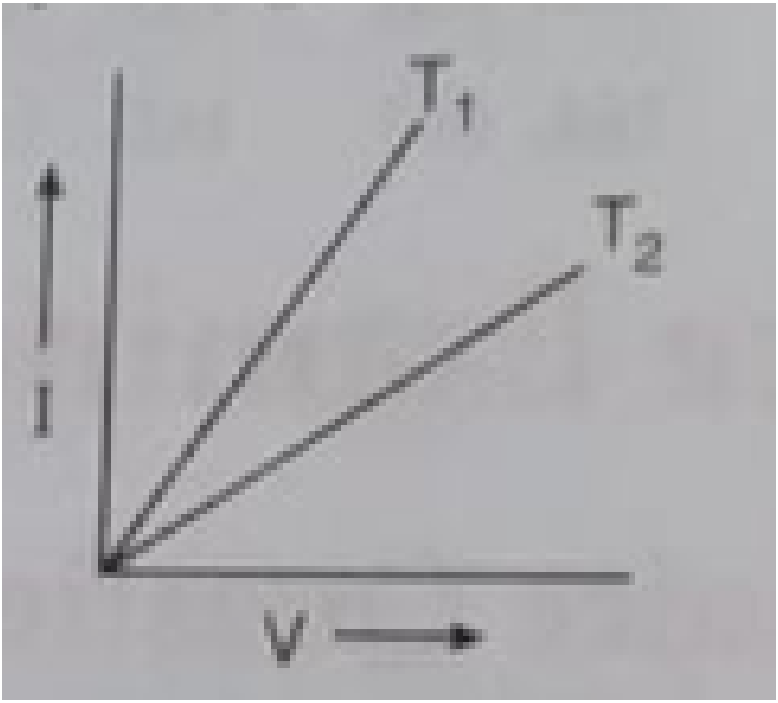
159. The current I and voltage V curves for a given metallic wire at two different temperatures T_1 and T_2 are shown in the figure. Then ,



A. $T_1 > T_2$

B. $T_1 < T_2$

C. $T_1 = T_2$

D. $T_1 = 2T_2$

Answer: $T_1 = 2T_2$

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160. The temperature coefficient of resistance of a wire is 0.00125 per degree celsius. At

300K, its resistance is 1 ohm. This resistance of the wire will be 2 ohm at.

A. 1,154 k

B. 1,100 k

C. 1,400 k

D. 1,127 k

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161. How many calories of heat will approximately be developed in a 210 W electric bulb in 5 minutes

A. 15000

B. 1050

C. 63000

D. 80000

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162. A 25 W and a 100 W bulbs are joined in parallel and connected to A.C. mains. Which will glow brighter?

A. 25 W bulb

B. 100 W bulb

C. First 25 W bulb and then 100 W bulb

D. Both will glow with same brightness.

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163. The heating element of a heater should be made with a material, which should have

A. high resistivity and high melting point

B. high resistivity and low melting point

C. low resistivity and low melting point

D. low resistivity and high melting point.

Watch Video Solution

164. Find the ratio of resistances when two heater wires of equal lengths are first connected is series and then in parallel.

A. $2:1$

B. $1:2$

C. $4:1$

D. $1:4$

Watch Video Solution

165. If two bulbs of wattage 25 and 100 respectively each rated at 220 volt are connected in series with the supply of 440 volt, bulb will get fused?

A. 100-watt bulb

B. 25-watt blub

C. both of them

D. none of these

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166. A constant voltage is applied between the two ends of a uniform metallic wire. Some heat is developed in it. The heat developed is doubled, if

A. both the length and radius of wire are halved

B. both length and radius of wire are doubled

C. the radius of wire is doubled

D. the length of the wrie is doubled

167. What is immaterial for an electric fuse?

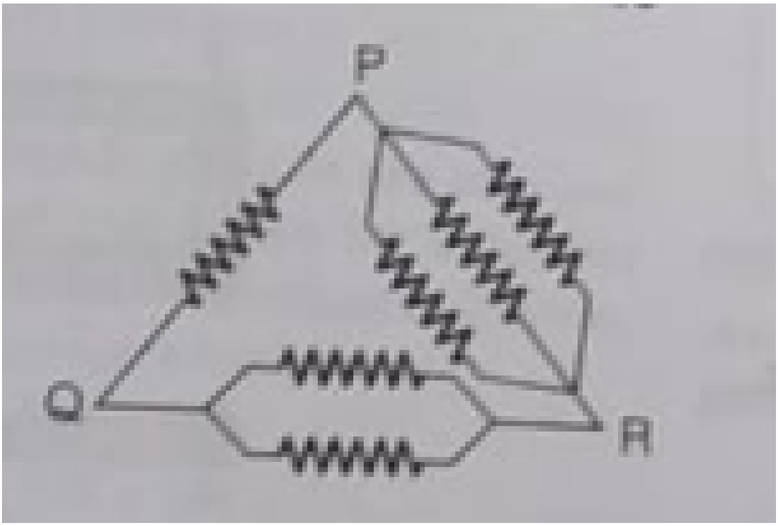
A. Its specific resistance

B. Current flowing through it

C. Its length

D. Its radius

168. Six equal resistances are connected between points P,Q and R as shown in the figure. Then, the net resistance will be maximum between



A. P and Q

B. Q and R

C. P and R

D. any two points.

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169. A wire of length L and 3 identical cells of negligible internal resistance are connected in series. Due to the current, the temperature of the wire is raised by DeltaT in a time t. A number N of similar cells is now connected in series with a wire of the same material and cross-section but of length 2L. The temperature of the wire is raised by the same amount DeltaT in the same time t. the value of N is

A. 4

B. 6

C. 8

D. 9

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170. A cell of e.m.f E is connected across a resistance r. The potential differene between the terminals of the cell is found to be V. The internal resistance fo the cell must be

A. $\frac{2(E-V)V}{r}$

B. $\frac{2(E-V)r}{E}$

C. $\frac{(E-V)r}{V}$

D. $(E-V)r$

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171. A current of 2.0 A passes through a cell of emf 1.5 V having internal resistance of 0.15 Ω. The potential difference (measured in volt) across both the terminals of the cell is

A. 1.35

B. 1.5

C. 1

D. 1.2

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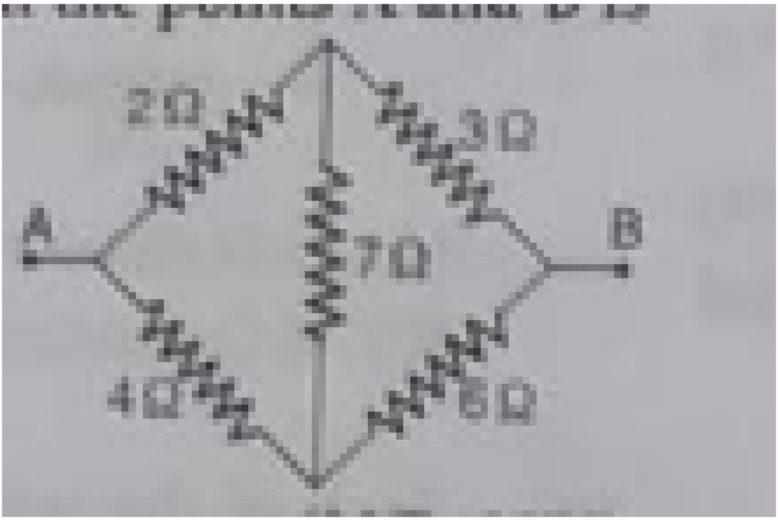
172. Five resistance are connected as shown in the figure. The effective resistance between the points A and B is



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173. One ampere is equivalent to

A. 1 coulomb second

B. 1 coulomb $\sec ond^{-1}$

C. 1 joule second

D. 1 joule $\sec ond^{-1}$

Watch Video Solution

174. Assuming that the charge of an electron is $1.6 \times 10^{-19} C$, the number of electrons passing through a section of wire per second, when the wire carries a current of 1 A is

A. 0.625×10^{19}

B. 1.6×10^{-19}

C. 1.6×10^{19}

D. 0.625×10^{17}

Watch Video Solution

175. The specific resistance ofo a wire 1.1 m long, 0.4 mm in diameter and haivng a total resistance of 4.2 ohm will be

A. $4.97 \times 10^5 \Omega m$

B. $48 \times 10^{-8} \Omega m$

C. $48 \times 10^4 \Omega m$

D. none of these

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176. Two copper wires, one of length 1 m and the other of length 9 m, are found to have the same resistance. Their diameters are in the ratio

A. $3:1$

B. $1:9$

C. $9:1$

D. $1:3$

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177. A metallic wire of resistane of 40Ω is stretched to twice its length. Its new resistance would be approximately.

A. 20 ohm

B. 80 ohm

C. 120 ohm

D. 160 ohm

Watch Video Solution

178. When a piece of aluminium wire of finite length is drawn through a series of dies to reduce it diameter to half tits original value, its resistance will become

A. two times

B. four times

C. eight times

D. sixteen times

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179. A certain piece of copper is to be shaped into a wire of minimum resistance. Its length and diameter should be

A. L,D

B. $2L, D/\sqrt{2}$

C. L/2,2D

D. $L/2, \sqrt{2}D$

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180. A uniform wire of resistance R is uniformly compressed along it s length, until its radius becomes n times the original radius. Now, the resistance of the wire becomes

A. R/n

B. nR

C. R/n^2

D. R/n^4

Watch Video Solution

181. The appropriate material to be used in the construction of resistance boxes out of the following is

A. copper

B. iron

C. manganin

D. aluminium

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182. Why are alloys used for making standard resistance coils?

A. Molybdenum

B. Manganese

C. Manganin

D. Magnesium

Watch Video Solution

183. If the resistivity of an alloy is ρ' and that of constituent metals is ρ, then

A. $\rho = \rho$

B. $\rho' < \rho$

C. $\rho' > \rho$

D. there is no simple relaxation between ρ' and ρ

Watch Video Solution

184. Carbon resistor used in electronic circuit are marked for their resistance value and tolerance by a colour scheme. A given resistor has a colour scheme brown, red, green and gold. It value is Ohms

A. $12 \times 10^5 \pm 5\,\%$

B. $1.0 \times 10^6 \pm 10\,\%$

C. $1.0 \times 10^6 \pm 5\,\%$

D. $1.0 \times 10^3 \pm 5\,\%$

Watch Video Solution

185. When a current flows in a conductor, the order of magnitude of drift velocity of electrons thorugh it is

A. $10^{-7} cms^{-1}$

B. $10^{-2} cms^{-1}$

C. $10^{4} mms^{-1}$

D. $0.5 mms^{-1}$

Watch Video Solution

186. The ratio of drift velocity to that of the thermal velocity of an electron in a condutor is

A. 10^{-6}

B. 10^{-8}

C. 10^{-5}

D. 10^{-10}

Watch Video Solution

187. Assume that each atom in a copper wire contributes one free electron. Estimate the number of free electrons in a copper wire having a mass of 6.4g (take the atomic weight of copper to be 64g mol^{-1}).

Watch Video Solution

188. Resistance of a conductor increases with the rise of temperature, because.

A. relaxation time dereases

B. relaxation time increases

C. electron density decreases

D. electron density inreases

Watch Video Solution

189. A piece of germanium and another of copper are stated to experience a rise in temperature. The resistance of

A. each of them increases

B. each o them decreases

C. copper increases and germanium decreases

D. copper decreases and germanium increases.

Watch Video Solution

190. The resistance of a conductor of a conductor is $5\Omega at 50^\circ C$, and 6Ωat $100^\circ C$.

What is its resistance at $0^\circ C$?

A. 1 ohm

B. 2 ohm

C. 3 ohm

D. 4 ohm

Watch Video Solution

191. Kilowatt is the unit of :

A. energy

B. electric current

C. electric charge

D. power

Watch Video Solution

192. Watt-hour meter measures

A. electrical energy

B. current

C. voltage

D. power

Watch Video Solution

193. In an ordinary electric heater, if the length of the coil is reduced to half, a given quantity of water will boil in

A. more time

B. less time

C. same time

D. a time, which depends upon the resistivity of the wire.

Watch Video Solution

194. A 500 W heating unit is designed to operate from a 115 V line. If the line voltage drops to 110, the percentage drop in heat output will be

A. 10.2%

B. 8.1%

C. 8.5%

D. 7.6%

Watch Video Solution

195. If R_1 and R_2 are respectively the filament resistances of a 200 W bulb and a 100 W bulb designed to operate on the same voltage, then

A. $R_1 = 2R_2$

B. $R_2 = 2R_1$

C. $R_2 = 4R_1$

D. $R_1 = 4R_2$

Watch Video Solution

196. Of the two bulbs in ahouse, one glows brighter than the other. Which of the two has a larger resistance?

A. The brighter bulb

B. The dim bulb

C. Both have the same resistances

D. The brightness does not depend upon the resistance

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197. The product of volt and coulomb is joule. (ii) The produce of volt and ampere is joule per second. (iii) The product of volt and watt is horse power. (iv) Watt-hour can be measured in terms of eletron-volt

A. All the four are correct

B. (i) and (iii) are correct

C. (iii) and (iv) are correct

D. (i),(ii) and (iv) are correct.

Watch Video Solution

198. Two heating coils, one of fine wire and the other of thick wire of the same material and of the same length are connected in series and in parallel. Which of the following statement is correct ?

A. In series, fine wire, and in parallel, thick wire will liberate more energy.

B. In series, fine wire will liberate less energy , while in parallel thick wire will liberate more energy

C. In series, thick wire will liberate more energy, while in parallel it will liberate less energy

D. Both will liberate equal energy.

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199. Household electrical appliances are not usually connected in series, because

A. switching off an appliance would switch off the rest

B. a fuse would blow, as soon as one appliance is used

C. power consumption would be very much greater

D. the appliances would get damaged due to high current.

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200. 40 electric bulb are connected in series across a 220 V supply. After one bulb is fused the remaining 39 are connected again in series across the same supply. The illumination will be

A. equal in both the cases

B. more with 40 bulbs than with 39

C. more with 39 bulbs than with 40.

D. in the ratio $40^{\circ} : 39^{\circ}$

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201. Two resistance r_1 and r_2 (r1< r2) are joined in parallel. The equialent resistane R is such that

A. $r_2 < R < r_1 + r_2$

B. $R > r_1 + r_2$

C. $R < r_1$

D. $r_1 < R < r_2$

Watch Video Solution

202. A metal wire of resistance R is cut into three equal pieces that are then connected side by side to form a new wire, the length of which is equal to one third of the original length. The resistance of this new wire is

A. R

B. 3 R

C. R/9

D. R/3

Watch Video Solution

203. n equal resistors are first connected in series and then connected in parallel. What is the ratio of the maximum to the minimum resistance?

A. n

B. $1/n^2$

C. n^2

D. 1/n

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204. n conductors, each of resistance r, when connected in parallel, give an effetive resistance R. What will be resistance, if they are connected in series?

A. $n^2 R$

B. R/n^2

C. R^2/n

D. n^2/R

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205. When an unknown resistance and a resistance of $4\Omega$are connected in the left and right gaps of a meterbridge, the balance point is obtained at 50 cm. the shift in the balance point if a 4Ωresistance is now connected in parallel to the resistance in the right gap is

A. 16.7

B. 4

C. 5

D. 6

Watch Video Solution

206. Four resistance R_1, R_2, R_3 and R_4 are connected in parallel. The resultant resistance R is

A. eqal to sum of the four resistance

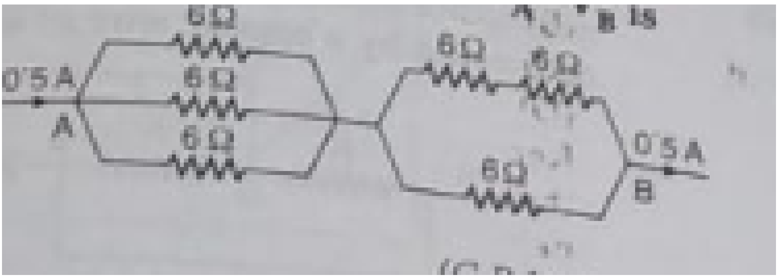
B. greater than the sum of the four resistances

C. less than the sum of the four resistives

D. less than any of four resistance

Watch Video Solution

207. Resistance of 6 ohm each are connected in the manner shown in the given figure. With the current 0.5 ampere as show in figure. The potential differnce $V_A - V_B$ is



A. 3.0 volt

B. 3.6 volt

C. 6.0 volt

D. 7.2 volt

Watch Video Solution

208. Three resistors of 4 ohms, 6 ohms, and 12 ohms are connected in parallel, and the combination is connected in a series with a 4

V battery having an internal resistance of 2 ohms. What is the battery's current?

A. 0.5 A

B. 1A

C. 2A

D. 10A

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209. A primary cell has an e.m.f. 1.5 volt. When short circuited, it gives a current of 3 ampere. The internal resistance of the cell is

A. 4.5 ohm

B. 2 ohm

C. 0.5 ohm

D. 1/4.5 ohm

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210. A cell supplies a current of 0.3 A through a resistance of 7 ohm and a current of 0.9 A through a resistance of 2 ohm. The internal resistance of the cell is

A. 2.0 ohm

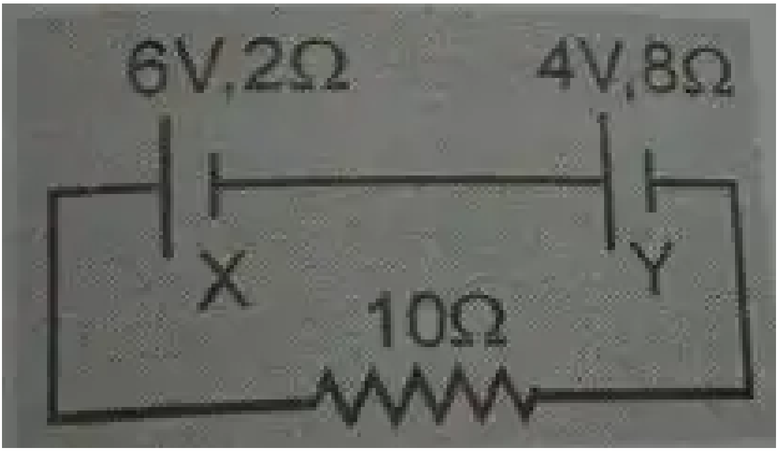
B. 1.2 ohm

C. 1.0 ohm

D. 0.5 ohm

Watch Video Solution

211. Two cells X and Y are connected to a resistance of 10Ω as shown in the figure.if the polarity of the cell Y is reversed, then the terminal voltage of the cell Y will be



A. 2.8 V

B. 3.2 V

C. 4.8 V

D. 5.8 V

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212. n cells of e.m.f E and internal resistance r are connected in series with an external resistance R. the current will increase n times that of a single cell, if

A. R is very large as comopared to the internal resistance

B. R is very small as compared to the internal resistance

C. R is equal to total internal resistance

D. regardless of relative magnitudes of R and r.

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213. To get maximum current in a resistance of 3 ohm one can use n rows of m cells

connected in parallel. If the total no. of cells is 24 and the internal resistance of a cell is 0.5

A. m = 12, n = 2

B. m = 8, n = 3

C. m = 6, n = 4

D. m = 2, n = 12

Watch Video Solution

214. Four identical cells of emf epsilon and internal resistance r are to be connected in series. Suppose, if one of the cell is connected wrongly, then the equivalent emf and effective internal resistance of the combination is

A. 2E and 4r

B. 2E and 2r

C. 4E and 4r

D. 4E and 2r

Watch Video Solution

215. A small sphere carries a charge of $20\mu C$. The energy density of electric field at a point 25 cm away from the centre of the sphere in air is

A. $0.367J/m^3$

B. $3.67J/m^3$

C. $36.7J/m^3$

D. $3.76J/m^3$

Watch Video Solution

216. Masses of three wires of a metal are in the ratio 1:2:3 and their lengths in the ratio 3:2:1. Electrical resistance of these wires will be in the ratio of

A. 1:4:9

B. 9:4:1

C. 1:2:3

D. 27:6:1

Watch Video Solution

217. The metallic conductor is at temperature θ_1. The temperature of metallic conductor is increased to θ_2. How will the product of its resistivity and conductivity change?

A. increases for both

B. decreases

C. may increase or decrease

D. remains constant.

Watch Video Solution

218. A wire of resistance 8Ω is bent in the form of a circle. What is the effective resistance between the ends of a diameter of this circle.

A. 1 ohm

B. 2 ohm

C. 8 ohm

D. 16 ohm

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219. Which of the following quantities do not change, when a resistor is heated by passing current through it?

A. Resistance

B. resistivity

C. Drift velocity

D. Number of free electrons.

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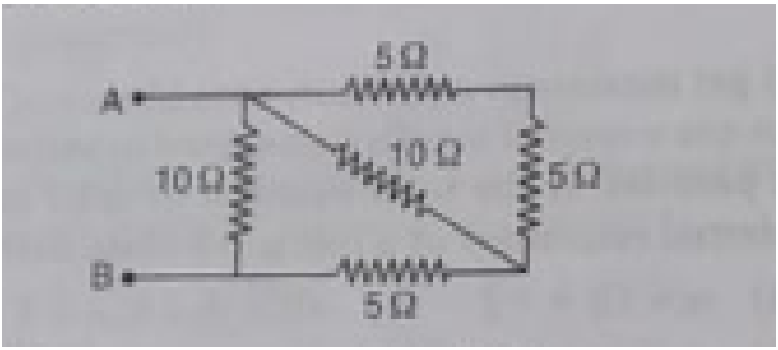
220. The effective resistance between points A and B in the given circuit A is



A. 25 ohm

B. 35 ohm

C. 10 ohm

D. 5 ohm

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221. Given three resistors of different values. How many different combination of these three resistance can be made ?

A. Six

B. five

C. four

D. eight

Watch Video Solution

222. Given three equal resistors. How many different combination of these three resistances can be made?

A. Three

B. Four

C. Five

D. Six

Watch Video Solution

223. A technician has only two resistance coils. By using them in series or in parallel he is able to obtain the resistance 3,4,12 and 16 ohm. The resistance of two coils are

A. 6 and 10 ohm

B. 4 and 12 ohm

C. 7 and 9 ohm

D. 5 and 12 ohm

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224. An electric cable of copper has just one wire of radius 9mm. Its resistance is 5ohm. This single copper wire of the cable is replaced by 6 different well insulated copper wires each of radius 3mm. The total resistance of the cable will now be equal to

A. 7.5 ohm

B. 45 ohm

C. 90 ohm

D. 270 ohm

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225. Two cells of 1.25 V and 0.75 are connected in parallel. The effective voltage will be

A. 0.75 V

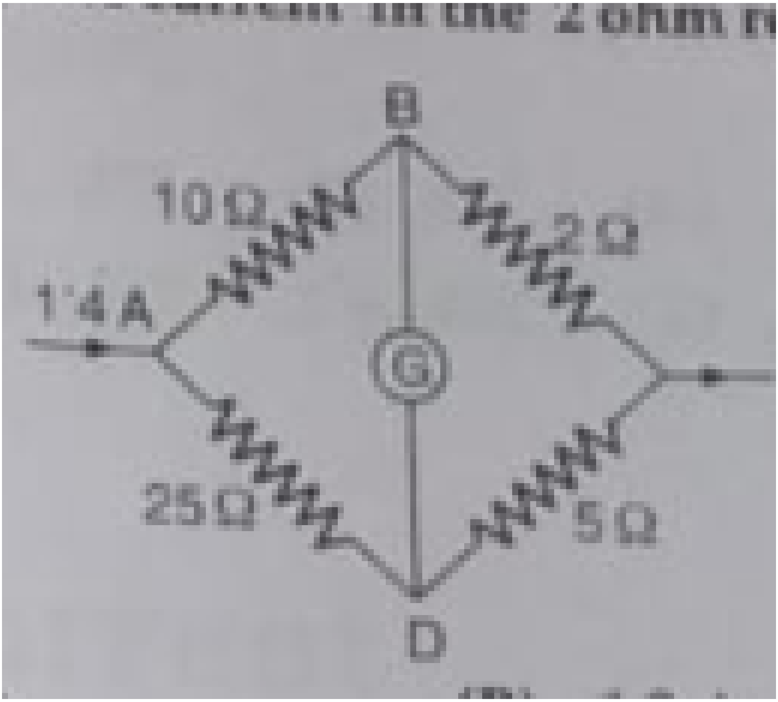
B. 1.0 V

C. 2.0 V

D. 0.50 V

Watch Video Solution

226. In the circuit shown, when galvanometer G shows no deflection, the current in the 2 ohm resistor is



A. 1.4 A

B. 1.2 A

C. 1.0 A

D. 0.4 A

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227. Two resistances are connected in the two gaps of a meter bridge. The balance point is 20 cm from the zero end. When a resistance 15Ω is connected in series with the smaller of two resistance, the null point shifts to 40 cm.

The smaller of the two resistance has the value.

A. 8

B. 9

C. 10

D. 12

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228. In an experiment to measure the internal resistance of a cell by potentiometer, it is found that the balance point is at a length of 2 m when the cell is shuntedd by a 5Ω resistance, and is at a length of 3 m when the cell is shunted by a 10 Omega resistance. The internal resistance of the cell is, then

A. 1.5Ω

B. 10Ω

C. 15Ω

D. 1Ω

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229. The magnetic field due to a current carrying loop of radius 3 cm at a point on axis at a distance of 4 cm from its centre of $54\mu T$. Then , the value of the magnetic field at the centre of the loop is

A. $250\mu T$

B. $150\mu T$

C. $125\mu T$

D. $75\mu T$

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230. If in circular coil A of radius R, current I is flowing and in another coil B of radius 2R a current 2I is flowing , then the ratio of the magnetic fields B_A and B_B, produced by them will be

A. 1

B. 2

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

D. 4

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231. A long wire carries a steady current. It is bent into a circle of one turn and the magnetic field at the centre of the coil is B. It is then bent into a circular loop of n turns. The magnetic field at the centre of the coil will be :

A. n B

B. $n^2 B$

C. 2nB

D. $2n^2 B$

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232. Two concentric coils each of radius equal to 2 pi cm are placed at right angles to each other 3 ampere and 4 ampere are the currents flowing in each coil respectively. The magnetic induction in $weber/m^2$ at the centre of the coils will be

$(\mu_0 = 4\pi \times 10^{-7} Wb/A.m)$

A. 12×10^{-15}

B. 10^{-5}

C. 5×10^{-5}

D. 7×10^{-5}

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233. A horizontal overhead power line is at a height of 4m from the ground and carries a current of 100 A from east to west. The magnetic field directly below it on the ground is $\left(\mu_0 = 4\pi \times 10^{-7} TmA^{-1}\right)$

A. 2.5×10^{-7} T northword

B. $2.5 \times 10^{-7} T southward$

C. 5.0×10^{-6} T northward

D. 5.0×10^{-6} T southward

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234. A current flows along the length of an infinitely long, straight, thin walled pipe. Then

A. the magnetic field is zero only on the axis of the pipe.

B. the magnetic field is different at different poins inside the pipe.

C. the magnetic field at any point inside the pipe is zero

D. the magnetic field at all the point inside the pipe is same, but not zero.

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235. A long straight wire of radius a carries a steady current I. the current is uniformly distributed across it cross-section. The ratio of the magnetic field at a/2 and 2a is

A. $\frac{1}{4}$

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

C. 1

D. 4

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236. A charged particle moves thorugh a uniform magnetic field perpendicular to its direction. Then

A. momentum changes, but the kinetic energy is constant

B. both momentum and the kinetic energy are not constant

C. both momentum and the kinetic energy are constant

D. kinetic energy changes, but the momentum is constant.

Watch Video Solution

237. A long solenoid has 200 turns per cm and carries a current i. The magnetic field at its centre is$6.28 \times 10^{-2} Wb/m^2$. Another long solenoid has 100 turns per cm and it carries a current i/3. The value of the magnetic fieldat its centre is

A. $1.05 \times 10^{-3} Wbm^{-2}$

B. $1.05 \times 10^{-4} Wbm^{-2}$

C. $1.05 \times 10^{-2} Wbm^{-2}$

D. $1.05 \times 10^{-5} Wbm^{-2}$

Watch Video Solution

238. A uniform electric field and a uniform magnetic field are acting along the same direction in a certain region. If an electron is projected along the direction of the fields with a certain velocity then

A. its velocity will decrease

B. its velocity will increase

C. it will turn towards right of direction of motion

D. it will turn towards left of direction of motion.

Watch Video Solution

239. In a region, steady and uniform electric and magnetic fields are present. These two fields are parallel to each other. A charged particle is released from rest in the region. The path of the particle will be

A. ellipse

B. circle

C. helix

D. straight line

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240. If electron and proton having same momenta enter normally to a magnetic field then

A. curved path of electron and proton will be same

B. they will move undeflected

C. curved path of electorn is more curved than that of proton.

D. path of proton is more curved.

Watch Video Solution

241. A particle of charge -16×10^{-18} coulomb moving with velocity $10ms^{-1}$ along the x- axis , and an electric field of magnitude $(10^4)/(m)$ is along the negative z- axis. If the charged particle continues moving along the x- axis , the magnitude of B is

A. $10^{3} Wbm^{-2}$

B. $10^{-3} Wbm^{-2}$

C. $10^{16} Wbm^{-2}$

D. $10^{5} Wbm^{-2}$

Watch Video Solution

242. The time period of a charged pawrticle undergoing a circular motion in a uniform magnetic field is independent of its

A. speed

B. mass

C. charge

D. magnetic induction

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243. Two long conductors, separated by a distance d carry current I_1 and I_2 in the same direction . They exert a force F on each other.

Now the current in one of them is increased to two times and its direction is reversed . The distance is also increased to 3d. The new value of the force between them is

A. $-2F$

B. F/3

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

D. $-\frac{F}{3}$

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244. A current is passed through a spring, then the spring will:

A. expand

B. compress

C. remain same

D. none of these

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245. An ammeter reads upto 1 ampere. Its internal resistance is 0.81 ohm. To increase the range to 10 A the value of the required shunt is

A. 0.03 ohm

B. 0.3 ohm

C. 0.9 ohm

D. 0.09 ohm

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246. If an ammeter is to be used in placed of a voltmeter, then we must connect with the ammeter

A. a low resistance in parallel

B. a high resistance in parallel

C. a high resistance in series

D. a low resistance in series

Watch Video Solution

247. A moving coil galvanometer has 150 equal divisions. Its current sensitivity is 2 divisions per millivolt. In ordre that each division reads 1 volt, the resistance in ohms needed to be connected in series with the coil will be

A. 10^3

B. 10^5

C. 99995

D. 9995

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248. The magnetic lines of force inside a bar magnet

A. are from north-pole to south-pole of the magnet

B. do not exist

C. depend upon the area of cross - section of the bar magnet

D. are from south-pole to north- pole of the magnet.

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249. A magnet needle is kept in a non-uniform magnetic field. It experiences

A. a torque but not a force

B. neither a force nor a torque

C. a force and a torque

D. a force but not a torque.

Watch Video Solution

250. A magnetic needle lying parallel to a magnetic field requires W units of work to turn through 60°. The external torque required to maintain the magnetic needle in this position is

A. $\sqrt{3}W$

B. W

C. $(\sqrt{3}/2)W$

D. 2W

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251. A thin rectangular magnet suspended freely has a period of oscillation T in a uniform magnetic field . Now it is broken in two equal parts perpendicular to magnetic axis and one place is allowed to oscillate in the same field .

If its period of oscillation is T' , then ration

(T)/(T') is

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

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

C. 2

D. $\frac{1}{4}$

252. The length of a magnet is large compared to its width and breadth. The time period of its oscillation in a vibration magnetometer is T. The magnet is cut along its length into three parts and these parts are then placed together. The time period of this combination will be

A. 2s

B. $\frac{2}{3}s$

C. $2\sqrt{3}s$

D. $2/\sqrt{3}s$

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253. The dimensions of magnetic field intensity in M,L,T and c(coulomb) is given as

A. $MT^{-2}C^{-1}$

B. MLT^{-1} ^ -1

C. $MT^{2}C^{-2}$

D. $MT^{-1}C^{-1}$

Watch Video Solution

254. Needle N_1, N_2 and N_3 are made of ferromagnetic , a paramagnetic and a diamagnetic substance respectively. A magnet when brought close to them will

A. attract N_1 strongly but repel N_2 and N_3 weakly

B. attact all three of them

C. attract N_1 and N_2 strongly but repel N_3

D. attract N_1 strongy, N_2 weakly and repel N_3 weakly.

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255. Curie temperature is the temperature above which

A. a ferromagnetic material becomes paramagnetic.

B. a paramagnetic material becomes diamagnetic.

C. a ferromagnetic material becomes diamagnetic.

D. a paramagnetic material becomes ferromagnetic.

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256. The materials suitable for making electromagnets should have

A. high retentivity and high coercivity

B. low retentivity and low coercivity

C. high retentivity and low coercivity

D. low retentivity and high coercivity.

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257. In S.I. system, magnetic permeability has units

A. weber $metre^{-1}ampere^{-1}$

B. weber metre $ampere^{-1}$

C. weber$meter^{-1}ampere^{-2}$

D. weber meter ampere.

Watch Video Solution

258. Mangetic field intensity at the centre of a coil of 50 turns, radius 0.5 m and carrying a current of 2 A is

A. $0.5 \times 10^{-5} T$

B. $1.26 \times 10^{-4} T$

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

D. $4 \times 10^{-5} T$

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259. A circular coil 'A' has a radius R and the current flowing through it is I. Another circular coil 'B' has a radius 2R and if 2I is the current flowing through it, then the magnetic fields at the centre of the circular coil are in the ratio of

A. $1:1$

B. $2:1$

C. $3:1$

D. $4:1$

Watch Video Solution

260. Two circular coils 1 and 2 are made from the same wire but the radius of the 1st coil is twice that of the 2nd coil. What is the ratio of potentail difference applied across them so that the magnetic field at their centres is the same?

A. 2

B. 3

C. 4

D. 6

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261. The magnetic field of a given length of wire carrying a current of a single turn circular coil at centre is B, then its value for two turns for the same wire when same current passing through it is

A. B/4

B. B/2

C. 2B

D. 4 B

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262. A long wire is first bent into a circular coil of one turn and then into a circular coil of smaller radius, having n identical turns. If the same current passes in both the cases, find the ratio of the magnetric fields produced at the centre in the two cases.

A. one quarter of tis value in first case

B. one half of its value in the first case

C. two times its value in first case

D. four times is value in first case.

Watch Video Solution

263. The magnetic field at a distance r from a long wire carryimg current I is 0.4 T. The magnetic field at a distance 2r is

A. 0.1 tesla

B. 0.2 tesla

C. 0.8 tesla

D. 1.6 tesla

Watch Video Solution

264. A straight wire of diameter 0.5 mm carrying a current of 1 A is replaced by another wire of 1 mm diameter carrying the same current. The strength of magnetic field far away is

A. twice the earlier value

B. one half of the earlier value

C. one quarter of the earlier value

D. same as the earlier value.

Watch Video Solution

265. Two long parallel wire P and W are both perpendicular to the plane of the paper with distance of 5 m between them . If P and W carry current of 2.5 A and 5A respectively in the same direction, then the magnetic field at a point half-way between the wires is

A. $\frac{\sqrt{3}\mu_0}{2\pi}$

B. $\frac{\mu_0}{\pi}$

C. $\frac{3\mu_0}{2\pi}$

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

Watch Video Solution

266. If a long copper rod carries a direct current, the magnetic field associated with the current will be

A. inside the pipe only outside the pipe only

B. neither inside nor outside the pipe.

C. both inside and outside the pipe.

D.

Watch Video Solution

267. A long solenoid carrying a current produces a magnetic field B along its axis. If the number of turns per cm is doubled and the current in the solenoid is halved, then the new value of the magnetic field along its axis will be

A. B

B. 2 B

C. 4 B

D. B/2

Watch Video Solution

268. When a charged particle moves perpendicular to a magnetic field, then

A. speed of the particle is changed

B. speed of the particle remains unchanged

C. acceleration of the particle remains unchanged.

D.

Watch Video Solution

269. A positively charged particle moving due east enters a region of uniform magnetic field directed vertically upwards. The particle will

A. get deflected in vertically upward direction

B. move in circuar path with an increased speed

C. move in circular path with a decreased speed

D. move in a circular path with a uniform speed.

Watch Video Solution

270. A charged particle moves with velocity $\vec{v}$ in a uniform magnetic field $\vec{B}$. The magnetic force experienced by the particle is

A. always zero

B. never zero

C. zero, if $\vec{b}$ and $\vec{v}$ are perpendicular

D. zero, if $\vec{B}$ and $\vec{v}$ are parallel.

Watch Video Solution

271. When a charged particle moving with velocity $\vec{v}$ is subjected to a magnetic field of induction $\vec{B}$, the force on it is non-zero. This implies that

A. angle between them is either zero or 180°

B. angle between them is necessarily 90°

C. angle between them can have any value other than 90°

D. angle between them can have any value other than zero and 180°

Watch Video Solution

272. The magnetic force acting on a charged particle of charge $-2\mu C$ in a magnetic field of 2 T acting y direction, when the particle velocity is $\left(2i + 3\hat{j}\right) \times 10^{6} ms^{-1}$, is

A. 4 N is Z-direction

B. 8 N in Y-direction

C. 8 N in Z-direction

D. 8 N in - Z-direction

Watch Video Solution

273. Due to earth's magnetic field, the charged cosmic rays particles

A. require greater kinetic energy to reach the equator than pole

B. requie less kinetic energy to reach the equator than pole

C. can never reach the pole

D. can never reach the equator

Watch Video Solution

274. A uniform magnetic field acts right angles to the direction of motion of electrones. As a result, the electron moves in acircular path of radius 2 cm. If the speed of electrons is doubled, then the radius of the circular path will be

A. 2.0 cm

B. 0.5 cm

C. 4.0 cm

D. 1.0 cm

Watch Video Solution

275. Under the influence of a uniform magnetic field, a charged partile is moving in a circle of radius R with constant speed v. The time period of motion

A. depends on both R and v

B. depends on v and not on R

C. depends o R and not on V

D. is independent of both R and v

Watch Video Solution

276. An electron moves in a circular orbit with a uniform speed v.It produces a magnetic field B at the centre of the circle. The radius of the circle is proportional to

A. $\sqrt{B/v}$

B. B/v

C. $\sqrt{v/B}$

D. v/B

Watch Video Solution

277. Calculate the wavelength associated with an electron moving with a velocity of $10^3 ms^{-1}$.

A. $10^{-8}m$

B. $2 \times 10^{-8}m$

C. $0.72 \times 10^{-6}m$

D. $10^{-10}m$

Watch Video Solution

278. An electron having mass m, charge q and kinetic energy E enters a uniform magnetic field B perpendicularly. Then its frequency of rotation will be

A. $\left(q\frac{B}{\pi}m\right)$

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

C. $\frac{qBE}{2\pi m}$

D. $\frac{qB}{2\pi E}$

Watch Video Solution

279. A proton and an alpha particle enter in a uniform magnetic field with the same velocity. The time period of rotation of the alpha particle wil be

A. four times that of the proton

B. two times that of the proton

C. three times that of proton

D. same as that of the proton.

Watch Video Solution

280. A deuteron of kinetic energy 50 keV is desvribing a circular orbit of radius 0.5 meter in a plane perpendicular to magnetic field $\overrightarrow{B}$. The kinetic energy of the proton that describes a circular orbit of radius 0.5 meter in the same plane with the same $\overrightarrow{B}$ is

A. 25 keV

B. 50 keV

C. 200 keV

D. 100 keV

Watch Video Solution

281. A beam of electron passes undeflected through mutually perpendicular electric and magnetic fields. If the electric field is switched off, and the same magnetic field is maintained, the electrons move

A. in an elliptical orbit

B. in a circular orbit

C. along a parabolic path

D. along a straight line.

Watch Video Solution

282. Two long parallel wires are at a distance of 1 m. Both of them carry 1A of current. The force of attraction per unit length between the two wires is

A. $2 \times 10^{-7} Nm^{-1}$

B. $2 \times 10^{-8} Nm^{-1}$

C. $5 \times 10^{-8} Nm^{-1}$

D. $5 \times 10^{-7} Nm^{-1}$

Watch Video Solution

283. Two parallel wires in free spaces are 10cm apart and each carries a current of 10A in the same direction. The force one wire exerts on the other per metre of length is

A. 2×10^{-4} N(attractive)

B. 2×10^{-7} N(attractive)

C. 2×10^{-4} N(repulsive)

D. 2×10^{-7} N(repulsive)

Watch Video Solution

284. A circular loop of area $0.01m^2$ carrying a current of 10 A, is held perpendicular to a magnetic field of intensity 0.1 T. The torque acting on the loop is

A. 0

B. 0.001

C. 0.01

D. 1.1

Watch Video Solution

285. A square current carrying loop is suspended in a uniform magnetic field acting perpendicular to the plane of the loop. If the force on one arm of the loop is $\overrightarrow{F}$, the net force on the remaining three arms of the loop is

A. $\overrightarrow{F}$

B. $-\overrightarrow{F}$

C. $3\overrightarrow{F}$

D. $-3\overrightarrow{F}$

Watch Video Solution

286. A closely wound solenoid of 2000 turns and area of cross-section $1.5 \times 10^{-4} m^2$ carries a current of 2.0 A. it suspended through its center and perpendicular to its length, allowing it to turn in a horizontal plane in a uniform magnetic field 5×10^{-2} tesla making an angle of 30° with the axis of the solenoid. The torque on the solenoid will be:

A. $3 \times 10^{-3} Nm$

B. $1.5 \times 10^{-3} Nm$

C. $1.5 \times 10^{-2} Nm$

D. $3 \times 10^{-2} Nm$

Watch Video Solution

287. To convert a galvanometer into an ammeter, we connect

A. low resistance in parallel

B. high resistance in series

C. high resistance in parallel

D. low resistance in series

Watch Video Solution

288. A galvanometer having a coil resistance of 60Ω shows full scale defection when a current of 1.0 A passes thoguth it. It can vbe convered into an ammeter to read currents up to 5.0 A by

A. by putting in paralel a resistance of 15 ohm

B. by putting in series a resistance of 15 ohm

C. by putting in parallel a resistane of 240 ohm

D. by putting in series a resistance of 240 ohm

Watch Video Solution

289. A galvanometer having a resistance of 8 ohm is shunted by a wire of resistance 2 ohm. If the total current is 1 A, the part of it passing through the shunt will be

A. 1.2 A

B. 0.8 A

C. 0.5 A

D. 0.3 A

Watch Video Solution

290. A galvanometer acting as a voltemeter will have

A. a high resistance in parallel with its coil.

B. a high resistance in sereis with its coil

C. a low resistance in parallel with its coil.

D. a low resistance in sereis with its coil

Watch Video Solution

291. To convert galvanometer into a voltmeter.

A. a high resistance is connected in parallel

B. a high resistance is connected in series

C. a low resistane is connected in parallel

D. a low resistane is connected in series

Watch Video Solution

292. A galvanometer has a a coil resistance 100 ohm and gives a full scale deflection for 30 mA current. If it is to work as a voltmeter of 30 volt rang, the resistance required to be added will be

A. 500 ohm

B. 900 ohm

C. 1,000 ohm

D. 1,800 ohm

Watch Video Solution

293. A galvanometer of resistance 50Ω is connected to a battery of 3 V along with resistance of 2950Ω in series. A full scale deflection of 30 divisions is obtained in the galvanometer. In order to reduce this deflection to 20 division the above series resistance should be

A. 4,450 ohm

B. 5,050 ohm

C. 5,550 ohm

D. 6,050 ohm

Watch Video Solution

294. A galvanometer of 50 ohm resistance has 25 divisions. A current of 4×10^{-4} ampere gives a deflection of one division. To convert this galvanometer into a voltmeter having a range of 25 volts, it should be connected with a resistance of

A. 2,500 ohm as a shunt

B. 2,450 ohm as a shunt

C. 2,550 ohm in series

D. 2,450 ohm in series

Watch Video Solution

295. The resistance of an ammeter is $13\Omega$and its scale is graduated fro a current upto 100 A. After an additional shunt has been connected to this ammeter it becomes possible to measure currents upto 750 A by this meter. The value of shunt resistance is

A. 0.2 ohm

B. 2 ohm

C. 20 ohm

D. 2 kohm

Watch Video Solution

296. A bar magnet of magnetic moment M is cut into two parts of equal lengths. The magnetic moment and pole strength of either part is

A. M/2, m/2

B. M, m/2

C. M/2, m

D. M, m

Watch Video Solution

297. A charged partice is moving in a circle of radius R with uniform speed v. The associated magnetic moment μ is given by

A. qv R/2

B. q v R

C. $qvR^2 / 2$

D. qvR^2

Watch Video Solution

298. If number of tunrs, area and current through a coil are given by n, A and I respectively, then its magnetic mometn is given by

A. n I A

B. n^2IA

C. nIA^2

D. $\dfrac{nI}{\sqrt{A}}$

Watch Video Solution

299. A bar magnet of magnetic moment $\overrightarrow{M}$ is placed in a magnetic field of induction $\overrightarrow{B}$. The torque exerted on it is

A. $\overrightarrow{M}.\overrightarrow{B}$

B. $-\overrightarrow{M}.\overrightarrow{B}$

C. $\overrightarrow{M} \times \overrightarrow{B}$

D. $-\overrightarrow{M} \times \overrightarrow{B}$

Watch Video Solution

300. A bar magnet having a magnetic moment of $2 \times 10^4 JT^{-1}$ is free to rotate in a horizontal plane. A horizontal magnetic field $B = 6 \times 10^{-4} T$ exists in the space. The work done in taking the magnet slowly from a direction parallel to the field to a direction 60° from the field is

A. 0.6 j

B. 2 j

C. 6 j

D. 12 J

Watch Video Solution

301. Work done in turning a magnet of magnetic moment M by an angle 90° from the meridian is n times the corresponding work done to turn it through an angle of 60°. Find the value of n.

A. 2

B. 1

C. 0.5

D. 0.25

302. A bar magnet is oscillating in the earth's magnetic field with a time period T. If the mass is quadrupled, then its time period will be:

A. T/2

B. T

C. 2T

D. 4T

303. A vibration magnetometer placed in magnetic meridian has a small bar magnet. The magnet executes oscillations with a time period of 2 sec in earth's horizontal magnetic field of 24 microtesla. When a horizontal field of 18 microtesla is produced opposite to the earth's field by placing a current carrying wire, the new time period of magnet will be

A. 1s

B. 2 s

C. 3 s

D. 4 s

Watch Video Solution

304. Two bar magnets having same geometry with magnetic moments M and 2M, are firstly placed in such a way what their similar poles are same side then its time period of oscillation is T_1. Now the polarity of one of the magnet is reversed then time period of oscillation will be

A. $T_1 < T_2$

B. $T_1 > T_2$

C. $T_1 = T_2$

D. $T_2 = \infty$

Watch Video Solution

305. Tesla is the unit of

A. electric flux

B. electric field

C. magnetic indution

D. magnetic flux

Watch Video Solution

306. If a diamagnetic substacne is brought near north or south pole of a bar magnet it is

A. attrat by both the poles

B. repelled by both the poles.

C. attracted by the north pole and repelled by the south pole.

D. repelled by the north pole and attracted by the south pole.

Watch Video Solution

307. A diamagnetic material in a magnetic field moves

A. perpendicualr to the field

B. from weaker to stronger parts

C. from stronger to weaker parts.

D. in none of the above directions.

Watch Video Solution

308. The magnetic moment of a diamagnetic atom is

A. equal to zero

B. equal to one

C. between zero and one

D. much greater than one.

Watch Video Solution

309. In which type of material the magnetic susceptibility does not depend on temperature?

A. Diamagnetic

B. Paramagnetic

C. Ferromagnetic

D. Ferrite

Watch Video Solution

310. According to Curie's law, the magnetic susceptibility of a substance at the absolute temperature T is proportional to

A. T

B. T^2

C. $1/T$

D. $1/T^2$

Watch Video Solution

311. Above curie temperature

A. a paramagnetic substance becomes ferromagnetic.

B. a paramagnetic substance becomes diamagnetic

C. a ferromagneti substance becomes diamagnetic

D. a ferromagneti substance becomes paramagnetic.

Watch Video Solution

312. Nickel shows ferromagnetic property at room temperature. If the temperature is increased beyond curie temperature, then it will show

A. paramagnetism

B. anti-ferromagnetism

C. diamagnetism

D. no magnetic property.

Watch Video Solution

313. Electromagnets are made of soft iron, because soft iron has

A. high retentivity and high coercivity

B. low retentivity and low coercivity

C. low retentivity and high coercivity

D. high retentivity and low coercivity

Watch Video Solution

314. For protecting a sensitive equipment form external magnetic field, it should be

A. placed inside an iron can

B. surounded with fine copper gauge

C. placed inside an aluminium can

D. wrapped with insulted wire, through which current is passed.

Watch Video Solution

315. Using mass (M), length (L) time (T) and current (A) as fundamental quantities, the dimension of permeability is

A. $\left[M^{-1}LT^{-2}A\right]$

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

C. $\left[MLT^{-2}A^{-2}\right]$

D. $\left[MLT^{-1}A^{-1}\right]$

Watch Video Solution

316. A length of wire carries a steady current. It is first bent to form a circular coil of one turn. The same length is now bent more sharply to give a loop of two turns of smaller radius. The magentic field at the centre caused by the same current now will be

A. one quarter of tis value in first case

B. one half of its value in the first case

C. two times its value in first case

D. four times is value in first case.

Watch Video Solution

317. Magnetic field B on the axis of a circular coil and far away distance x from the centre of the coil are related as:

A. 1/r

B. $1/r^{3/2}$

C. $1/r^{2}$

D. $1/r^{3}$

Watch Video Solution

318. A long straight wire of radius a carries a steady current I. the current is uniformly distributed across it cross-section. The ratio of the magnetic field at a/2 and 2a is

A. $1/4$

B. $1/2$

C. 1

D. 4

Watch Video Solution

319. Which of the following conclusions can eb drawn from the result $\oint \overrightarrow{B} . \overrightarrow{dA} = 0$

A. The magnetic field is zero everywhere

B. The magnetic monopole cannot exist

C. The magnetic lines of force do not intersect each other

D. A current produces magnetic field.

Watch Video Solution

320. An electron is travelling along the X-direction. It encounters a magnetic field in the Y-direction. Its subsequent motion will be

A. straight line along the X-direction

B. a circle in the XZ-plane

C. a circle in the YZ-plane

D. a circle in the XY-plane.

Watch Video Solution

321. A charged particle enters a magnetic field H with its initial velocity making angle of 45° with H. The path of the particle will be

A. a straight line

B. a circle

C. an ellipse

D. a helical

Watch Video Solution

322. A proton and an alpha particle of the same velocity enter in turn a region of unifrom magnetic field acting a plane perpendicular to the magnetic field. Deduce the ratio of the radii of the circular paths described by the particles. Explain why kinetic energy of the particle after emerging from the magnetic field remains unaltered.

A. $1:2$

B. $1:4$

C. $1:16$

D. $4:1$

Watch Video Solution

323. An electron (with charge $1.6 \times 10^{-19} C$) moving at right angles to a uniform magnetic field completes a circular orbit in 10^{-6} sec. Calculate the vlaue of magnetic field. Given mass of electron $= 9 \times 10^{-31} kg$.

A. 1.31 cm

B. 2.35 cm

C. 3.31 cm

D. 4.31 cm

Watch Video Solution

324. In a mass spectrometer used for measuring the masses of ions, the ions are initially accelerated by an electric potential V and then made to describe semicircular path of radius R using a magnetic field B. If V and B arc kept constant the ratio (("charge on the ion")/("mass of the ion")) will be proportional to

A. R

B. 1/R

C. R^2

D. $1/R^2$

Watch Video Solution

325. A prot is about 1,840 time heavier than an electron. When it is accelerated by a potential difference of 1 kV, its kinetic energy will be

A. 1,840 keV

B. 1/1840 keV

C. 1 keV

D. 920 ke V

Watch Video Solution

326. A cyclotron is used to accelerate

A. electrons

B. neutrons

C. positive ions

D. negaive ions

Watch Video Solution

327. The cyclotron frequency of an electron gyrating in a magneti fied of 1 T is approximately

A. 28 MHz

B. 280 MHz

C. 2.8 GHz

D. 28 GHz

Watch Video Solution

328. Two parallel beams fo positions moving in the same direction will

A. repel each other

B. wil not interact with each other

C. attract each other

D. be deflected normal to the plane containing the two beams.

Watch Video Solution

329. A Galvanometer can be changed into ammeter by providing

A. low resistance in parallel

B. high resistance in series

C. high resistance in parallel

D. low resistance in series

Watch Video Solution

330. A galvanometer has a resistnace of 100 ohm. A difference of potential of 100 millovolt between its terminals gives a full scale deflection. Calculate shunt resistance, which will enable the instrument to read upto 5 ampere.

A. 0.01 ohm

B. 0.02 ohm

C. 0.03 ohm

D. 0.04 ohm

Watch Video Solution

331. The magnetic moment has midensions of :

A. L A

B. $L^2 A$

C. $LT^{-1} A$

D. $L^2 T^{-1} A$

Watch Video Solution

332. The magnetic moment (μ) of a revovlign electron around the nucleus varies with principle quantum number n as

A. $\mu \propto n$

B. $\mu \propto 1/n$

C. $\mu \propto n^2$

D. $\mu \propto 1/n^2$

Watch Video Solution

333. The earth's magnetic field at a given point is $0.5 \times 10^{-5} Wbm^2$. This field is to be annulled by magnetic induction at the center of circular conducing loop of radius 5 . The current required to be flown in the loop is nearly

A. 0.2 A

B. 0.4 A

C. 4A

D. 40 A

Watch Video Solution

334. Lines of force, due to earth's horizontal magnetic field are.

A. elliptical

B. curved lines

C. concentric circles

D. parallel and straight

Watch Video Solution

335. Which of the following statements is not correct about the magnetic field? .

A. magnetic lines of force do not cut each other

B. inside the agnet, the lines go from north to south pole of the magnet

C. the magnet lines form a closed loop

D. tangents to the magnetic lines give the direction of the magnetic field.

Watch Video Solution

336. Angle of dip is 90° at

A. poles

B. equator

C. both (A) and (B)

D. none of these

Watch Video Solution

337. The magnetic needle of a tangent galvanometer is deflected at an angle 30° due to a magnet. The hoeizontal component of earth's magnetic field $0.34 \times 10^{-4} T$ is along the plane of the coil. The magnetic intensity is

A. $1.96 \times 10^{-4} T$

B. $1.96 \times 10^{-5} T$

C. $1.96 \times 10^{4} T$

D. $1.96 \times 10^{5} T$

Watch Video Solution

338. A magnet makes 40 oscillations per minute at a place having magnetic field intensity of $0.1 \times 10^{-5}T$. At another place, it takes 2.5 sec to complete one vibrating. The value of earth's horizontal field at that place is

A. $0.09 \times 10^{-6}T$

B. $0.18 \times 10^{-6}T$

C. $0.36 \times 10^{-6}T$

D. $0.72 \times 10^{-6}T$

Watch Video Solution

339. Domain formation is the necessary feature of

A. diamagnetism

B. Paramagnetic

C. Ferromagnetic

D. all of these

Watch Video Solution

340. A permanent magnet attracts

A. all substances

B. ony ferromagnetic substances

C. some substances and repels others.

D. ferromagnetic substances and repels all other.

Watch Video Solution

341. A bar of diamagnetic substance is placed in a magnetic field with its length making angle theta with the direction of the magnetic field. How will the bar behave ?

A. It will align itself perpendicular to the magnetic field.

B. It will align itself parallel to the magnetic field.

C. It will remain as before

D. Its behaviour can not be predicted.

Watch Video Solution

342. If a magnetic material, moves form stronger to weaker parts of a magnetic field, then it is known as

A. paramagnetism

B. diamagnetic

C. Ferromagnetic

D. anti-ferromagnetic

Watch Video Solution

343. When a magnetic substance is heated, then it

A. remains the same

B. loses its magnetism

C. becomes a strong magnet

D. either (A) or (C)

Watch Video Solution

344. A frog can be leviated in a magnetic field produced by a current in a vertical soleniod placed below the frog. This is possible because the body of the frog is

A. paramagnetic

B. diamagnetic

C. Ferromagnetic

D. anti-ferromagnetic

Watch Video Solution

345. Suspectibility is positive for

A. paramagnetic substances

B. ferrmagnetic substances

C. non-magnetic substances.

D. diamagnetic substances

Watch Video Solution

346. Which of the following is most suitable for the core of the electromagnets?

A. Cu - Ni alloy

B. Soft iron

C. Steel

D. Air

Watch Video Solution

347. The best material for the core of a transformer is

A. stainless stell

B. mild steel

C. hard steel

D. soft iron

Watch Video Solution

348. A tape-recorder records sound in the form of

A. electrical energy

B. magnetic field on the tape

C. magnetic energy

D. variable resistance on the tape

Watch Video Solution

349. Assertion : If an electron and proton enter an electric field with equal energy, then the path of electron is more curved than that of proton. Reason: Electron has a tendency to form curve.

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

A. A

B. B

C. C

D. D

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350. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a

question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : If an electron and proton enter a magnetic field with equal momentum, then the paths of both of them will be equally curved. Reason: The magntiude of charge on an electron is same as that on a proton.

A. A

B. B

C. C

D. D

Watch Video Solution

351. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : A proton and an alpha particle having the same kinetic energy are moving in ircular paths in a uniform magnetic field. the radii of the ciruclar paths will be equal

Reasons: Any two charged particles having equal kinetic energies and entering a region of uniform magnetic field $\overrightarrow{b}$ in a direction perpendicualr to the $\overrightarrow{b}$, will describe circular trajectories of equal radii.

A. A

B. B

C. C

D. D

Watch Video Solution

352. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : A charge, whether stationary or in motion, produces a magnetic field. Reason : Moving charges produce only electric field in the surrounding space.

A. A

B. B

C. C

D. D

Watch Video Solution

353. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the

correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : The energy of a charged particle does not change, when it moves inside the magnetic field. Reason: It is because, force on the charged particle due to the magnetic field acts perpendicular to its path.

A. A

B. B

C. C

D. D

Watch Video Solution

354. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : Cyclotron is not used to accelerate electrons. Reason : Mass of electrons is very small.

A. A

B. B

C. C

D. D

Watch Video Solution

355. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : The coils of a spring come close to each ohter, when current is passed thorugh it.

REason : It is becuase, the coils o spring carry current in the same direction and hence attract each other.

A. A

B. B

C. C

D. D

Watch Video Solution

356. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

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the assertion. (C) if asssertion is true, but reason if false, (D) if assertion is false and reason is true

Assertion : if the current in a solenoid is reversed in direction while keeping the same magnitude , the magnetic field energy stored in teh solenoid decreases. Reason : The magnetic field energy density is proportional to the square of magnetic field.

A. A

B. B

C. C

D. D

Watch Video Solution

357. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

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reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : The range of an ammeter can be both increased or decreased. Reason : The required shunt resistance can be calculated by using the relation, $R = \frac{GS}{G+S}$

A. A

B. B

C. C

D. D

Watch Video Solution

358. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

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(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : The range of a voltmeter can be both increased or decreased. Reason : The required resistance can be calculated by using the relation, $R = \frac{V}{I_g} - G$

A. A

B. B

C. C

D. D

Watch Video Solution

359. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a

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(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : We cannot think of magnetic field configuration with three poles. Reason: A bar magnet does exert a torque on itself due to its own field.

A. A

B. B

C. C

D. D

Watch Video Solution

360. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

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assertion.

(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : Both A m^2 and JT^{-1} are the units of magnetic dipole moment. Reason : Both the units are equivalent to each other.

A. A

B. B

C. C

D. D

Watch Video Solution

361. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

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Assertion : An atom behaves as a magnetic diple. Reson : It is beause, an atom contains equal positive and negative charges.

A. A

B. B

C. C

D. D

Watch Video Solution

362. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

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true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : The true geogrpahic north direction is found by using a compass needle.

Reason : The magnetic meridian of the earth is along the axis of rotation of the earth.

A. A

B. B

C. C

D. D

Watch Video Solution

363. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

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(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : If a compass needle be kept at magnetic north pole of the earth, the compass needle may stay in any direction.

Reason : Dip needle is vertical at the north pole of the earth.

A. A

B. B

C. C

D. D

Watch Video Solution

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assertion.

(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : If δ_1 and δ_2 are the angle of dip observed in two planes at right angles to eah other, then the true angle of dip. $\delta = \frac{\delta_1 + \delta_2}{2}$

Reason : It is not possible to determine the true angle of dip from the given observed values

A. A

B. B

C. C

D. D

Watch Video Solution

365. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

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Assertion : Te magnetic induction may be measured as $T, Nm^{-1}A^{-1}$ or $JA^{-1}M^{-2}$

Reason : All the three units are equivalent.

A. A

B. B

C. C

D. D

Watch Video Solution

366. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

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Assertion : When a magnet is heated to a high temperature $(cogn1,000^{\circ}C)$ it loses its magnetism. Reason: The temperature of $1,000^{\circ}C$ is quite above the Curie temperature for iron.

A. A

B. B

C. C

D. D

Watch Video Solution

367. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a

question, you are required to choose the correct are out of the given four responses and mark it as

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Assertion : A disc-shaped magnet is leviated above a superconducting material that has been cooled by liquid nitrogen. Reason : Supersonductors repel a magnet.

A. A

B. B

C. C

D. D

Watch Video Solution

368. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : Diamagnetic materials can exhibit magnetism. Reason : Diamagnetic materials have permanent magnetic dipole moment.

A. A

B. B

C. C

D. D

Watch Video Solution

369. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason

are false

Assertion : Steel is preferred for making permanent magnets, althoguh soft iron can be easily magnetised. rEason : It is because, coercivity for steel is quite large as compared to soft iron.

A. A

B. B

C. C

D. D

Watch Video Solution

370. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A)If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the assertion.

(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : Soft iron is preferred for making electromagnets.

Reason : Owing to low value of retentivitiy, the residual magnetism left in the soft iron is very small, when the current is switched off.

A. A

B. B

C. C

D. D

Watch Video Solution

371. Direction. In the follwing questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the

correct are out of the given four responses and mark it as

(A). If both assertion and reason are true and reason is the correct explanation of the assertion, (B) if both assertion and reason are true but reason is not correct explanation of the assertion. (C) if asssertion is true, but reason if false, (D) if both assertion and reason are false

Assertion : Magnetic Reasonance imaging (MRI) is a useful diagnotic tool for producing images of various parts of human body.

Reason : Protons of various tissues of human body play a role in MRI.

A. A

B. B

C. C

D. D

Watch Video Solution

372. Weber m^{-2} is equal to

A. tesla

B. henry

C. watt

D. dyne

Watch Video Solution

373. One tesla is equal to

A. 10^{-8} gauss

B. 10^{-7} gauss

C. 10^{-4} gauss

D. 10^{4} gauss

Watch Video Solution

374. The magnetic field B due to a current carrying circular loop of radius 12cm at its centre is $0.5 \times 10^{-4}T$. Find the magnetic field due to this loop at a point on the axis at a distance of 5.0cm from the centre.

A. $3.6 \times 10^{-5}T$

B. $0.4 \times 10^{-4}T$

C. $6.3 \times 10^{-5}T$

D. $9.3 \times 10^{-5}T$

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375. A wire carrying current I and other carrying 2I in the sam direction produce a magnetic field B at the midpoint. What will be the field when 2I wire is swiched off?

A. B/2

B. 2B

C. B

D. 4B

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376. A long hollow copper pipe carries a current. Then, the magneic field product is

A. both inside and outside the pipe

B. neither inside nor otuside the pipe

C. outside the pipe only

D. inside the pipe only

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377. A solenoid 1.5 m long and 0.4 cm in diameter possesses 10 turns per cm length. A current of 5 A falls through it. The magnetic field at the axis inside the solenoid is

A. $4\pi \times 10^{-2} T$

B. $2\pi \times 10^{-2} T$

C. $2\pi \times 10^{-3} T$

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

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378. The magnitude of magnetic induction for a current carrying toroid of uniform cross-section is

A. uniform over the whole cross-section

B. maximum at the centre of cross-setion

C. maximum on the outer edge

D. maximum on the inner edge.

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379. The path of an electron in a uniform magnetic field may be

A. circular but not helical

B. helical but not circular

C. neither helial nor circular

D. either helical or circular.

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380. Cyclotron is a device to

A. measure charge

B. measure voltage

C. accelerate protons

D. acceleate electrons.

Watch Video Solution

381. A cyclotron is operating at a frequency of $12 \times 10^6 Hz$. Mass of deuteron is 3.3×10^{-27} kg and its charge is 1.6xx10^(-19) C. To accelerate the deuterons, the magnetic induction of the field required is :

A. 0.016 T

B. 0.16T

C. 1.6 T

D. 16 T

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382. A straight wire of mass 200 g and length 1.5 m carries a current of 2 A. it is suspended in mid air by a uniform horizontal magnetic field B. The magnitude of B (in tesla) is

A. 0.55

B. 0.65

C. 1.5

D. 2

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383. Two wires carry current in different directions. They will:

A. attract each other

B. repel eahc toher

C. create gravitational field

D. any of the above

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384. A galvanometer having a resistance of 8 ohm is shunted by a wire of resistance 2 ohm. If the total current is 1 A, the part of it passing through the shunt will be

A. 0.2 A

B. 0.25 A

C. 0.5 A

D. 0.8 A

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385. A galvanometer coil has a resistance of 15 ohm and gives full scale deflection for a current of 4 mA. To convert it to an ammeter of range 0 to 6 A,

A. 10 m ohm resistance is to be connected in parallel to the galvanometer.

B. 10 m ohm resistance is to be connected in series to the galvanometer

C. 0.1 ohm resistnce is to be connected in parallel to the galvanometer.

D. 0.1 ohm resistance is to be connected in series to the galvanomter.

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386. A galvanometer having a coil resistance of 100 omega gives a full scale deflection , when a current of 1 mA is passed through it. The value of the resistance, which can convert this galvanometer into ammeter giving a full scale deflection for a current of 10A.

A. 0.1 ohm in parallel

B. 0.1 ohm in series

C. 0.2 ohm in parallel

D. 0.2 ohm in series

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387. To convert galvanometer into a voltmeter.

A. low resistance in parallel

B. low resistance in series

C. high resistance in parallel

D. high resistance in series.

Watch Video Solution

388. An ammeter and a voltmeter are joined in series to a cell. Their readings are A and V respectively. If a resistacne is now joind in parallel with the voltmeter

A. both A and V will increase

B. both A and V will decrease

C. A will decrease and V will increase

D. A will increase and V will decrease.

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389. Unit of reduction factor is

A. ampere

B. ohm

C. tesla

D. weber

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390. The magnetic moment is a

A. scalar quantity

B. vector quantity

C. constant

D. none of these

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391. The magnetic moment has dimension of

A. L A

B. $L^2 A$

C. $LT^{-1} A$

D. $L^2 T^{-1} A$

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392. A bar magnet of magnetic moment M is cut into two parts of equal lengths. The magnetic moment and pole strength of either part is

A. M/2, m/2

B. M, m/2

C. M/2, m

D. M, m

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393. The direction of the neutral points is on the equitorial line of a bar magnet, when the north pole of the magnet is pointing towards

A. north

B. east

C. south

D. west

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394. Two magnets each of magnetic moment M are placed so as to form a cross at right angles to each other. The magnetic moment of the system is

A. 0.5 M

B. M

C. $\sqrt{2}M$

D. 2 M

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395. A long vertical wire in which a current is flowing produces a neutral point with the earth's magnetic field at a distance of 5 cm from the wire. If the horizontal component of the earth's magnetic induction is 0.18 gauss, then the current in the wire is

A. 0.036 A

B. 0.45 A

C. 0.9 A

D. 4. 5A

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396. A bar magnet of magnetic moment $200A-m^2$ is suspended in a magnetic field of intensity $0.25N/A-m$. The couple required to deflect it through 30° is

A. 15 N m

B. 20 N m

C. 25 N m

D. 50 N m

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397. The work done in turning a magnet of magnetic moment M through an angle θ from the meridian is

A. $MB(1-\cos\theta)$

B. $MB\cos\theta$

C. $mB(1-\sin\theta)$

D. $MB\sin\theta$

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398. What is the direction of magnetic field lines a magnet ?

A. from south pole to north pole

B. form north pole to south pole

C. across the bar magnet

D. form south pole to north pole inside the magnet and from north pole to south pole outside the magnet.

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399. A magnetic needle is placed on a cork floating on a still lake in the northern hemisphere. Does this needle together with the cork move towards the north of the lake?

A. Yes

B. No

C. May or may not move

D. Nothing can be said

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400. The effect due to uniform magnetic field on a freely suspended magnetic needle is as follows

A. Both torque and net force are present

B. Torque is present but no net force

C. Force is present but not net torque

D. Both torque and net force are abent.

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401. Angle between magnetic meridian and geographical meridian is called

A. angle of dip

B. angle of declination

C. angle of depression

D. Both (A) and (B)

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402. Isogonic lines are those, for which

A. declination is same at all the places on the line

B. angle of dip is same at all the places on the line

C. the value of the horizontal component of earth's magnetic field is the same

D. all of the above

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403. At which place on the earth, the earth's magnetic field becoes horizontal?

A. Magnetic pole

B. Geographical pole

C. Magnetic meridin

D. Magnetic equator

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404. A dip circle is at right angle to the magnetic meridian. What will be its apparanet dip?

A. 0°

B. 30°

C. 60°

D. 90°

Watch Video Solution

405. The sensitivity of a moving coil galvanometer increases with decrease is

A. number of turns decreases

B. number of turns increases

C. field increases

D. field decreases

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406. The diamagnetic material are

A. strongly repelled by a magnet

B. strongly attracted by a magnet

C. feebly repelled by a magnet

D. feebly attracted by a magnet

Watch Video Solution

407. The substance, in which the magnetic moment of single atom is not zero, is called

A. Diamagnetic

B. Paramagnetic

C. Ferromagnetic

D. ferrite

Watch Video Solution

408. The relative permeability of a diamagnetic material is

A. equal to unity

B. more than unity

C. less than unity

D. zero

Watch Video Solution

409. In which type of material the magnetic susceptibility does not depend on temperature?

A. Diamagnetic

B. Paramagnetic

C. Ferromagnetic

D. ferrite

Watch Video Solution

410. Above curie temperature

A. super conducting

B. ferromagnetic

C. diamagnet

D. paramagnetic

Watch Video Solution

411. Steel si preferred for making permanent magnets, whereas soft iron is prefferred for making electromagnets. Give one reason.

A. high coercivity

B. low coercivity

C. low retentivity

D. both (A) and (C)

Watch Video Solution

412. A permanent magnet magnet has the properties of retentivity and coercivity, which in magnitude are respectivley.

A. high-high

B. low-low

C. low-high

D. high-low

Watch Video Solution

413. An electromagnet uses

A. soft iron core

B. steel core

C. nickel core

D. copper core

Watch Video Solution

414. Core of transformer is made up of

A. soft iron

B. steel

C. iron

D. alnico

Watch Video Solution

415. A current I flows along the length of an infinitely logn, straight and thin walled pipe. Then, the magnetic field.

A. at all points inside the pipe is the same, but not zero

B. at any point inside the pipe is zero.

C. is zero only on the axis of the pipe

D. is different at different points inside the pipe.

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416. A power line lies along east-west direction and carries a current of 10 ampere. The force per meter due to earth's magnetic field of 10^{-4} tesla is

A. $10^{-2}N$

B. $10^{-3}N$

C. $10^{-4}N$

D. $10^{-5}N$

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417. A moving coil galvanometer has a resistance of 900 ohm. In order to send only 10% of the main current through this galvanometer, the resistance of the required shunt is

A. 0.9 ohm

B. 90 ohm

C. 100 ohm

D. 900 ohm

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418. A moving coil galvanometer of resistance 100Ω is used as an ammeter using a resistance 0.1Ω. The maximum diflection current in the galvanometer is $100\mu A$. Find the minimum current in the circuit so that the ammeter shows maximum deflection

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419. The magnetic field lines

A. intersect at the neutral point

B. intersect near north and south poles

C. cannot intersect at all

D. depend upon the position of the magnet.

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420. A paricle of charge q and mass m moves in a circular orbit of radius r with angular speed ω. The ratio of the magnitude of its magnetic moment to that of its angular momentum depends on.

A. ω and q

B. ω, q and m

C. q and m

D. ω and m

Watch Video Solution

421. Two particles , each of mass m and charge q, are attached to the two ends of a light rigid rod of length 2 R . The rod is rotated at constant angular speed about a perpendicular axis passing through its centre. The ratio of the magnitudes of the magnetic moment of the system and its angular momentum about the centre of the rod

A. $\frac{q}{2m}$

B. $\frac{q}{m}$

C. $\frac{2q}{m}$

D. $\frac{q}{\pi m}$

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422. A bar magnet is placed inside a non-uniform magnetic field. It experiences

A. a force and a torque

B. a force but not a torque

C. a torque but not a force

D. neither a force nor a toruqe.

Watch Video Solution

423. The angle between the earth's magnetic axis and earth's geographic axis is

A. 0°

B. 11.5°

C. 23°

D. none of the above

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424. The line joining the points of horizontal component of earth's magnetic field is called

A. manetic meridian

B. magneic equator

C. magneic axis

D. magnetic line

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425. If a diamagnetic solution is poured into a U-tube and one am of this U-tube placed between the poles of a strong magnet with the meniscus in a line with the field, then the level of the solution will

A. rise

B. fall

C. oscillate slowly

D. remain as such

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426. The mensicus of a liquid contained in one of the limbs of a narrow U-tube is held in an electromagnetic with the mensicus in line with the field . The liquid is seen to rise . This indicates that the liquid is

A. ferrogmagneti

B. Paramagnetic

C. diamagnetic

D. non-magnetic

Watch Video Solution

427. A magnetic needle suspended by a silk thread is vibrating in the earth's magnetic field. If the temperature of the needle is increased by $500^{\circ} C$, then

A. the time period decreases

B. the time period remains unchanged

C. the time period increase

D. the needle stops vibrating

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428. Electromagnets are made of soft iron, because soft iron has

A. low susceptibility and low retentivity

B. low permeability and low retentivity

C. high susceptibility and low retentivity

D. high susceptibility and high retentivity

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429. Tesla is the unit of

A. field

B. flux

C. induction

D. moment

Watch Video Solution

430. The unit of magnetic induction is

A. Am^{-1}

B. A m

C. Weber

D. tesla

Watch Video Solution

431. The current that flows through a conductor of length 10 cm bent into the form of an arc of circle of radius 2 cm to produce a magnetic field of 0.1 oersted at its centre is

A. 1 ampere

B. 4 ampere

C. 0.5 ampere

D. 0.1 ampere

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432. A Rowland ring of mean radius 15 cm has 3500 turns of wire wound on a ferromagnetic core of relative permeability 800. What is the magnetic field B in the core for a magnetising current of 1.2 A?

A. 5.76 tesla

B. 4.48 tesla

C. 0.39 oersted

D. 5.76 oersted

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433. When current flows in a conductor, then the ratio of the intensity of electric field E at any point within the condutor and the current density at a point is called

A. towards north

B. towards soth

C. towards east

D. towards west

Watch Video Solution

434. The magnetic field at a point due to a current carrying conductor is directly proportional to

A. resistance of the conductor

B. thickness of the conductor

C. current flowing through the conductor

D. distance from the conductor.

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435. A charged particle is moving through magnetic field. Then, magneti field

A. always exerts a force on the particle

B. never exerts a force on the particle

C. exerts a force, if the particle is moving at right angles to the field

D. exerts a force, if the particle is moving along the field.

Watch Video Solution

436. An electron is projected into a magnetic field with components of velocity parallel and normal to the field. The path followed by electron will be

A. straight

B. parabolic

C. helical

D. elliptical

Watch Video Solution

437. An electric charge e moves with a constant velocity v parallel to the lines of force of a uniform magnetic field B, the force experienced by the charge is:

A. B ev

B. ev/B

C. zero, if $\overrightarrow{b}$ and $\overrightarrow{v}$ are perpendicular

D. e/Bv

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438. A proton having charge e enters a magnetic field of strength B with a velocity v in a direction making angle θ with the direction of the field. The force on proton is

A. B e v

B. zero

C. $Bev\cos\theta$

D. $Bev\sin\theta$

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439. A proton is projected in a direction perpendicular to a uniform magnetic field and an electron is projected along the direction of the field. Then, the path followed by

A. electron will be circular, while that of proton will be straight

B. proton will be circular, while that of electron will be straight

C. both of them will be parabolic

D. both of them will be straight

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440. The magnetic field at a point due to a current carrying conductor is directly proportional to

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C. current flowing through the conductor

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Watch Video Solution

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D. exerts a force, if the particle is moving along the field.

Watch Video Solution

442. An electorn is projected into a magnetic field with components of velocity parallel and normal to the field. The path followed by electron will be

A. straight

B. parabolic

C. circular

D. elliptical

Watch Video Solution

443. A deuterium nucleus consists of one proton and one neutron. If a deuterium nucleus and a helium nucleus are both placed in the same electric field, the acceleration of deuterium is:

A. equal to that of the helium

B. greater than that of helium

C. less than that of helium

D. not related in a fixed way to that of helium.

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444. The mass of a proton is about 2,000 times the mass of an electron. An electron and a proton are injected into a uniform electric field at right agles to the direction of the field with the same initial kinetic energy. Then

A. the eletron trajectory will be less curved than that of the proton

B. the proton trajectory will be les curved than that of the electron

C. both the trajectories will be equally curved

D. both the trajectoreis will be straight.

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445. An electron and a proton both having same linear momentum are projected at right angles to a uniform magneic field. Then trajectory of

A. both will be equally curved

B. both will be straight

C. electron will be less curved than that of proton

D. proton will be less curved than that of electron.

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446. An electron and a proton both having same linear momentum are projected at right angles to a uniform magneic field. Then trajectory of

A. the alpha-particles will move along a circular path of smaller radius than the proton.

B. both will move along circular paths of same radius.

C. both will follow a straight path.

D.

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447. A 2 MeV proton is moving perpendicular to a uniform magnetic field o 2.5 tesla. The force on the proton is

A. $2.5 \times 10^{10} N$

B. $7.84 \times 10^{-11} N$

C. $2.5 \times 10^{-11} N$

D. $7.84 \times 10^{12} N$

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448. The magnetic field ofa U-magnet is parallel to the surface of this paper with the N-pole on the left side. A conductor is placed in the field so that it is perpendicular to this page. When a current flows through the conductor out of the paper, it will tend to move :

A. donwards

B. upwards

C. to the right

D. to the left

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449. Two parallel wires carrying currents in the same direction attract each other because of:

A. potential difference between them

B. mutual inductance between them

C. electric forces between them

D. magnetic forces between them

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450. Two long straight wires carrying the same current 1 and separated by a distance r exert fore F per unit length on each other. If the current is increased to 2 I and separation is reduced r/2, then force will become

A. 8F

B. 2 F

C. F/2

D. F/8

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451. Two long parallel wires are carrying currents of 5 A and 12 A respectively. If the force per unit length between these wires is $3 \times 10^{-5} Nm^{-1}$, the distance between them should be

A. 400 m

B. 4 m

C. 0.4 m

D. 0.04 m

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452. A circular loop of area $0.01 m^2$ carrying a current of 10 A, is held perpendicular to a magnetic field of intensity 0.1 T. The torque acting on the loop is

A. 0.001 N

B. 0.314 N

C. 0.52 N

D. zero

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453. A circular loop of radius R carrying a current is placed in a uniform magnetic field with its plane perpendicular to B. The force on the loop is

A. $2\pi BIR$

B. $2\pi BI^2R$

C. $4\pi BIR$

D. zero

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454. The torque on the loop

A. πIBR^2

B. pBI^2R^2

C. πB^2IR^2

D. `zero

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455. A current carrying loop is placed in uniform magnetic field. The torque acting on it does not depend upon

A. shape of the loop

B. size of the loop

C. value of the current

D. magnetic field

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456. The basic instrument used to detect the current:

A. galvanometer

B. ammeter

C. wattmeter

D. voltmeter

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457. A galvanometer is said to be sensitive, if it gives a

A. small deflection for a small current

B. small deflection for a large current

C. large deflection for a large current

D. large deflection for a small current.

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458. Give two factors by which voltage sensitivity of a moving coil galvanometer can be increased?

A. increasing the number of turns

B. decreasing the number of turns

C. decresaing the area of the coil

D. none of the above

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459. The deflection in a moving coil galavanometer falls from 50 to 10 divisions, when a shunt of 12 ohm is connected across it. The resistance of the coil of the galvanometer is

A. 2.4 ohm

B. 12 ohm

C. 48 ohm

D. 60 ohm

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460. Can we increase/decrease the range of a given ammeter?

A. a small resistance is connected in series

B. a small resistance is connected as shunt

C. a large resistance is connected in series

D. a large resistance is connected in shunt

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461. A galvanometer can measure a current up to 20 milliampere. When it is connected in series with a resistance of 2,970 ohm, it can read upto 60 volt. The galvanometer has a resistance

A. 130

B. 30

C. 230

D. 60

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462. The resistance of an ideal ammeter is

A. very low

B. very high

C. infinity

D. can have any value

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463. The resistance of ideal voltmeter is:

A. very low

B. very high

C. nearly zero

D. none of the above

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464. When a bar magnet is immersed in a heap of iron fillings stick to the surface of the bar magnet. A close examination would reveal that iron filings

A. stick uniformly throughout the surface of bar magnet

B. stick randomly on the surface of bar magnet

C. have maximum concentration at the mid portion of bar magnet

D. have maximum cocentration at the two ends of the bar magnet.

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465. Which one of the following statements is correct ? The field strength of a bar magnet?

A. is same througout the entire length of the bar magnet

B. is greater at the cenre of the bar magnet

C. is the greatest at the poles

D. increases as the magnet ages.

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466. A steel wire of length l has a magnetic moment M. It is then bent into semicircular arc. What is the new magnetic moment?

A. M

B. M/L

C. $2M / \pi$

D. M L

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467. A bar magnet suspended freely has period of oscillation of 2s. Now, the bar magnet is broken into equal halves and one-half is suspended to oscillate freely in the same magnetic field. Find the time period of oscillation of this half of the magnet.

A. same

B. $1/8$

C. $1/4$

D. $1/2$

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468. A large magnet is broken into two pieces, so that their lengths are in the ratio 2:1. The pole strengths of the two piece will be

A. in the ratio 4:1

B. in the ratio 2:1

C. in the ratio 1:2

D. equal

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469. Choose the correct answer

A. All electrns posses magnetic moment

B. All protons posses magnetic moment

C. All nuclei posses magnetic moment

D. All atoms posses magnetic moment

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470. A circular loop is carrying current and is said to be equivalent to magnetic dipole. Then, a point on the axis of the loop lies in its

A. end-on position

B. broad side-on position

C. both end-on and broad side-on positions

D. none of the above

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471. A circular loop is carrying current and is said to be equivalent to a magnetic dipole. Then, a point on the loop lies in its

A. end-on position

B. broad side-on position

C. both end-on and broad side-on positions

D. none of the above

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472. The magnetic moment of atomic neon is equal to

A. zero

B. $2\mu_B / 2$

C. μ_B

D. $\mu_b/2$

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473. A uniform magnetic field is obtained in

A. a bar magnet

B. a horsehoe magnet

C. a circular coil carrying a current

D. a cylindrical coil carrying a current

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474. The magneic field at a distance d from a short bar magnet in longitudinal and trnasverse positions are in the ratio

A. $1:1$

B. $1:2$

C. $2:1$

D. $3:1$

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475. The absence of magnetic monopole is explained by ?

A. C oulomb's law

B. Lorentz's law

C. Gauss's law

D. Fleming's law

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476. Isogonic lines are those, for which

A. zero declination

B. equal declination

C. equal dip

D. equal horizontal field

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477. Earth's magnetic field always has a horizontal component except at

A. equator

B. poles

C. both at equator and poles

D. none of the above

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478. At magnetic poles the angle of dip is

A. 45°

B. 30°

C. 0°

D. 90°

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479. At a certain place, the angle of dip is 30° and the horizontal component of earth's magnetic field is 0.50 oerested. The earth's total magnetic field (in oerested) is

A. $\sqrt{3}$

B. 1

C. $1/\sqrt{3}$

D. $1/2$

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480. The angle of dip at the magnetic equator is

A. 0°

B. 45°

C. 90°

D. 30°

Watch Video Solution

481. The angle of dip is θ at a place, where the horizontal and vertical componetns of earth's magnetic fiels are equal . The value of θ is

A. 0°

B. 45°

C. 90°

D. 30°

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482. A magnet is placed vertically on a paper. Then, the neutral point obtained on the paper is

A. one only

B. two only

C. three only

D. zero

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483. The period of oscillation of a magnet in vibration magnetometer is 2 sec. The period of oscillation of a magnet whose magnetic moment is four times that of the first magnet is

A. 1 s

B. 4 s

C. 8 s

D. 0.05 s

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484. A magnet suspended in earth's magnetic field can vibrated in horizontal plane. . A second magnet is so placed that the field becomes less than the horizontal component of earth's field. In this situatio, the time period will

A. increase

B. decrease

C. remain unchanged

D. cannot be predicted

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485. The time period of oscillation of a freely suspended manet does not depend upon

A. the length of the magnet

B. the pole strength of the magnet

C. the horizontal component of the earth's magnetic field

D. the length and nature of the material of the suspension.

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486. A magnet was found to vibrate at a place with a period of T.A piece of brass of same length, breadth and mass was placed over the magnet. The new time period will be

A. 2T

B. $T / \sqrt{2}$

C. T/2

D. $\sqrt{2}T$

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487. A thin rectangular magnet suspended freely has a period of oscillation T in a uniform magnetic field . Now it is broken in two equal parts perpendicular to magnetic axis and one place is allowed to oscillate in the same field . If its period of oscillation is T' , then ration (T)/(T') is

A. 4 s

B. 2s

C. 0.5 s

D. 0.25 s

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488. Which of following is not a unit of the intensity of magnetisation?

A. Am^{-1}

B. $JT^{-1}m^{-3}$

C. $NT^{-1}m^{-2}$

D.

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489. Which of the following is not the unit of magnetic induction ?

A. T

B. Wbm^{-2}

C. $JA^{-1}m^{-2}$

D. $NA^{-1}m^{-1}$

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490. Which of the following is ferromagnetic?

A. Aluminium

B. Quartz

C. Nickel

D. Bismuth

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491. An example of a ferromagnetic substance is

A. Aluminium

B. silver

C. marble

D. alnico

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492. If the premanent magnetic moment of the atoms of a substance is zero, then substance is called

A. diamagnetic

B. ferromagnetic

C. antiferromagnetic

D. paramagnetic

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493. From molecular view point, discuss the temperature dependence of susceptibility for diamagnetism, paramagnetism and ferromagnetism.

A. decreases with temperature

B. does not vary with temperature

C. first dereases and then increases with increase of temperature

D. increases with temperature

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494. The magnetic permeability is maximum for

A. paramagnetic substances

B. ferromagnetic

C. diamagnetic

D. non-magnetic

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495. Suspectibility is positive for

A. paramagnetic

B. ferromagnetic

C. non-magnetic

D. diamagnetic

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496. Choose the correct answer

A. Diamagnetism occurs in all meterials

B. Diamagnetism is the result of partial alignment of permanent magnetic moment

C. The magnetic field due to induced magnetic moment is opposite to the applied field

D. The magnetising field intensity is always zero in free space.

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497. Fill ups

At ....temperature a ferromagnetic material passes over to paramagnetics.

A. non-magnetic

B. diamagnetic

C. paramagnetic

D. strongly ferromagnetic.

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498. Above curie temperature

A. remains ferromagnetic

B. becomes ferromagnetic

C. becomes paramagnetic

D. becomes diamagnetic

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499. The area of B-H curve is an indication of

A. the permeability of the medium

B. the susceptibility of the substance

C. the retentivity of the material

D. the energy dissipated per unit volume of the substance per cycle.

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500. Area contained within the hysteresis loop represents

A. magnetic energy of the specimen

B. loss of energy of the specimen

C. loss of energy per unit volume per cycle

D. none of the above

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501. The hysteresis curve of a magnetic material is generally studied for

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502. The hysteresis cycle for the material of permanent magnet is

A. short and wide

B. tall and narrow

C. tall and wide

D. short and narrow.

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503. Direction. In the following questions, a statement of assertion is followed by a statement of reason. While answering a question, you are required to choose the correct are out of the given four responses and mark it as

(A)If both assertion and reason are true and reason is the correct explanation of the assertion,

(B) if both assertion and reason are true but reason is not correct explanation of the assertion.

(C) if assertion is true, but reason if false,

(D) if both assertion and reason are false

Assertion : Soft iron is preferred for making electromagnets.

Reason : Owing to low value of retentivitiy, the residual magnetism left in the soft iron is very small, when the current is switched off.

A. magnetic saturation limit is high and retenitivity and coercivity are small

B. retentivity is high

C. coercivity is high

D. area of hysteresis loop is large

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504. The material of a permanent magnet has

A. high retentivity and high coercivity

B. low retentivity and low coercivity

C. high retentivity and low coercivity

D. low retentivity and high coercivity.

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505. Why soft iron is used in making the core of a transformer ?

A. low hysteresis loss and how permeability

B. low hystereis loss and high permeability

C. high hysteriss loss and low permeability

D. high hysteresis loss and high permeability

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506. Ferromagnetic substance used in a transformer must have

A. high susceptibility and high hysteresis loss

B. high permeability and low hysteresis loss

C. low permeability and high hysteresis loss

D. low permeability and low hysteresis loss

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507. A tape-recorder records sound in the form of

A. varibale electrical resistance on the tape

B. sound wave on the tape

C. electrical energy

D. magnetic field on the tape.

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