RAVI MATHS TUITION CENTER , CHENNAI. WHATSAPP – 8056206308

12TH CBSE PHYSICS 2 MCQS

12th Standard

Physics

Exam Time : 02:55:00 Hrs

Total Marks : 175

175 x 1 = 175

1) When a current I is set up in a wire of radius r, the drift speed id v_d. If the same current is set up through a wire of radius 2r the drift speed will be

(a) $v_d/4$ (b) $v_d/2$ (c) $2v_d$ (d) $4v_d$

2) The equivalent resistance of n resistors each of same resistance when connected in parallel is R_p. If they are connected in series, the equivalent resistance will be:

(a) R_p/n^2 (b) R_p/n (c) nR_p (d) n^2R_p

3) Three equal resistors each of resistance R are connected so as to form a triangle. The equivalent resistance across any two corners is:

(a) 2R/3 (b) R/3 (c) 3R/2 (d) 3R

4) Four wires each of same length, diameter and material are connected to each other to form a square. If the resistance of each wire is R, then equivalent resistance across the opposite corners is:

(a) R/4 (b) R/2 (c) R (d) none of the above

5) What is the resistance across A and B in the fig

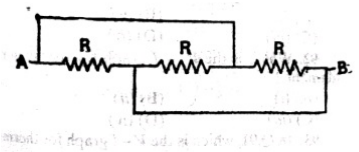


Fig. Q-82.1

(a) 3R (b) R (c) R/3 (d) None of the above

6) What is the resistance across A and B in the fig?

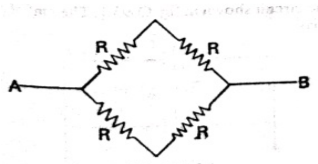


Fig. Q-83.1

(a) $\frac{R}{2}$ (b) R (c) 2R (d) 4R

7) What is the resistance between A and B in the fig.

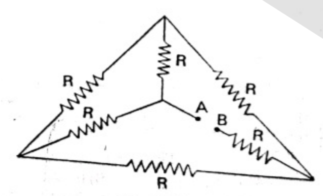


Fig. Q-85.1

(a) R/2 (b) R (c) 2R (d) 3R

8) What is the resistance across A and B in the fig.?

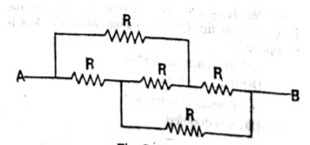


Fig. Q-86.1

(a) R/5 (b) R/3 (c) R (d) 3R

9) According to the Kirchhoff's law the sum of the products of current and resistance as well as emfs in a closed loop is:

(a) greater than zero (b) zero (c) less than zero (d) determained by the emf

10) Why the wheatstone bridge is more accurate than the other methods of measuring resistance?

(a) It has four resistor arms (b) It is based on Kirchhoff's laws (c) It does not involve ohm's law

(d) It is a null method

11) For higher sensitivity which of the following is essential for the potentiometer?

(a) Higher emf of quxiliary battery (b) Higher resistivity of the wire (c) Larger length of the wire

(d) None of the above

12) The length of a conductor is halved. Its conductivity will be

(a) halved (b) unchanged (c) doubled (d) quadrupled

13) The length and area of cross - section of a conductor are doubled, its resistance will be:

(a) halved (b) unchanged (c) doubled (d) quadrupled

14) Ohms law is valid when the temperature of the conductor is:

(a) constant (b) very high (c) very low (d) varying

15) To obtain maximum resistance by joining the given resistors, they should be grouped in

(a) series (b) parallel (c) mixture of series and parallel combinations

16) A wire of resistance 3Ω is cut into there equal pieces, which are joined to from a triangle. The equivalent resistance between any two corners of the triangle is

(a) $\frac{3}{2}\Omega$ (b) $\frac{2}{3}\Omega$ (c) $\frac{1}{4}\Omega$ (d) 4Ω

17) For ohmic conductor the drift velocity v_d and the electric field applied across it are related as:

(a) $v_d \propto \sqrt{E}$ (b) $v_d \propto E$ (c) $v_d \propto E^{\frac{3}{2}}$ (d) $v_d \propto E^2$

18) A wire is cut into 4 pieces, which are put together side by side to obtain one conductor. If the original resistance of the wire was R, the resistance of the bundle will be:

(a) R/4 (b) R/8 (c) R/16 (d) R/32

19) A wire of resistance R is bent in the form of a circle. The resistance between two points on the circumference of the wire and at the end of a diameter of the circle is:

(a) R/4 (b) R/8 (c) R/16 (d) R/32

20) We have two resistors R_1 and R_2 By using them singly in series and parallel combination we can obtain four resistances of 3, 4, 12 and 16 ohms. The R_1 and R_2 are:

(a) 3, 4 (b) 4, 12 (c) 12,16 (d) 16, 3

21) A steady current is set up in a metallic wire of non uniform cross-section. How is the speed of flow v of electrons is related to the area of cross-section A?

(a) v is independent of A (b) $v \propto A^{-1}$ (c) $v \propto A$ (d) $v \propto A^2$

22) The equivalent resistance in series combination is:

(a) smaller than the largest resistance (b) larger than the largest resistance

(c) smaller than the smallest resistance (d) larger than the smallest resistance

23) 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

24) An aluminum wire is drawn through die so as to reduce its diameter to half. If the original resistance be R, the new resistance of the wire will be:

(a) R/16 (b) R/4 (c) 4R (d) 16R

25) An aluminium wire is drawn through a die so as to double its length.If the original resistance be R, than the new resistance of the wire will be:

(a) R/16 (b) R/4 (c) 4R (d) 16R

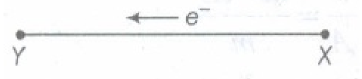
26) An external resistance R is connected to a cell of internal resistance r.The current in the circuit is maximum when:

(a) R > r (b) R < r (c) R = r (d) cannot be parallel

27) Which of the following has -ve temperature coefficient of resistance?

(a) Tungsten (b) Carbon (c) Nichrome (d) Platinum

28) Twenty million electrons reaches from point X to point Y in two micro second as shown in the figure. Direction and magnitude of the current is



(a) 1.5×10^{-10} A from X to Y (b) 1.6×10^{-6} A from Y to X (c) 1.5×10^{-13} A from Y to X
(d) 1.6×10^{-4} A from X to Y

29) The relation between electric current density (J) and drift velocity (v_d) is

(a) $J = nev_d$ (b) $J = \frac{ne}{v_d}$ (c) $J = \frac{v_d e}{n}$ (d) $J = nev^2_d$

30) If drift velocity of electron is v_d and intensity of electric field is E, then which of the following relation obeys the Ohm's law?

(a) v_d = constant (b) $v_d \propto E$ (c) $v_d = \sqrt{E}$ (d) $v_d \propto E^2$

31) Which of the following characteristics of electrons determines the current in a conductor?

(a) Drift velocity alone (b) Thermal velocity alone (c) Both drift velocity and thermal velocity
(d) Neither drift nor thermal velocity

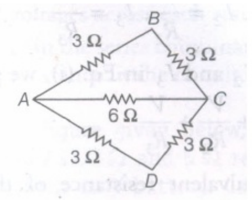
32) A resistor has a colour code of green, blue, brown, and silver. What is its resistance?

(a) 5600 Ω ± 10% (b) 560 Ω ± 5% (c) 560 Ω ± 10% (d) 56 Ω ± 5%

33) Multiplication of resistivity and conductivity of any conductor depends on

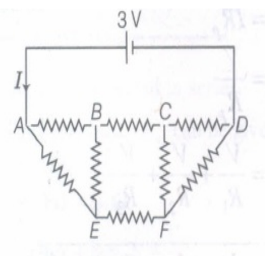
(a) cross-section (b) temperature (c) length (d) None of these

34) In the following diagram, equivalent resistance between A and D is



(a) 5 Ω (b) 4 Ω (c) 3Ω (d) 2Ω

35) Figure shows a network of eight resistors, each equal to 2Ω, connected to a 3V battery of negligible internal resistance. The current I in the circuit is



(a) 0.25 A (b) 0.50 A (c) 0.75 A (d) 1.0 A

36) The equivalent resistance of n resistors each of same resistance when connected in series is R. If the same resistances are connected in parallel, the equivalent resistances will be

(a) R/n^2 (b) R/n (c) $n^2 R$ (d) nR

37) A television of 200 W is used for 4h, then what is the value unit expense of electricity?

(a) 50 (b) 20 (c) 0.8 (d) 0.2

38) Two bulbs of 40W and 60W are connected to 220V line, the ratio of resistance will be

(a) 4 : 3 (b) 3 : 4 (c) 2 : 3 (d) 3 : 2

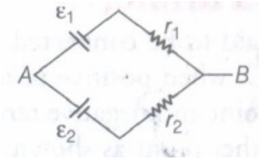
39) The internal resistance of a 2.1 V cell which gi es a current of 0.2 A through a resistance of 10 Ω is

(a) 0.2 Ω (b) 0.5 Ω (c) 0.8 Ω (d) 1.0 Ω

40) Electromotive force of primary cell is 2.4 V. When cell is short circuited, then current becomes 4A. Internal resistance of cell is

(a) 60 Ω (b) 1.2 Ω (c) 4 Ω (d) 0.6 Ω

41) Two batteries of emf ε_1 and ε_2, ($\varepsilon_2 > \varepsilon_1$) and internal resistances r_1 and r_2 respectively are connected in parallel as shown in figure.



(a) Two equivalent emf ε_{eq} of the two cells is between ε_1 and ε_2 i.e., $\varepsilon_2 < \varepsilon_{eq} < \varepsilon_2$

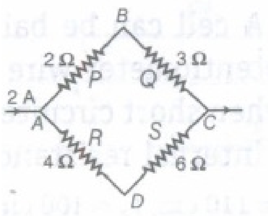
(b) The equivalent emf ε_{eq} is smaller than ε_1 (c) The ε_{eq} is given by $\varepsilon eq = \varepsilon_1 + \varepsilon_2$ always

(d) ε_{eq} is independent of internal resistances ε_1 and ε_2

42) Kirchhoff's current law is consequence of conservation of

(a) energy (b) momentum (c) charge (d) mass

43) If 2 A current is flowing in the shown circuit, then potential difference (VB - VD) in balanced condition is

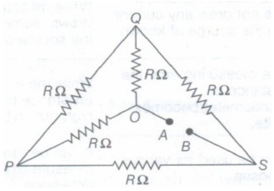


(a) 12 V (b) 6 V (c) 4 V (d) zero

44) The Wheatstone bridge and its balance condition provide a practical method for determination of an

(a) known resistance (b) unknown resistance (c) Both (a) and (b) (d) None of the above

45) If each of the resistance in the network in figure is R, the equivalent resistance between terminals A and B is



(a) 5 R (b) 2 R (c) 4 R (d) R

46) A resistance R is to be measured using a meter bridge, student chooses the standard resistance S to be won. He finds the null point at l, = 2.9 em. He is told to attempt to improve the accuracy. Which of the following is a useful way?

(a) He should measure I_1 more accurately (b) He should change Sto 1000Ω and repeat the experiment

(c) He should change S to 3Ω and repeat the experiment

(d) He should given up hope of a more accurate measurement with a meter bridge

47) 2 mA current is flowing in the wire of potentiometer of 5m long and 5 Ω resistance. The potential gradient is

(a) 2×10^{-3} V/m (b) 2.5×10^{-2} V/m (c) 1.6×10^{-3} V/m (d) 2.3×10^{-3} V/m

48) A potential difference V is applied to a copper wire of length I and diameter d. If V is doubled, then the drift velocity

(a) is doubled (b) is halved (c) remains same (d) becomes zero

49) A potential difference of 100 V is applied to the ends of a copper wire one metre long. What is the average drift velocity of electrons?
(given. $\sigma = 5.81 \times 10^7\ \Omega^{-1}$or $n_{cu} = 8.5 \times 10^{28}\ m^{-3}$)

(a) 0.43 ms^{-1} (b) 0.83 ms^{-1} (c) 0.52 ms^{-1} (d) 0.95 ms^{-1}

50) The length of 50 Ω resistance becomes twice by stretching. The new resistance is

(a) 25 Ω (b) 50 Ω (c) 100 Ω (d) 200 Ω

51) A metal rod of length 10 cm and a rectangular cross-section of 1 cm $\times \frac{1}{2}$ cm is connected to a battery across opposite faces. The resistance will be

(a) maximum when the battery is connected across 1 cm $\times \frac{1}{2}$ cm faces

(b) maximum when the battery is connected across 10 cm x 1 cm faces

(c) maximum when the battery is connected across 10 cm$\times \frac{1}{2}$ cm faces

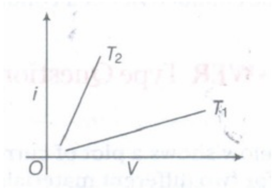
(d) same irrespective of the three faces

52) Corresponding to the resistance $4.7 \times 10^6 \Omega \pm 5\%$ which is order of colour coding on carbon resistors?

(a) Yellow, violet, blue, gold (b) Yellow, violet, green, gold (c) Orange, blue, green, gold

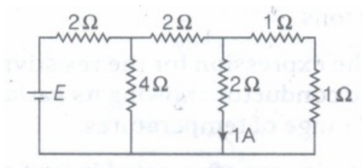
(d) Orange, blue, violet, gold

53) The current i and voltage Vgraph for a given metallic wire at two different temperatures T, and T2 are shown in the figure. It is concluded that



(a) $T_1 > T_2$ (b) $T_1 < T_2$ (c) $T_1 = T_2$ (d) $T_1 = 2T_2$

54) The emf of the battery shown in figure is



(a) 12 V (b) 13 V (c) 16 V (d) 18 V

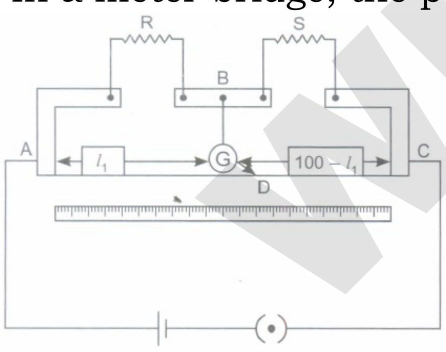
55) Consider a current carrying wire current I in the shape of a circle. Note that as the current progresses along the wire, the direction of j (current density) changes in an exact manner, while the current I remain unaffected. The agent that is essentially responsible for is

(a) source of emf. (b) electric field produced by charges accumulated on the surface of wire.

(c) the charges just behind a given segment of wire which push them just the right way by repulsion

(d) the charges ahead.

56) In a meter bridge, the point D is a neutral point (figure).



(a) The meter bridge can have other neutral point for this set of resistances.

(b) When the jockey contacts a point on meter wire left of D, current flows to B from the wire

(c) When the jockey contacts a point on the meter wire to the right of D, current flows from B to the wire through galvanometer.

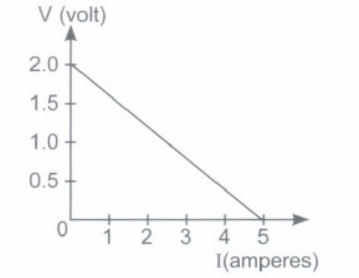
(d) When R is increased, the neutral point shifts to left.

57) Which of the following is wrong? Resistivity of a conductor is

(a) independent of temperature. (b) inversely proportional to temperature

(c) independent of dimensions of conductor. (d) less than resistivity of a semiconductor.

58) For a cell, the graph between the potential difference (V) across the terminals of the cell and the current (I) drawn from the cell is shown in the figure.



(a) $2\ \mathrm{V}, 0.5\Omega$ (b) $2\ \mathrm{V}, 0.4\Omega$ (c) $> 2\mathbf{V}, \mathbf{0.5}\Omega$ (d) $> 2\mathbf{V}, \mathbf{0.4}\Omega$

59) A Daniel cell is balanced on 125 cm length of a potentiometer wire. Now the cell is short-circuited by a resistance 2 ohm and the balance is obtained at 100 cm. The internal resistance of the Daniel cell is

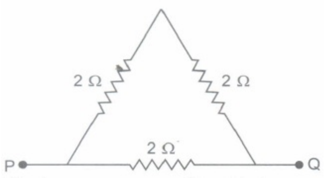
(a) 0.5 ohm (b) 1.5 ohm (c) 1.25 ohm (d) 4/5 ohm

60) When there is an electric current through a conducting wire along its length, then an electric field must exist

(a) outside the wire but normal to it. (b) outside the wire but parallel to it

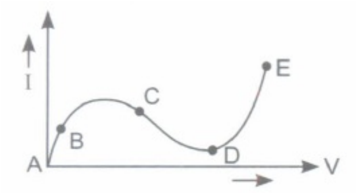
(c) inside the wire but parallel to it. (d) inside the wire but normal to it

61) Three resistors each of 2 ohm are connected together in a triangular shape. The resistance between any two vertices will be



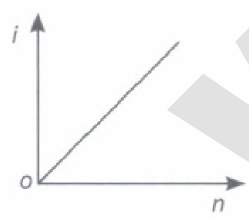
(a) 4/3 ohm (b) 3/4 ohm (c) 3 ohm (d) 6 ohm

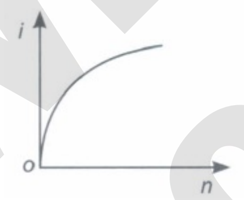
62) From the graph between current I and voltage V shown below, identify the portion corresponding to negative resistance

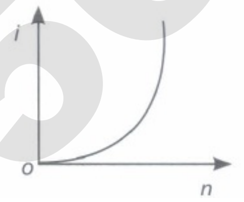


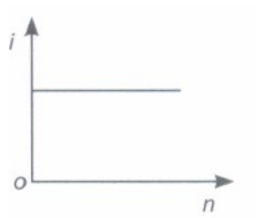
(a) AB (b) BC (c) CD (d) DE

63) A battery consists of a variable number 'n' ofidentical cells having internal resistances connected in series. The terminals of battery are short circuited and the current i is measured. Which of the graph below shows the relationship between i and n?

(a) 

(b) 

(c) 

(d) 

64) Temperature dependence of resistivity p(T) of semiconductors, insulators and metals is significantly based on the following factors:

(a) number of charge carriers can change with temperature T

(b) time interval between two successive collisions is independent on T.

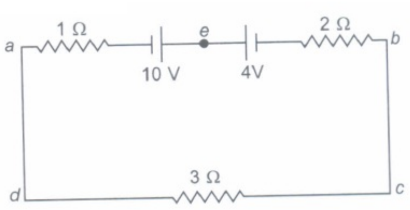
(c) length of material can be a function of T. (d) mass of carriers is a function of T

65) Ohm's law is true.

(a) For metallic conductors at low temperature. (b) For metallic conductors at high temperature

(c) For electrolytes when current passes through them (d) For diode when current flows

66) The magnitude and direction of the current in the circuit shown will be



(a) 7/3A from a to b through e (b) 7/3A from b to a through e (c) 1 A from b to a through e

(d) 1 A from a to b through e

67) In an experiment of meter bridge, a null point is obtained at the centre of the bridge wire. When a resistance of 10 ohm is connected in one gap, the value of resistance in other gap is

(a) 10 Ω (b) 5 Ω (c) 15 Ω (d) 500 Ω

68) The terminal potential difference of a cell is greater than its e.m.f. when it is

(a) being discharged. (b) in open circuit (c) being charged. (d) being either charged or discharged.

69) If the length of potentiometer wire is increased, then the length of the previously obtained balance point will

(a) increase. (b) decrease. (c) remain unchanged. (d) become two times.

70) The magnetic field at a perpendicular distance of 2 cm from an infinite straight current carrying conductor is 2×10^{-6} T. The current in the wire is

(a) 0.1 A (b) 0.2 A (c) 0.4 A (d) 0.8 A

71) A positive charge is moving towards an observer. The direction of magnetic induction lines is

(a) clockwise (b) anticlockwise (c) right (d) left

72) If a copper wire carries a direct current, the magnetic field associated with the current will be

(a) only outside the wire (b) only inside the wire (c) both inside and outside the wire

(d) neither inside nor outside the wire

73) Current carrying wire produces

(a) Only electric field (b) Only magnetic field (c) Both electric and magnetic field

(d) None of the above

74) A circular coil of n turns and radius r carries a current I. The magnetic field at the centre is

(a) $\frac{\mu_o nI}{r}$ (b) $\frac{\mu_o nI}{2r}$ (c) $\frac{2\mu_o nI}{r}$ (d) $\frac{\mu_o nI}{4r}$

75) A thin ring of radius R metre has charge q coulomb uniformly spread on it. The ring rotates about its axis with a constant frequency of f revolutions/s. The value of magnetic field induction in Wb/m^2 at the centre of the ring is

(a) $\frac{\mu_o qf}{2\pi R}$ (b) $\frac{\mu_o q}{2\pi fR}$ (c) $\frac{\mu_o q}{2fR}$ (d) $\frac{\mu_o qf}{2R}$

76) A coil of wire has an area of 600 sq. cm and has 500 turns. If it carries 1.5 A current, its magnetic dipole moment is

(a) 5 Am^2 (b) 15 Am^2 (c) 30 Am^2 (d) 45 Am^2

77) Ampere's circuital law can be derived from

(a) Ohm's law (b) Biot-Savart's law (c) Kirchhoff's law (d) Gauss's law

78) A circular coil carrying current behaves as a

(a) bar magnet (b) horse shoe magnet (c) magnetic shell (d) solenoid

79) A long solenoid has n turns per metre and current I A is flowing through it. The magnetic field induction at the ends of the solenoid is

(a) zero (b) $\mu_o nI/2$ (c) $\mu_o nI$ (d) $2\mu_o NI$

80) Two charged particles traverse identical helical paths in a completely opposite sense in a uniform magnetic field $\vec{B} = B_0\hat{k}$.

(a) They have equal z-components of momenta (b) They must have equal charges

(c) They necessarily represent a particle anti-particle pair.

(d) The charge to mass ratio satisfy $\left(\frac{e}{m}\right)_1 + \left(\frac{e}{m}\right)_2 = 0$

81) Biot-Savart law indicates that the moving electrons produce a magnetic field $\vec{B}$ such that

(a) $\vec{B} \perp \vec{v}$ (b) $\vec{B} \parallel \vec{v}$ (c) it obeys inverse cube law

(d) it is along the line joining the electron and point of observation.

82) A current carrying circular loop of radius R is placed in the x-y plane with centre at the origin. Half of the loop with x > 0 is now bent so that it now lies in the y-z plane.

(a) The magnitude of magnetic moment now diminishes (b) The magnetic moment does not change

(c) The magnitude of $\vec{B}$ at (0,0,z), z > > R increases.

(d) The magnitude $\vec{B}$ at (0,0,z), z > > R is unchanged.

83) An electron is projected with uniform velocity along the axis of a current carrying long solenoid. Which of the following is true?

(a) The electron will be accelerated along the axis (b) The electron path will be circular about the axis.

(c) The electron will experience a force at 45° to the axis and hence execute a helical path.

(d) The electron will continue to move with uniform velocity along the axis of the solenoid.

84) In a cyclotron a charged particle

(a) undergoes acceleration all the time (b) speeds up between the dees because of the magnetic field.

(c) speeds up in a dee (d) slows down within a dee and speeds up between dees.

85) A circular current loop of magnetic moment M is in arbitrary orientation in an external magnetic field. $\vec{B}$ The work does to rotate the loop by 30° about an axis perpendicular to its plane is

(a) MB (b) $\sqrt{3}\frac{MB}{2}$ (c) $\frac{MB}{2}$ (d) zero

86) An electron moving in a circular orbit of radius r makes n rotations per second. The magnetic field produced at the centre has magnitude

(a) zero (b) $\frac{\mu_0 n^2 e}{r}$ (c) $\frac{\mu_0 ne}{2r}$ (d) $\frac{\mu_0 ne}{2\pi r}$

87) Two similar coils of radius R, are lying concentrically with their planes at right angles to each other. The currents flowing in them are I and 2 I respectively. The resultant magnetic field at the centre will be :

(a) $\frac{\sqrt{5}\mu_0 I}{2R}$ (b) $\frac{3\mu_0 I}{2R}$ (c) $\frac{\mu_0 I}{2R}$ (d) $\frac{\mu_0 I}{R}$

88) Two circular coils 1 and 2 are made from the same wire but the radius of the Ist coil twice that of the 2nd coil. What potential difference ratio should be applied across them so that the magnetic field at their centres is the same?

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

89) A toroid of n turns, mean radius R and cross-sectional radius carries a current I. It is placed on a horizontal table taken as x-y plane. Its magnetic moment $\vec{M}$

(a) is non-zero and points in the z-direction by symmetry

(b) points along the axis of the toroid ($\vec{M} = M\hat{\phi}$)

(c) is zero, otherwise, there would be a field falling as $\frac{1}{r^3}$at large distances outside the toroid

(d) is pointing radially outwards.

90) The magnetic field of earth can be modeled by that of a point dipole placed at the center of the earth. The dipole axis makes an angle of $11.3^\circ$with the axis of the earth. At Mumbai, declination is nearly zero. Then,

(a) the declination varies between 11.3°W to 11.3° (b) the least declination is 0°

(c) the plane defined by dipole axis and earth axis passes through Greenwich.

(d) declination averaged over the earth must be always negative.

91) In a permanent magnet at room temperature

(a) the magnetic moment of each molecule is zero

(b) the individual molecules have a non-zero magnetic moment which is all perfectly aligned

(c) domains are partially aligned (d) domains are all perfectly aligned.

92) A paramagnetic sample shows a net magnetization of when placed $8Am^{-1}$ in an external magnetic field 0.6 T at a temperature of 4K. When the same sample is placed in an external magnetic field of 0.2 T at a temperature of 16 K, the magnetization will be

(a) $\frac{32}{3}Am^{-1}$ (b) $\frac{2}{3}Am^{-1}$ (c) 6 Am^{-1} (d) 2.4 Am^{-1}

93) A long straight wire of radius a carries a steady current i. The current is uniformly distributed across its cross-section. The ratio of the magnetic field at a/2 and 2 a is

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

94) The magnetic force acting on a charged particle of charge $-2\mu C$ in a magnetic field of 2 T acting in y-direction, when the particle velocity is $\left(2\hat{i}+3\hat{j}\right)\times 10^6 ms^{-1}$ is

(a) 8 N in z-direction (b) 8 N in -z-direction (c) 4 N in z-direction (d) 8 N in y-direction

95) A proton and an α-particle moving with same velocity enter into a uniform magnetic field, acting normal to the plane of their motion. The ratio of radii of the circular paths described by the proton and α-particle is

(a) 1 : 2 (b) 1 : 4 (c) 1 : 16 (d) 4 : 1

96) A proton and an alpha particle both enter a region of uniform magnetic field B, moving at right angles to the field B. If the radius of circular orbits for both the particles is equal and the kinetic energy acquired by proton is 1 MeV, the energy acquired by the alpha particles will be :

(a) 1 MeV (b) 4 MeV (c) 0.5 MeV (d) 1.5 MeV

97) A charged particle with charge q enters a region of constant, uniform and mutually orthogonal fields $\vec{E} \quad and \quad \vec{B}$ with a velocity $\vec{v}$ perpendicular to both $\vec{E} \quad and \quad \vec{B}$, and comes out without any change in magnitude or direction of $\vec{v}$. Then

(a) $\vec{v}=\vec{B}\times\vec{E}/E^2$ (b) $\vec{v}=\vec{E}\times\vec{B}/B^2$ (c) $\vec{v}=\vec{B}\times\vec{E}/B^2$ (d) $\vec{v}=\vec{E}\times\vec{B}/E^2$

98) Proton, Deuteron and alpha particle of the same kinetic energy are moving in circular trajectories in a constant magnetic field. The radii of proton, deuteron and alpha particle are respectively $r_p, r_d \quad and \quad r_\alpha$. Which one of the following relations is correct?

(a) $r_\alpha = r_p = r_d$ (b) $r_\alpha = r_p < r_d$ (c) $r_\alpha > r_d > r_p$ (d) $r_\alpha = r_d > r_p$

99) When a proton is released from rest in a room, it starts with an initial acceleration a_0 towards west. When it is projected towards north with a speed v_0 it moves with an initial acceleration 3 a_0 towards west. The electric and magnetic fields in the room are

(a) $\frac{ma_0}{e} east, \frac{3ma_0}{ev_0} down$ (b) $\frac{ma_0}{e} west, \frac{2ma_0}{ev_0} up$ (c) $\frac{ma_0}{e} west, \frac{2ma_0}{ev_0} down$ (d) $\frac{ma_0}{e} east, \frac{3ma_0}{ev_0} up$

100) An electron of mass M_e, initially at rest, moves through a certain distance in a uniform electric field in time t_1. A proton of mass M_p also initially at rest, takes time t_2 to move through an equal distance in this uniform electric field. Neglecting the effect of gravity, the ratio t_2/t_1 is nearly equal to

(a) 1 (b) $\sqrt{\frac{M_p}{M_e}}$ (c) $\sqrt{\frac{M_e}{M_p}}$ (d) 1836

101) 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 uniform horizontal magnetic field B. The magnitude of B (in Tesla) is : (Take $g = 9.8 m/s^2$)

(a) 2 (b) 1.5 (c) 0.55 (d) 0.65

102) A conducting wire of length l is turned in the form of a circular coil and a current I is passed through it. For the torque, due to magnetic field produced at its centre, to be maximum, the number of turns in the coil will be

(a) one (b) two (c) three (d) more than three.

103) A galvanometer having a coil resistance of 100Ω 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 10 A is

(a) 0.01Ω (b) 2Ω (c) 0.1Ω (d) 3Ω

104) A galvanometer of resistance 25Ω is connected to a battery of 2 volt along with a resistance in series. When the value of this resistance is 3000Ω, a full scale deflection of 30 units is obtained in the galvanometer. In order to reduce this deflection 10 20 units, the resistance in series will be

(a) 4514Ω (b) 5413Ω (c) 2000Ω (d) 6000Ω.

105) A galvanometer has a sensitivity of 60 division/ampere. When a shunt is used its sensitivity becomes 10 division/ampere. What is the value of shunt used if the resistance of the galvanometer is 20Ω ?

(a) 2Ω (b) 3Ω (c) 4Ω (d) 6Ω

106) In an ammeter 0.5% of main current passes through galvanometer. If resistance of galvanometer is G, the resistance of ammeter will be

(a) G/200 (b) G/199 (c) 199 G (d) 200G.

107) The current sensitivity of a moving coil galvanometer increases by 35%, when its resistance is increased by a factor 3. The voltage sensitivity of galvanometer changes by a factor

(a) 35% (b) 45% (c) 55% (d) none of the above

108) A current of 5 A is flowing through a circular coil of diameter 14 cm having 100 turns. The magnetic dipole moment associated with this coil is :

(a) $0.077Am^2$ (b) $0.77Am^2$ (c) $7.7Am^2$ (d) $77Am^2$

109) A magnet with moment M is given. If it is bent into a semicircular form, its new magnetic moment will be :

(a) M/π (b) $M/2$ (c) M (d) $2M/\pi$

110) A short bar magnet of magnetic moment $0.4JT^{-1}$ is placed in a uniform magnetic field of 0.16 T. The magnet is in stable equilibrium when the potential energy is

(a) -0.064 J (b) zero (c) -0.082 J (d) 0.064 J

111) A magnetic needle lying parallel to a magnetic field requires W units of work to turn it through 60°. The torque required to keep the needle in this position will be

(a) 2 W (b) W (c) $\frac{W}{\sqrt{2}}$ (d) $\frac{W}{\sqrt{3}}$ (e) $\sqrt{3}W$

112) The work done in turning a magnet of magnetic moment M by an angle of 90° from the magnetic meridian is n times the corresponding work done to turn it through an angle of 60°, where n is

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

113) A magnetic needle suspended parallel to a magnetic field requires $\sqrt{3}J$ of work to turn it through 60°. The torque needed to maintain the needle in this position will be :

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

114) A magnetic field can be produced

(a) only by moving charge (b) only by changing electric field (c) Both (a) and (b)

(d) None of the above

115) There is a thin conducting wire carrying current. What is the value of magnetic field induction at any point on the conductor itself ?

(a) 1 (b) Zero (c) - 1 (d) Either (a) or (b

116) An electron of charge (e) is moving parallel to uniform magnetic field B with constant velocity v. The force acting on electron is

(a) Bev (b) Be / v (c) B / ev (d) Zero

117) In a uniform magnetic field, an electron (or charge particle) enters perpendicular to the field. The path of electron will be

(a) ellipse (b) circular (c) parabolic (d) linear

118) If the velocity of charged particle is doubled and value of magnetic field is reduced to half, then the radius of path of charged particle will be

(a) 8 times (b) 3 times (c) 4 times (d) 2 times

119) Two parallel wires are placed 1m apart and 1A and 3 A currents are flowing in the wires in opposite direction. The force acting per unit length of both the wires will be

(a) 6×10^{-7} N / m attractive (b) 6×10^{-5} N /m attractive (c) 6×10^{-7} N / m repulsive

(d) 6×10^{-5} N / m repulsive

120) A circular loop of area A, carrying current I, is placed in a magnetic field B perpendicular to the plane of the loop. The torque on the loop due to magnetic field is

(a) BIA (b) 2 BIA (c) $\frac{1}{2}BIA$ (d) Zero

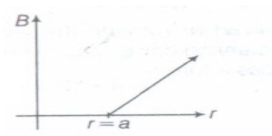
121) The area of a circular ring is 1 cm^2 and current of 10 A is passing through it. If a magnetic field of intensity 0.1 T is applied perpendicular to the plane of the ring. The torque due to magnetic field on the ring will be

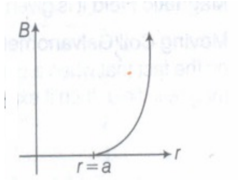
(a) zero (b) 10^{-4} N-m (c) 10^{-2} N-m (d) 1 N-m

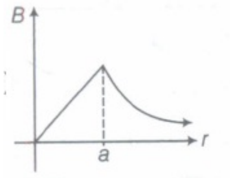
122) The current i is flowing in a coil of area A with the number of turns N, then the magnetic moment of the coil M will be

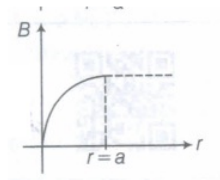
(a) NiA (b) Ni / A (c) $Ni/\sqrt{A}$ (d) N^2 Ai

123) For a cylindrical conductor of radius a, which of the following graphs shows a correct relationship of B versus r?

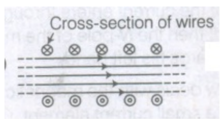
(a) 

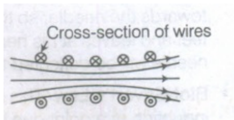
(b) 

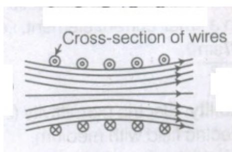
(c) 

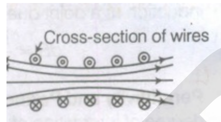
(d) 

124) Which of the following represent a correct figure to display of magnetic field lines due to a solenoid?

(a) 

(b) 

(c) 

(d) 

125) A long solenoid has 20 turns cm^{-1}. The current necessary to produce a magnetic field of 20 mT inside the solenoid is approximately

(a) 1 A (b) 2 A (c) 4 A (d) 8 A

126) An electron is travelling horizontally towards East. Amagnetic field in vertically downward direction exerts a force on the electron along

(a) East (b) West (c) North (d) South

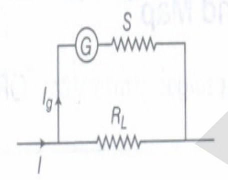
127) An electron is moving in a cyclotron at a speed of 3.2 x 10^7 ms" in a magnetic field of 5 x 10^{-4} T perpendicular to it. What is the frequency of this electron? (q = 1.6 x 10^{-19} C,m_e = 9.1 x 10^{-31} kg)

(a) 1.4 x 10^5 Hz (b) 1.4 x 10^7 Hz (c) 1.4 x 10^6 Hz (d) 1.4 x 10^9 Hz

128) The wire which connects the battery of a car to its starter motor carries current of 300 A during starting. Force per unit length between wires (wires are 0.7 m long and 0.015 m distant apart) is

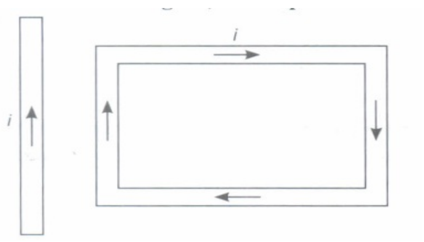
(a) 1.2 Nm^{-1} repulsive (b) 1.2 Nm^{-1} attractive (c) 2.4 Nm^{-1} repulsive (d) 2.4 Nm^{-1}attractive

129) For the voltmeter circuit given,



(a) $\frac{I_g}{I} = \frac{G}{S}$ (b) $\frac{I}{I_g} = \frac{R_L+G}{S}$ (c) $(I - I_g)R_L = I_g(G+S)$ (d) $IR_L = I_gG$

130) A rectangular loop carrying a current i is situated near a long straight wire such that the wire is parallel to the one of the sides of the loop and is in the plane of the loop. If a steady current I is established in wire as shown in figure, the loop will



(a) rotate about an axis parallel to the wire. (b) move away from the wire or towards right

(c) move towards the wire (d) remain stationary.

131) A circular coil of radius 4 cm and of 20 turns carries a current of 3 amperes. It is placed in a magnetic field of intensity 0.5 weber/m^2. The magnetic dipole moment of the coil is

(a) 0.15 ampere-m^2 (b) 0.3 ampere-m^2 (c) 0.45 ampere-m^2 (d) 0.6 ampere-m^2

132) A cubical region of space is filled with some uniform electric and magnetic fields. An electron enters the cube across one of its faces with velocity v and a positron enters via opposite face with velocity -v. At this instant

(a) the electric forces on both the particles cause identical accelerations.

(b) the magnetic forces on both the particles cause equal accelerations.

(c) Only electron gains or looses energy

(d) the motion of the centre of mass (CM) is determined by E alone

133) Consider a wire carrying a steady current, I placed in a uniform magnetic field B perpendicular to its length. Consider the charges inside the wire. It is known that magnetic forces do not work. This implies that,

(a) motion of charges inside the conductor is unaffected by B, since they do not absorb energy.

(b) Some charges inside the wire move to the surface as a result of B.

(c) if the wire moves under the influence of B, no work is done by the force.

(d) If the wire moves under the influence of B, no work is done by the electric force on the ions, assumed fixed within the wire.

134) Two identical current carrying coaxial loops, carry current I in an opposite sense. A simple amperian loop passes through both of them once. Calling the loop as C,

(a) $\oint_C \boldsymbol{B} \cdot \boldsymbol{dl} = \pm \boldsymbol{2\mu_0 I}$ (b) the value of $\oint_C \boldsymbol{B}. dl$ is independent of sense of C.

(c) there may be a point on C where, B and dl are parallel. (d) B vanishes everywhere on C.

135) If a charged particle moves through a magnetic field perpendicular to it

(a) both momentum and energy of particle change. (b) momentum as well as energy are constant.

(c) energy is constant but momentum changes. (d) momentum is constant but energy changes

136) A current carrying closed loop of an irregular shape lying in more than one plane when placed in uniform magnetic field, the force acting on it

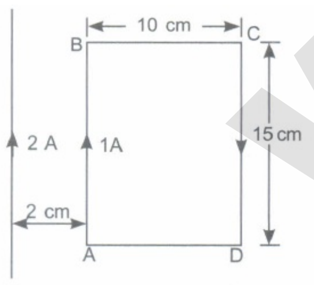
(a) will be more in the plane where its larger position is covered. (b) is zero. (c) is infinite.

(d) mayor may not be zero.

137) A current loop placed in a non-uniform magnetic field experiences

(a) a force of repulsion. (b) a force of attraction. (c) a torque but not force. (d) a force and a torque

138) What is the net force on the rectangular coil?



(a) 25×10^{-7} N towards wire. (b) 25×10^{-7} N away from wire (c) 35×10^{-7} N towards wire

(d) 35×10^{-7} N away from wire.

139) If the beams of electrons and protons move parallel to each other in the same direction, then they

(a) attract each other (b) repel each other (c) no relation (d) neither attract nor repel

140) A conducting circular loop of radius r carries a constant current i. It is placed in a uniform magnetic field B, such that B is perpendicular to the plane of the loop. The magnetic force acting on the loop is

(a) irB (b) 2πriB (c) zero (d) πrib

141) The gyro-magnetic ratio of an electron in an H-atom, according to Bohr model, is

(a) independent of which orbit it is in. (b) neutral (c) positive

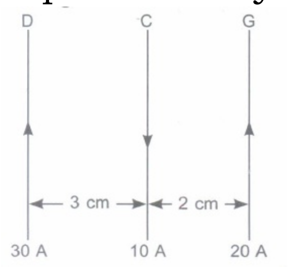
(d) increases with the quantum number n.

142) An electron is projected along the axis of a circular conductor carrying the same current. Electron will experIence

(a) a force along the axis. (b) a force perpendicular to the axis (c) a force at an angle of 4° with axis

(d) no force experienced.

143) Three long, straight parallel wires, carrying current are arranged as shown in the figure. The force experienced by a 25 cm length of wire C is



(a) 10^{-3} N (b) 2.5 x 10^{-3} N (c) zero (d) 1.5 x 10^{3} N

144) A positive charge enters in a magnetic field and travels parallel to but opposite the field. If experiences

(a) an upward force (b) a downward force (c) an accelerated force (d) no force

145) Two magnets have the same length and the same pole strength. But one of the magnets has a small hole at its centre. Then,

(a) both have equal magnetic moment (b) one with hole has small magnetic moment

(c) one with hole has large magnetic moment (d) one with hole loses magnetism through the hole

146) A large magnet is broken into two pieces so that their lengths are in the ratio 2 : 1. The pole strengths of the two pieces will have ratio.

(a) 2: 1 (b) 1: 2 (c) 4: 1 (d) 1: 1

147) Gauss's law for magnetism is

(a) the net magnetic flux through any closed surface is B. $\triangle$S

(b) the net magnetic flux through any closed surface is E. $\triangle$S

(c) the net magnetic flux through any closed surface is zero (d) Both (a) and (c)

148) The value of angle of dip is zero at the magnetic equator because on it

(a) V and Hare equal (b) the values of V and Hare zero (c) the value of V is zero

(d) the value ofH is zero

149) The relative permeability of a substance X is slightly less than unity and that of substance Y is slightly more than unity, then

(a) X is paramagnetic and Y is ferromagnetic (b) X is diamagnetic and Y is ferromagnetic

(c) X and Y both are paramagnetic (d) X is diamagnetic and Y is paramagnetic

150) In a permanent magnet at room temperature,

(a) magnetic moment of each molecule is zero

(b) the individual molecules have non-zero magnetic moment which are all perfectly aligned

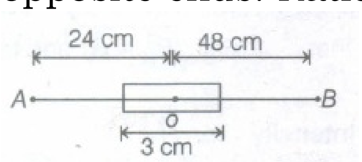
(c) domains are partially aligned (d) domains are all perfectly aligned

151) Cutting a bar magnet in half is like cutting a solenoid, such that we get two smaller solenoids with

(a) weaker magnetic properties (b) strong magnetic properties (c) constant magnetic properties

(d) Both (a) and (b)

152) A bar magnet of length 3 cm has points A and B along axis at a distance of 24 cm and 48 cm on the opposite ends. Ratio of magnetic fields at these points will be



(a) 8 (b) 3 (c) 4 (d) $1/2\sqrt{2}$

153) A short bar magnet placed with its axis at 30° with an external field of 800 G experiences a torque of 0.016 Nm. The magnetic moment of the magnet is

(a) 4 Am^2 (b) 0.5 Am^2 (c) 2 Am^2 (d) 0.40 Am^2

154) The earth's magnetic field at the equator is approximately 0.4 G, the earth's dipole moment is

(a) 1 x 10^{23} Am ^{2} (b) 1.05 x 10^{23} Am ^{2} (c) 8 x 10^{22} Am ^{2} (d) 4 x 10^{2} Am ^{2}

155) At a certain place, horizontal component is $1/\sqrt{3}$ times the vertical component. The angle of dip at this place is

(a) zero (b) $\pi/3$ (c) $\pi/6$ (d) None of these

156) If a diamagnetic substance is brought near the North or the South-pole of a bar magnet, then it is

(a) attracted by the both poles (b) repelled by both the poles

(c) repelled by the North-pole and attracted by the South-pole

(d) attracted by the North-pole and repelled by the South-pole

157) Ferromagnetism show their properties due to

(a) filled inner subshells (b) vacant inner subshells (c) partially filled inner subshells

(d) all the subshells equally filled

158) Hysteresis loss is minimised by using

(a) alloy of steel (b) shell type of core (c) thick wire which has low resistance (d) metal

159) To make electromagnet, substance should be of

(a) high permeability and high susceptibility (b) low permeability and high susceptibility

(c) high permeability and low susceptibility (d) low permeability and low susceptibility

160) The magnetic field of Earth can be modelled by that of a point dipole placed at the centre of the Earth. The dipole axis makes an angle of 11.3° with the axis of Earth. At Mumbai, declination is nearly zero. Then,

(a) the declination varies between 11.3° W to 11.3° E (b) the least declination is 0°.

(c) the plane defined by dipole axis and Earth axis passes through Greenwich

(d) declination averaged over Earth must be always negative.

161) Consider the two idealized systems: (i) a parallel plate capacitor with large plates and small separation and (ii) a long solenoid of length L > > R, radius of cross-section. In (i) E is ideally treated as a constant between plates and zero outside. In (ii) magnetic field is constant inside the solenoid and zero outside. These idealised assumptions, however, contradict fundamental laws as below.

(a) case (i) contradicts Gauss's law for electrostatic fields.

(b) case (ii) contradicts Gauss's law for magnetic fields. (c) case (i) agrees with $\int E.dl = 0$.

(d) case (ii) contradicts $\int \boldsymbol{H}.dl = I_{en}$

162) S is the surface of a lump of magnetic material.

(a) Lines of B are not necessarily continuous across S.

(b) Some lines of B must be discontinuous across S.

(c) Lines of H are necessarily continuous across S. (d) Lines of H cannot all be continuous across S.

163) A long solenoid has 1000 turns per metre and carries a current of 1 A. It has a soft iron core of μ_r = 1000. The core is heated beyond the Curie temperature, T_c.

(a) The H field in the solenoid is (nearly) unchanged but the B field decreases drastically

(b) The H and B fields in the solenoid are nearly unchanged.

(c) The magnetisation in the core reverses direction.

(d) The magnetisation in the core does not diminishes

164) Essential difference between electrostatic shielding by a conducting shell and magnetostatic shielding is due to

(a) electrostatic field lines cannot end on charges and conductors do not have free charges.

(b) lines of B can also end but conductors cannot end them.

(c) lines of B cannot end on any material and perfect shielding is not possible.

(d) shells of high permeability materials cannot be used to divert lines of B from the interior region.

165) A magnetic 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

166) Three needles N_1, N_2 and N_3 are made of a 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) attract all three of them.

(c) attract N_1 and N_2 strongly but repel N_3 (d) attract N_1 strongly, N_2 weakly and repel N_3 weakly

167) Angle of dip is 90° at

(a) poles. (b) equator. (c) both at equator and poles. (d) tropic of cancer.

168) Lines of force, due to earth's horizontal magnetic field, are

(a) elliptical (b) curved lines (c) concentric circles (d) parallel and straight

169) If the magnetising field on a ferromagnetic material is increased, its permeability

(a) is decreased (b) is increased (c) is unaffected (d) may be increased or decreased

170) The best material for the ore of a transformer is

(a) stainless steel (b) mild steel (c) hard steel (d) soft iron

171) Domain formation is the necessary feature of

(a) diamagnetism. (b) Paramagnetism. (c) ferromagnetism (d) all of these.

172) In which type of material the magnetic susceptibility does not depend on temperature

(a) Diamagnetic (b) Paramagnetic (c) Ferromagnetic (d) Ferrite

173) A diamagnetic material in a magnetic field moves

(a) perpendicular to the field (b) from weaker to stronger parts (c) from stronger to weaker parts.

(d) in random direction.

174) The universal property among all substances is

(a) diamagnetism. (b) paramagnetism. (c) ferromagnetism. (d) all of these

175) A magnet can be completely demagnetised by

(a) breaking the magnet into small pieces (b) heating it slightly (c) dropping it into ice cold water

(d) a reverse field of appropriate strength

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