RAVI MATHS TUITION CENTER, CHENNAI-82. WHATSAPP.- 8056206308

12TH CBSE PHYSICS CHAPTER TEST Moving Charges And Magnetism 1

12th Standard CBSE

Physics

Exam Time : 01:30:00 Hrs

Total Marks : 75

1) 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 1

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

2) A positive charge is moving towards an observer. The direction of magnetic induction lines is 1

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

3) If a copper wire carries a direct current, the magnetic field associated with the current will be 1

(a) only outside the wire (b) only inside the wire (c) both inside and outside the wire (d) neither inside nor outside the wire

4) Current carrying wire produces 1

(a) Only electric field (b) Only magnetic field (c) Both electric and magnetic field (d) None of the above

5) A circular coil of n turns and radius r carries a current I. The magnetic field at the centre is 1

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

6) 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 1

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

7) 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 1

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

8) Ampere's circuital law can be derived from 1

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

9) A circular coil carrying current behaves as a 1

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

10) 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 1

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

11) Two charged particles traverse identical helical paths in a completely opposite sense in a uniform magnetic field $\vec{B} = B_0\hat{k}$. 1

(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 $\left(\frac{e}{m}\right)_1 + \left(\frac{e}{m}\right)_2 = 0$

12) Biot-Savart law indicates that the moving electrons produce a magnetic field $\vec{B}$such that 1

(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.

13) 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. 1

(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.

14) An electron is projected with uniform velocity along the axis of a current carrying long solenoid. Which of the following is true? 1

(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.

15) In a cyclotron a charged particle 1

(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.

16) 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 1

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

17) An electron moving in a circular orbit of radius r makes n rotations per second. The magnetic field produced at the centre has magnitude 1

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

18) 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 : 1

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

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19) 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? 1

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

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20) 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 $\vec{M}$ 1

(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.

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21) 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° with the axis of the earth. At Mumbai, declination is nearly zero. Then, 1

(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.

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22) In a permanent magnet at room temperature 1

(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.

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23) Consider the two idealized systems: (i) a parallel plate capacitor with large and small separation and (ii) a long solenoid of length L > > R, radius of the cross-section. In (i) $\vec{E}$ is ideally treated as a constant between plates and zero outside. In (ii) magnetic field is constant inside the solenoid and zero outside. These idealized assumptions, however, contradict fundamental law as below: 1

(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 $\oint \vec{E}.\vec{dl} = 0$ (d) case (ii) contradicts $\oint \vec{H}.\vec{dl} = l_{en}$

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24) 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 1

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

25) 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 1

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

26) 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 1

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

(d) 8 N in y-direction

27) 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 1

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

28) An electron is travelling along the X-direction. It encounters the magnetic field in the Y-direction. Its subsequent motion will be 1

(a) straight line along X-direction (b) a circle in the X-Z plane

(c) a circle in the YZ plane (d) a circle in the XY plane

29) A charged particle goes undeflected in a region containing electric and magnetic field. It is possible that 1

(a) $\vec{E} \parallel \vec{B}$ but $\vec{v}$ is not parallel to $\vec{E}$ (b) $\vec{v} \parallel \vec{B}$ but $\vec{E}$ is not parallel to $\vec{B}$

(c) $\vec{E} \parallel \vec{B}, \vec{v} \parallel \vec{E}$ (d) $\vec{E}$ is not parallel to $\vec{B}$ and $\vec{v}$

30) Two particles X and Y having equal charges after being accelerated through the same potential difference, enter a region of uniform magnetic field and describe circular paths of radii $R_1 \quad and \quad R_2$ respectively. The ratio of the mass of X to that Y is 1

(a) $\frac{R_1}{R_2}$ (b) $\frac{R_2}{R_1}$ (c) $\left(\frac{R_1}{R_2}\right)^{1/2}$ (d) $\left(\frac{R_1}{R_2}\right)^{2}$

31) 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 : 1

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

32) A particle of mass m and charge q is accelerated through a potential difference V to a velocity $\vec{v}$ towards south. The particle enters a region with both a magnetic field $\vec{B}$ (pointing eastwards) and electric field $\vec{E}$ (pointing downwards). The particle travels with a constant velocity through this region. The potential difference V through this region should be equal to 1

(a) E/B (b) E/qB (c) 2 mE/qB (d) $mE^2/2qB^2$

33) An electric charge + q moves with velocity $\vec{v} = 3\hat{i} + 4\hat{j} + \hat{k}$, in an electromagnetic field give $\vec{E} = 3\hat{i} + \hat{j} + 2\hat{k}, \quad \vec{B} = \hat{i} + \hat{j} - 3\hat{k}$. They y-component of the force experienced by + q is 1

(a) 2 q (b) 11 q (c) 5 q (d) 3 q

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34) 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 1

(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) $\vec{v} = \vec{E} \times \vec{B}/E^2$

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35) 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? 1

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

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36) 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 1

(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) $\frac{ma_0}{e} east, \frac{3ma_0}{ev_0} up$

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37) 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 1

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

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38) 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 $g = 9.8 m/s^2$) 1

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

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39) A horizontal wire 0.1 m long carries a current of 5 A. Find the magnitude and direction of the magnetic field, which can support the weight of the wire. Given the mass of the wire is $3 \times 10^{-3} kg/m \quad and \quad g = 10 ms^{-2}$. 1

(a) $6 \times 10^{-3} T$, acting vertically upwards

(b) $6 \times 10^{-3} T$, acting horizontally perpendicular to wire

(c) $6 \times 10^{-2} T$, acting vertically downwards

(d) $6 \times 10^{-2} T$, acting horizontally perpendicular to wire

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40) 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 is 1

(a) q/2 m (b) q/m (c) 2 q/m (d) $q/\pi\,m$.

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41) 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 1

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

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42) 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 1

(a) 0.01Ω (b) 2Ω (c) 0.1Ω (d) 3Ω

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43) 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 $3000\Omega,$ 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 1

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

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44) 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 ? 1

(a) 2Ω (b) 3Ω (c) 4Ω (d) 6Ω

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45) In an ammeter 0.5% of main current passes through galvanometer. If resistance of galvanometer is G, the resistance of ammeter will be 1

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

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46) 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 1

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

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47) 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 : 1

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

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48) A magnet with moment M is given. If it is bent into a semicircular form, its new magnetic moment will be : 1

(a) M/π (b) $M/2$ (c) M (d) $2M/\pi$

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49) 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 1

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

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50) 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 1

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

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51) 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 1

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

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52) 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 : 1

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

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53) A magnetic field can be produced 1

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

(d) None of the above

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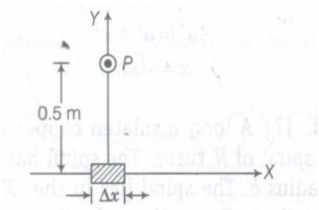
54) An element $\triangle I = \triangle x\ \hat{i}$ is placed at the origin and carries a current I = 10A. 1



If $\triangle x$ = 1cm, magnetic field at point P is

(a) $4 \times 10^{-8}\hat{\mathbf{k}}$T (b) $4 \times 10^{-8}\hat{\mathbf{i}}$T (c) $4 \times 10^{-8}\hat{\mathbf{j}}$T (d) $-4 \times 10^{-8}\hat{\mathbf{j}}$T

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55) There is a thin conducting wire carrying current. What is the value of magnetic field induction at any point on the conductor itself ? 1

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

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56) A helium nucleus moves in a circle of 0.8 m radius in one second. The magnetic field produced at the centre of circle will be 1

(a) $\mu_0 \times 10^{-19}$ (b) $\mu_0 \times 10^{+19}$ (c) $2\mu_0 \times 10^{-19}$ (d) $\frac{2\times10^{-19}}{\mu_0}$

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57) For a toroid, magnetic field strength in the region enclosed by wire turns is given by 1

(a) B = μ_0 n I, where n = number of turns.

(b) B = μ_0 I / n, where n = number of turns per metre

(c) $B = \frac{\mu_0 I}{2r}$,where r = mean radius

(d) $B = \frac{\mu_0 NI}{2\pi r}, \begin{cases} \text{where, } N = \text{ number of turn} \\ \text{and } r = \text{ radius of toroid.} \end{cases}$

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58) The value of force F acting on charge q moving with velocity perpendicular to the magnetic field B will be 1

(a) F = qvB (b) $F = \frac{qv}{B}$ (c) $F = \frac{qB}{v}$ (d) $F = \frac{Bv}{q}$

59) An electron of charge (e) is moving parallel to uniform magnetic field B with constant velocity v. The force acting on electron is 1

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

60) In a uniform magnetic field, an electron (or charge particle) enters perpendicular to the field. The path of electron will be 1

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

61) 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 1

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

62) 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 1

(a) 6 x10^{-7} N / m attractive (b) 6 x10^{-5} N /m attractive (c) 6 x10^{-7} N / m repulsive (d) 6 x10^{-5} N / m repulsive

63) 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 1

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

64) 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 1

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

65) 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 1

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

66) A galvanometer of resistance 25 Ωshows full scale deflection for current of 10 mA. To convert it into 100 V range voltmeter, the required series resistance is 1

(a) 9975 Ω (b) 10025 Ω (c) 10000 Ω (d) 975 Ω

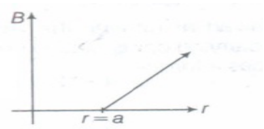
67) Vector form of Biot-Savart's law is 1

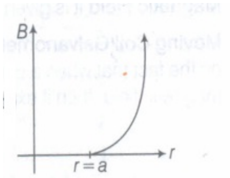
(a) $d\mathbf{B} = \frac{\mu_0}{4\pi}\frac{1\times dl}{r^2}$ (b) $d\mathbf{B} = \frac{Id\mathbf{l}\times\mathbf{r}}{r^3}$ (c) $d\mathbf{B} = \frac{\mu_0}{4\pi}\frac{Id\mathbf{l}\times\mathbf{r}}{r^3}$ (d) $d\mathbf{B} = \frac{\mu_0}{4\pi}\frac{Id\mathbf{l}\times\mathbf{r}}{r^2}$

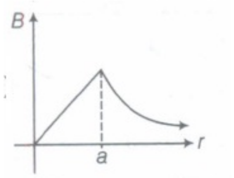
68) A polygon shaped wire is inscribed in a circle of radius R. The magnetic induction at the centre of polygon, when current flows through the wire is 1

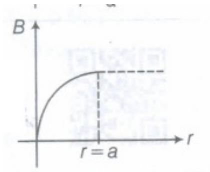
(a) $\frac{\mu_0 nI}{2\pi R}\tan\left(\frac{2\pi}{n}\right)$ (b) $\frac{\mu_0 nI}{2\pi R}\tan\left(\frac{4\pi}{n}\right)$ (c) $\frac{\mu_0 nI}{2\pi R}\tan\left(\frac{\pi}{n}\right)$ (d) $\frac{\mu_0 nI}{2\pi R}\tan\left(\frac{\pi}{n^2}\right)$

69) For a cylindrical conductor of radius a, which of the following graphs shows a correct relationship of B versus r? 1

(a) 

(b) 

(c) 

(d) 

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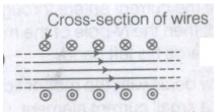
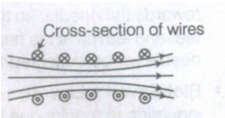
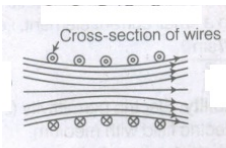
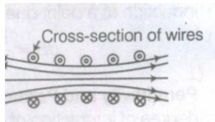
70) Which of the following represent a correct figure to display of magnetic field lines due to a solenoid? 1

(a) 

(b) 

(c) 

(d) 

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

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

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72) An electron is travelling horizontally towards East. Amagnetic field in vertically downward direction exerts a force on the electron along 1

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

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73) 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) 1

(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

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74) 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 1

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

(d) 2.4 Nm $^{-1}$attractive

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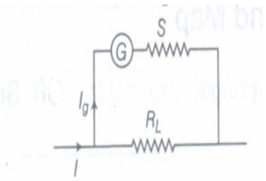
75) For the voltmeter circuit given, 1



(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) $IR_L = I_gG$

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1) (b) 0.2 A 1

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2) (b) anticlockwise 1

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3) (a) only outside the wire 1

4) (b) Only magnetic field 1

5) (b) $\frac{\mu_o nI}{2r}$ 1

6) (d) $\frac{\mu_o qf}{2R}$ 1

7) (d) 45 Am^2 1

8) (b) Biot-Savart's law 1

9) (c) magnetic shell 1

10) (b) $\mu_o nI/2$ 1

11) (d) The charge to mass ratio satisfy $\left(\frac{e}{m}\right)_1 + \left(\frac{e}{m}\right)_2 = 0$ 1

12) (a) $\vec{B} \perp \vec{v}$ 1

13) (a) The magnitude of magnetic moment now diminishes 1

14) (d) 1

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

15) (a) undergoes acceleration all the time 1

16) (d) zero 1

17) (c) $\frac{\mu_0 ne}{2r}$ 1

18) (a) $\frac{\sqrt{5}\mu_0 I}{2R}$ 1

19) (c) 4 1

20) (c) 1

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

21) (a) the declination varies between 11.3° W to 11.3° 1

22) (c) domains are partially aligned 1

23) (d) case (ii) contradicts $\oint \vec{H}.\vec{dl} = l_{en}$ 1

24) (b) $\frac{2}{3} Am^{-1}$ 1

25) (d) 1 1

26) (b) 8 N in -z-direction 1

27) (a) 1 : 2 1

28) (b) a circle in the X-Z plane 1

29) (c) $\vec{E} \parallel \vec{B}, \vec{v} \parallel \vec{E}$ 1

30) (d) $\left(\frac{R_1}{R_2}\right)^2$ 1

31) (a) 1 MeV 1

32) (d) $mE^2/2qB^2$ 1

33) (b) 11 q 1

34) (b) $\vec{v} = \vec{E} \times \vec{B}/B^2$ 1

35) (b) $r_\alpha = r_p < r_d$ 1

36) (c) $\frac{ma_0}{e} west, \frac{2ma_0}{ev_0} down$ 1

37) (b) $\sqrt{\frac{M_p}{M_e}}$ 1

38) (b) 1.5 1

39) (b) $6 \times 10^{-3} T$, acting horizontally perpendicular to wire 1

40) (a) q/2 m 1

41) (a) one 1

42) (a) 0.01Ω 1

43) (a) 4514Ω 1

44) (c) 4Ω 1

45) (a) G/200 1

46) (c) 55% 1

47) (c) $7.7Am^2$ 1

48) (d) $2M/\pi$ 1

49) (a) -0.064 J 1

50) (e) $\sqrt{3}W$ 1

51) (b) 2 1

52) (b) $3J$ 1

53) (a) only by moving charge 1

54) (a) $4 \times 10^{-8}\hat{\mathbf{k}}\mathrm{T}$ 1

55) (b) Zero 1

56) (c) $2\mu_0 \times 10^{-19}$ 1

57) (d) $B = \frac{\mu_0 NI}{2\pi r}, \begin{cases} \text{where, } N = \text{ number of turn} \\ \text{and } r = \text{ radius of toroid.} \end{cases}$ 1

58) (a) F = qvB 1

59) (d) Zero 1

60) (b) circular 1

61) (b) 3 times 1

62) (c) 6 x10^{-7} N / m repulsive 1

63) (d) Zero 1

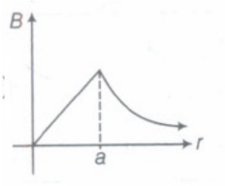
64) (a) zero 1

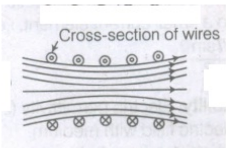
65) (a) NiA 1

66) (a) 9975 Ω 1

67) (c) $d\mathbf{B} = \frac{\mu_0}{4\pi}\frac{Id\mathbf{l}\times\mathbf{r}}{r^3}$ 1

68) (c) $\frac{\mu_0 nI}{2\pi R}\tan\left(\frac{\pi}{n}\right)$ 1

69) (c) 
 1

70) (c) 
 1

71) (d) 8 A 1

72) (d) South 1

73) (b) 1.4×10^7 Hz 1

74) (a) 1.2 Nm^{-1} repulsive 1

75) (c) $(I - I_g)R_L = I_g(G+S)$ 1