Test / Exam Name: Moving Charges And Magnetism **Standard: 12th Science** **Subject: Physics**

Instructions

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Q1. An electron and a proton are moving along the same direction with the same kinetic energy. They enter a uniform magnetic field acting perpendicular to their velocities. The dependence of radius of their paths on their masses is: **1 Mark**

A $r \propto m$
B $r \propto \sqrt{m}$
C $r \propto \frac{1}{m}$
D $r \propto \frac{1}{\sqrt{m}}$

Q2. A current of 10A is flowing from east to west in a long straight wire kept on a horizontal table. The magnetic field developed at a distance 10cm verticaly above the wire is: **1 Mark**

A 1.2×10^{-5}T, acting towards south.
B 2×10^{-5}T, acting towards north.
C 3×10^{-5}T, acting downwards.
D 2×10^{-5}T, acting upwards.

Q3. There are uniform electric and magnetic fields in a region pointing along X-axis. An $\alpha-$ particle is projected along Y-axis with a velocity v. The shape of the trajectory will be: **1 Mark**

A Circular in XZ plane.
B Circular in YZ plane.
C Helical with its axis parallel to X-axis.
D Helical with its axis parallel to Y-axis.

Q4. A straight current carrying conductor is placed inside a uniform magnetic field. The force per unit length acting on the conductor is: **1 Mark**

A Maximum when the conductor is perpendicular to the direction of magnetic field.
B Maximum when the conductor is along the direction of magnetic field.
C Minimum when the conductor is perpendicular to the direction of magnetic field.
D Minimum when the conductor makes an angle of 45° with the direction of magnetic field.

Q5. A loop carrying a current I clockwise is placed in x y plane, in a uniform magnetic field directed along z-axis. The tendency of the loop will be to: **1 Mark**

A move along x-axis **B** move along y-axis **C** shrink **D** expand

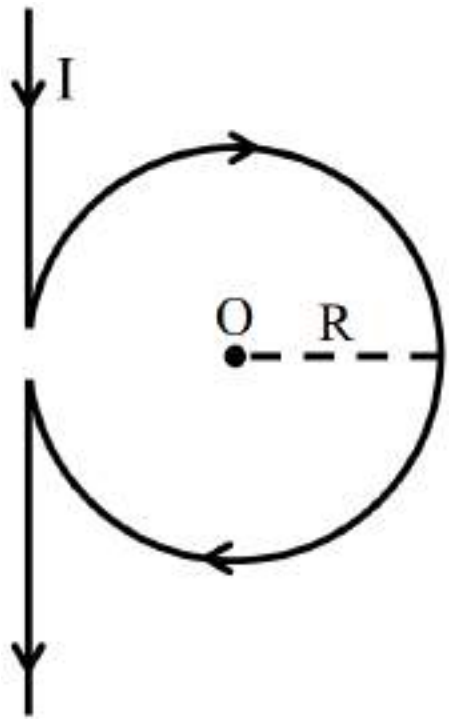
Q6. A current of 5A is flowing from east to west in a long straight wire kept on a horizontal table. The magnetic field developed at a distance of 10cm due south on the table is: **1 Mark**

A 1×10^{-5}T acting downwards.
B 1×10^{-5}T acting upwards.
C 2×10^{-5}T acting downwards.
D 2×10^{-5}T acting upwards.

Q7. A current of 10A is flowing from east to west in a long straight wire kept on a horizontal table. The magnetic field developed at a distance of 10cm due north on the table is: **1 Mark**

A 2×10^{-5}T, acting downwards.
B 2×10^{-5}T, acting upwards.
C 4×10^{-5}T, acting downwards.
D 4×10^{-5}T, acting upwards.

Q8. A current I flows through a long straight conductor which is bent into a circular loop of radius R in the middle as shown in the figure: **1 Mark**



The magnitude of the net magnetic field at point O will be:

A Zero
B $\frac{\mu_0 I}{2R}(1+\pi)$
C $\frac{\mu_0 I}{4\pi R}$
D $\frac{\mu_0 I}{2R}\left(1-\frac{1}{\pi}\right)$

Q9. An electron is released from rest in a region of uniform electric and magnetic fields acting parallel to each other. The electron will: **1 Mark**

A Move in a straight line.
B Move in a circle.
C Remain stationary.
D Move in a helical path.

Q10. Two identical circular coaxial coils A and B, arranged in vertical planes parallel to each other, carry currents in the same direction. **1 Mark**
If the distance between the coils is decreased at a constant rate, the current:

A Increases in A and decreases in B.
B Decreases in both A and B.
C Increases in both A and B.
D Remains same in both A and B.

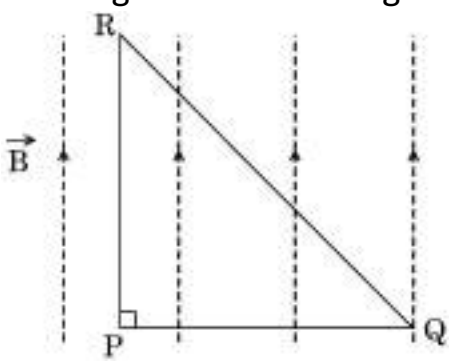
Q11. A bar magnet is dropped in a hollow metallic cylinder along its vertical axis. The acceleration of the falling magnet will be: **1 Mark**

A Zero **B** Equal to g **C** Less than g **D** Greater than g

Q12. A charge particle after being accelerated through a potential difference 'V' enters in a uniform magnetic field and moves in a circle of radius r. If V is doubled, the radius of the circle will become: **1 Mark**

A $2r$
B $\sqrt{2}r$
C $4r$
D $\frac{r}{\sqrt{2}}$

Q13. An isosceles right angled current carrying loop PQR is placed in a uniform magnetic field $\vec{B}$ pointing along PR. If the magnetic force acting on the arm PQ is F, then the magnetic force which acts on the arm QR will be: **1 Mark**



A F
B $\frac{F}{\sqrt{2}}$
C $\sqrt{2}F$
D $-F$

Q14. The sensitivity of a tangent galvanometer can be increased by increasing: **1 Mark**

A The radius of the coil
B The external magnetic field
C The number of turns of the coil
D All the above

Q15. How is galvanometer converted into a voltmeter? **1 Mark**

A By connecting a high resistance multiplier in parallel to the galvanometer.
B By connecting a low resistance multiplier in parallel to the galvanometer.

C By connecting a low resistance multiplier in series with the galvanometer.

D By connecting a high resistance multiplier in series with the galvanometer.

Q16. Lorentz force is: **1 Mark**

A Electrostatic force acting on a charged particle.

B Magnetic force acting on a moving charged particle.

C The vector sum of electrostatic and magnetic force acting on a moving charged particle.

D The vector sum of gravitational and magnetic force acting on a moving charged particle

Q17. A steady electric current is flowing through a cylindrical conductor. **1 Mark**

A The electric field at the axis of the conductor is zero.

B The magnetic field at the axis of the conductor is zero.

C The electric field in the vicinity of the conductor is zero.

D The magnetic field in the vicinity of the conductor is zero.

Q18. A charged particle moves along a circle under the action of possible constant electric and magnetic fields. Which of the following are possible? **1 Mark**

A $\mathrm{E} = 0,\ \mathrm{B} = 0$

B $\mathrm{E} = 0,\ \mathrm{B} \neq 0$

C $\mathrm{E} \neq 0,\ \mathrm{B} = 0$

D $\mathrm{E} \neq 0,\ \mathrm{B} \neq 0$

Q19. The current sensitibility of a moving coil galanometer increases with decrease in: **1 Mark**

1 Magnetic field **2** Area of a coil **3** Number of turns **4** None of these

Q20. A charged particle moves through a magnetic field in a direction perpendicular to it. Then the: **1 Mark**

A Velocity remains unchanged.

B Speed of the particle remains unchanged.

C Direction of the particle remains unchanged.

D Acceleration remains unchanged.

Q21. A charged particle enters a magnetic field H with its initial velocity making an angle of 45° with H. Then the path of the particle will be: **1 Mark**

A Circle **B** Helical **C** A straight line **D** A circle

Q22. Two streams of protons move parallel to each other in the same direction. They will: **1 Mark**

A Attract each other

B Repel each other

C Neither attract nor repel

D Rotate

Q23. Consider the following statements and select the incorrect statement(s). **1 Mark**

1. The presence of a large magnetic flux through a coil maintains a current in the coil if the circuit is continuous.
2. A coil of a metal wire kept stationary in a non– uniform magnetic field has an e.m.f induced in it.
3. A charged particle enters a region of uniform magnetic field at an angle of 85° to the magnetic lines of force, the path of the particle is a circle.
4. There is no change in the energy of a charged particle moving in a magnetic field, although a magnetic force is acting on it.

A I and II. **B** II and III. **C** II only. **D** IV only.

Q24. Cyclotron is a device used to _____. **1 Mark**

A Slow down charged particles

B Accelerate the positively charged particles

C Stop the charged particles

D None of the options

Q25. 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, **1 Mark**

A The electric forces on both the particles cause identical accelerations.

B The magnetic forces on both the particles cause equal accelerations.

C Both particles gain or loose energy at the same rate.

D The motion of the centre of mass (CM) is determined by B alone.

Q26. 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 Mark**

A The magnitude of magnetic moment now diminishes.T

B he magnetic moment does not change.

C The magnitude of B at (0, 0, z), z > R increases.
D The magnitude of B at (0, 0, z), z >> R is unchanged.

Q27. A milli voltmeter of 25 milli volt range is to be converted into an ammeter of 25 ampere range. The value (in ohm) of necessary shunt will be: **1 Mark**

A 0.001. **B** 0.01. **C** 1. **D** 0.05.

Q28. Which of the following statement is not correct about two parallel conductors carrying equal currents in the same direction? **1 Mark**

A Each of the conductors will experience a force
B The two conductors will repel each other
C There are concentric lines of force around each conductor
D Each of the conductors will move if not prevented from doing so

Q29. A beam consisting of protons and electrons moving at the same speed goes through a thin region in which there is a magnetic field perpendicular to the beam. The protons and the electrons: **1 Mark**

A Will go undeviated.
B Will be deviated by the same angle and will not separate.
C Will be deviated by different angles and hence separate.
D Will be deviated by the same angle but will separate.

Q30. Magnetic field at the centre of a circular coil of radius r, through which a current I flows is: **1 Mark**

A Directly proportional to r.
B Inverseley proportional to I.
C Directly proportional to I.
D Directly proprotional to I2.

Q31. What is moving coil galvanometer used for? **1 Mark**

A Measurement of voltage only
B Measurement of resistance
C Measurement of small currents
D Measurement of electric field

Q32. In a coaxial, straight cable, the central conductor and the outer conductor carry equal currents in opposite directions. The magnetic field is zero: **1 Mark**

A Outside the cable.
B Inside the inner conductor.
C Inside the outer conductor.
D In between the tow conductors.

Q33. An electron having a charge e moves with a velocity v in X-direction. An electric field acts on it in Y-direction? The force on the electron acts in: **1 Mark**

A Positive direction of Y-axis
B Negative direction of Y-axis.
C Positive direction of Z-axis.
D Negative direction of Z-axis.

Q34. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion: The sensitivity of a moving coil galvanometer is increased by placing a suitable magnetic material as a core inside the coil.

Reason: Soft iron has high magnetic permeability and cannot be easily magnetized or demagnetized.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false and R is also false.

Q35. Under what condition the force acting on the charge particle moving in the magnetic field maximum? **1 Mark**

A Charge particle moves perpendicular to the velocity vector.
B Charge particle moves in straight line with the velocity vector.
C Charge particle moves with an angle 60 with the velocity vector.
D All

Q36. The magnetic field at the origin due to a current element $\mathrm{i}\vec{\mathrm{d\,l}}$ placed at a position $\vec{\mathrm{r}}$ is: **1 Mark**

A $\frac{\mu_0 \mathrm{i}}{4\pi}\frac{\vec{\mathrm{d\,l}}\times\vec{\mathrm{r}}}{\mathrm{r}^3}$
B $-\frac{\mu_0 \mathrm{i}}{4\pi}\frac{\vec{\mathrm{r}}\times\vec{\mathrm{d\,l}}}{\mathrm{r}^3}$
C $\frac{\mu_0 \mathrm{i}}{4\pi}\frac{\vec{\mathrm{r}}\times\vec{\mathrm{d\,l}}}{\mathrm{r}^3}$
D $-\frac{\mu_0 \mathrm{i}}{4\pi}\frac{\vec{\mathrm{d\,l}}\times\vec{\mathrm{r}}}{\mathrm{r}^3}$

Q37. Which of the following particles will describe the smallest circle when projected with the same velocity perpendicular to a magnetic field? **1 Mark**

A Electron **B** Proton **C** He^+ **D** Li^+

Q38. There will be no force between two wires carrying currents if currents are: **1 Mark**

A Parallel to each other
B Antiparallel to each other
C Perpendicular to each other
D None of these.

Q39. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion: Diamagnetic materials can exhibit magnetism.
Reason: Diamagnetic materials have permanent magnetic dipole moment.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false and R is also false.

Q40. A circular current loop of magnetic moment M is in an arbitrary orientation in an external magnetic field B. The work done to rotate the loop by 30° about an axis perpendicular to its plane is: **1 Mark**

A MB.
B $\sqrt{3}\frac{MB}{2}$
C $\frac{MB}{2}$
D Zero.

Q41. A moving charge produces: **1 Mark**

A Electric field only. **B** Magnetic field only. **C** Both of them. **D** None of them.

Q42. A moving coil type of galvanometer is based upon the principle that: **1 Mark**

A Coil carrying current experiences a torque in magnetic field.
B A coil carrying current produces a magnetic field.
C A coil carrying current experiences impulse in a magnetic field.
D A coil carrying current experiences a force in a magnetic field.

Q43. A stream of electrons is projected horizontally to the right. A straight conductor carrying a current is supported parallel to the electron stream and above it. If the current in the conductor is from left to right, what will be the effect on the electron stream? **1 Mark**

A The electron stream will be pushed downwards.
B The electron stream will be pulled upwards.
C The electron stream will be retarded.
D The electron beam will be speeded up towards the right.

Q44. In a cyclotron, a charged particle: **1 Mark**

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.

Q45. Which of the following is not a point of similarity between Biot-Savart law and Coulomb's law. **1 Mark**

A Both fields depend inversely on the square of the distance from the source to the point of observation.
B They are not a universal law.
C The principle of superposition does not apply to both.
D Both are long-range fields.

Q46. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

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 will stay vertical at the north pole of earth

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false and R is also false.

Q47. **1 Mark**

The couple developed in the suspension wire and the loose spring in a suspension type of moving coil galvanometers called:

A Deflecting couple **B** Restoring couple **C** Twisting couple **D** None of these

Q48. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion: The poles of magnet can not be separated by breaking into two pieces.

Reason: The magnetic moment will be reduced to half when a magnet is broken into two equal pieces.

A Both A and R are true and R is the correct explanation of A.

B Both A and R are true but R is not the correct explanation of A.

C A is true but R is false.

D A is false and R is also false.

Q49. A proton, a deuteron and an α particle are accelerated through same potential difference and then they enter in a normal uniform magnetic field, the ratio of their kinetic energies will be: **1 Mark**

A 2 : 1 : 3 **B** 1 : 1 : 2 **C** 1 : 1 : 1 **D** 1 : 2 : 4

Q50. Which of the following is true? **1 Mark**

A Parallel currents repel, and antiparallel currents attract.

B Parallel currents attract, and antiparallel currents repel.

C Both parallel and antiparallel currents attract.

D Both parallel and antiparallel currents repel.

Q51. A vertical wire carries a current in upward direction. An electron beam sent horizontally towards the wire will be deflected: **1 Mark**

A Towards right. **B** Towards left. **C** Upwards. **D** Downwards.

Q52. The path of an electron in a uniform magnetic field may be: **1 Mark**

A Circular but not helical

B Helical but not circular

C Neither helical nor circular

D Either helical or circular

Q53. A charged particle moves in a magnetic field. The only force influencing the particle is the force caused by the magnetic field. **1 Mark**

During the particle's movement in the magnetic field, what will NOT change?

A The particle's velocity

B The particle's acceleration

C The particle's speed

D The particle's momentum

E The particle's position

Q54. In a cyclotron, a charged particle. **1 Mark**

A Undergoes acceleration all the time.

B Speeds up between the dees because of the magnetic field.

C Speeds up in a dees.

D Slows down within a dee and speeds up between dees.

Q55. To convert galvanometer into voltmeter one should connect: **1 Mark**

A High resistance in series with galvanometer.

B Low resistance in series with galvanometer.

C High resistance in parallel with galvanometer.

D Low resistance in parallel with galvanometer.

Q56. Two ions have equal masses but one is singly-ionised and the other is doubly-ionised. They are projected from the same place in a uniform magnetic field with the same velocity perpendicular to the field. **1 Mark**

A Both ions will move along circles of equal radii.

B The circle described by the singly-ionised charge will have a radius that is. double that of the other circle.

C The two circles do not touch each other.

D The two circles touch each other.

Q57. When current passes through the circuit a compass needle rests in which direction (with respect to the Earth)? **1 Mark**

A South - north **B** North - south **C** East - west **D** West - east

Q58. What is the angle of dip at the magnetic poles? **1 Mark**

A 30° **B** 0° **C** 45° **D** None of these

Q59. Isoclinic lines are the lines joining places with: **1 Mark**

A Equal dip
B Equal declination
C jequal dip and declination
D None of these

Q60. An unknown particle is being studied in a magnetic field of variable intensity and direction. When the magnetic field is turned off, the particle is observed to move toward the earth. When the magnetic field is turned on, the particle is observed to continue to move toward the earth, no matter the strength or the direction of the magnetic field. Which of the particles listed below is most likely the unknown particle? **1 Mark**

A Beta particle **B** Alpha particle **C** Positron **D** Neutron
E Gamma ray

Q61. A tangent galvanometer is connected directly to an ideal battery. If the number of turns in the coil is doubled the deflection will: **1 Mark**

A Increase.
B Decrease.
C Remain unchanged.
D Either increase or decrease.

Q62. A charged particle goes undeflected in a region containing an electric and a magnetic field. It is possible that **1 Mark**

A $\overrightarrow{E} || \overrightarrow{B}$, $\overrightarrow{v} || \overrightarrow{E}$
B $\overrightarrow{E}$ is not parallel to $\overrightarrow{B}$
C $\overrightarrow{v} || \overrightarrow{B}$ but $\overrightarrow{E}$ is not parallel to $\overrightarrow{B}$
D $\overrightarrow{E} || \overrightarrow{B}$ but $\overrightarrow{v}$ is not parallel to $\overrightarrow{E}$

Q63. What is the work done by the magnetic field on a moving charged particle? **1 Mark**

A Maximum
B Minimum
C Depends on the strength of the magnetic field
D Zero

Q64. A charge + q is sent through a magnetic field. The force acting on it is maximum when the angle between the direction of motion of the charged particle and the magnetic field: **1 Mark**

A 0° **B** 45° **C** 90° **D** 180°

Q65. A current-carrying, straight wire is kept along the axis of a circular loop carrying a current. The straight wire: **1 Mark**

A Will exert an inward force on the circular loop.
B Will exert an outward force on the circular loop.
C Will not exert any force on the circular loop.
D Will exert a force on the circular loop parallel to itself.

Q66. The AC voltage across a resistance can be measured using a: **1 Mark**

A Hot wire voltmeter.
B Moving coil galvanometer.
C Potential coil galvanometer.
D Moving magnet galvanometer.

Q67. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion: Magnetic Resonance Imaging (MRI) is a useful diagnostic tool for producing images of various parts of human body.
Reason: Protons of various tissues of the human body play a role in MRI.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false and R is also false.

Q68. In an electric motor, wires carrying a current of 5A are placed at right angles to a magnetic field of induction 0.8T. If each wire has length of 20cm, then the force acting on each wire is: **1 Mark**

A 0.2N **B** 0.4N **C** 0.6N **D** 0.8N

Q69. If a charged particle moves unaccelerated in a region containing electric and magnetic fields, **1 Mark**

A $\overrightarrow{E}$ must be perpendicular to $\overrightarrow{B}$
B $\overrightarrow{V}$ must be perpendicular to $\overrightarrow{E}$
C $\overrightarrow{V}$ must be perpendicular to $\overrightarrow{B}$
D E must be equal to vB.

Q70. Force between the two parallel wires carrying currents has been used to define: **1 Mark**

A Ampere **B** Coulomb **C** Volt **D** Watt

Q71. The north pole of a magnet is brought near a stationary negatively charged conductor. What is the force experienced by it at the poles? **1 Mark**

A Maximum
B Minimum
C Zero
D Depend on the nature of the conductor

Q72. The concept of displacement current was introduced by _____. **1 Mark**

A Newton **B** Ampere **C** Maxwell **D** Fleming

Q73. Two parallel, long wires carry currents i_1 and i_2 with $i_1 > i_2$. When the currents are in the same direction, the magnetic field at a point midway between the wires is $10\mu T$. If the direction of i_2 is reversed, the field becomes $30\mu T$. The ratio $\frac{i_1}{i_2}$ is: **1 Mark**

A 4 **B** 3 **C** 2 **D** 1

Q74. A circular loop of area $1cm^2$, carrying a current of 10A, is placed in a magnetic field of 0.1T perpendicular to the plane of the loop. The torque on the loop due to the magnetic field is: **1 Mark**

A Zero **B** 10^4N-m **C** 10^2N-m **D** 1N-m

Q75. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion: Ferro-magnetic substances become paramagnetic above Curie temp.
Reason: Domains are destroyed at high temperature.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false and R is also false.

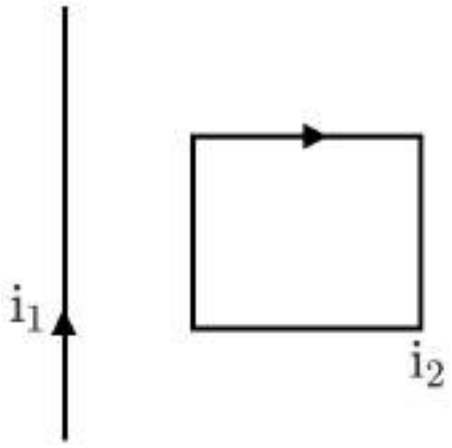
Q76. A metallic rod of mass per unit length 0.5kg m^{-1} is lying horizontally on a smooth inclined plane which makes an angle of 30°with the horizontal. The rod is not allowed to slide down by flowing a current through it when a magnetic field of induction 0.25 T is acting on it in the vertical direction. The current flowing in the rod to keep it stationary is: **1 Mark**

A 7.14 A. **B** 5.98 A. **C** 11.32 A. **D** 14.76 A.

Q77. A very long bar magnet is placed with its north pole coinciding with the centre of a circular loop carrying as electric current i. The magnetic field due to the magnet at a point on the periphery of the wire is B. The radius of the loop is a. The force on the wire is: **1 Mark**

A Very nearly $2\pi aiB$ perpendicular to the plane of the wire.
B $2\pi aiB$ in the plane of the wire.
C πaiB along the magnet.
D Zero.

Q78. Consider the situation shown in figure. The straight wire is fixed but the loop can move under magnetic force. The loop will: **1 Mark**



A Remain stationary.
B Move towards the wire.
C Move away from the wire.
D Rotate about the wire.

Q79. If the current is doubled, the deflection is also doubled in: **1 Mark**

A A tangent galvanometer
B A moving-coil galvanometer
C Both
D None of these

Q80. When the charged particles move in a combined magnetic and electric field, then the force acting is known as _____. **1 Mark**

A Centripetal force **B** Centrifugal force **C** Lorentz force **D** Orbital force

Q81. A charged particle moves in a uniform magnetic field. The velocity of the particle at some instant makes an acute angle with the magnetic field. The path of the particle will be: **1 Mark**

A A straight line.
B A circle.
C A helix with uniform pitch.
D A helix with nonuniform pitch.

Q82. A charged particle moves in a gravity-free space without change in velocity. Which of the following is are possible: **1 Mark**

A $\mathrm{E} = 0,\ \mathrm{B} = 0$
B $\mathrm{E} = 0,\ \mathrm{B} \neq 0$
C $\mathrm{E} \neq 0,\ \mathrm{B} = 0$
D $\mathrm{E} \neq 0,\ \mathrm{B} \neq 0$

Q83. If the current is doubled, the deflection is also doubled in: **1 Mark**

A A tangent galvanometer.
B A moving-coil galvanometer.
C Both.
D None.

Q84. A particle moves in a region having a uniform magnetic field and a parallel, uniform electric field. At some instant, the velocity of the particle is perpendicular to the field direction. The path of the particle will be: **1 Mark**

A A straight line.
B A circle.
C A helix with uniform pitch.
D A helix with nonuniform pitch.

Q85. The gyro-magnetic ratio of an electron in an H-atom, according to Bohr model, is: **1 Mark**

A Independent of which orbit it is in.
B Negative.
C Positive.
D Increases with the quantum number n.

Q86. The current sensitivity of a galvanometer is defined as:. **1 Mark**

A The current flowing through the galvanometer when a unit voltage is applied across its terminals.
B Current per unit deflection.
C Deflection per unit current.
D Dflection per unit current when a unit voltage is applied across its terminals

Q87. A hollow tube is carrying an electric current along its length distributed uniformly over its surface. The magnetic field: **1 Mark**

A Increases linearly from the axis to the surface.
B Is constant inside the tube.
C Is zero at the axis.
D Is zero just outside the tube.

Q88. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**
Assertion: The true geographic 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 Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false and R is also false.

Q89. A charged particle is moved along a magnetic field line. The magnetic force on the particle is: **1 Mark**

A Along its velocity.
B Opposite to its velocity.
C Perpendicular to its velocity.
D Zero.

Q90. Two parallel wires carry currents of 20A and 40A in opposite directions. Another wire carying a current anti parallel to 20A is placed midway between the two wires. T he magnetic force on it will be: **1 Mark**

A Towards 20A.
B Towards 40A.
C Zero.
D Perpendicular to the plane of the currents.

Q91. If a charged particle at rest experiences no electromagnetic force: **1 Mark**

A The electric field must be zero.
B The magnetic field must be zero.
C The electric field may or may not be zero.
D The magnetic field may or may not be zero.

Q92. A long, straight wire of radius R carries a current distributed uniformly over its cross section. T he magnitude of the magnetic field is: **1 Mark**

A Maximum at the axis of the wire.
B Minimum at the axis of the wire.
C Maximum at the surface of the wire.
D Minimum at the surface of the wire.

Q93. What is shape of magnet in moving coil galvanometer to make the radial magnetic field? **1 Mark**

A Concave **B** Horse shoe magnet **C** Convex **D** None of the above

Q94. Two particles X and Y having equal charge, after being accelerated through the same potential difference enter a region of uniform magnetic field and describe circular paths of radii R_1 and R_2 respectively. The ratio of the mass of X to that of Y is: **1 Mark**

A $\left(\frac{R_1}{R_2}\right)^{\frac{1}{2}}$
B $\frac{R_1}{R_2}$
C $\left(\frac{R_1}{R_2}\right)^{2}$
D R_1R_2.

Q95. Energy in a current carrying coil is stored in the form of: **1 Mark**

A Electric field. **B** Magnetic field. **C** Dielectric strength. **D** Heat.

Q96. Which of the following particles will have minimum frequency of revolution when projected with the same velocity perpendicular to a magnetic field? **1 Mark**

A Electron **B** Proton **C** He^+ **D** Li^+

Q97. In a moving coil galvanometer, the deflection of the coil θ is related to the elecrical current i by the relation: **1 Mark**

A $i \propto \tan\theta$
B $i \propto \theta$
C $i \propto \theta^2$
D $i \propto \theta$

Q98. A proton beam is going from north to south and an electron beam is going from south to north. Neglecting the earth's magnetic field, the electron beam will be deflected **1 Mark**

A Towards the proton beam.
B Away from the proton beam.
C Upwards.
D Downwards.

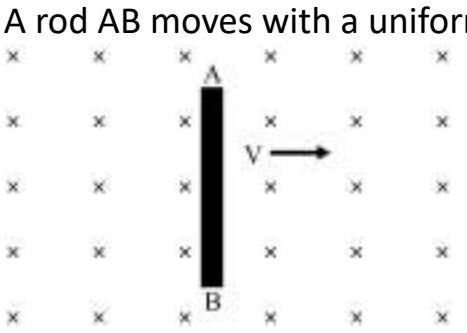
Q99. A charged particle would continue to move with a constant velocity in a region wherein: **1 Mark**

A E = 0, B ≠ 0. **B** B ≠ 0, E ≠ 0. **C** B ≠ 0, E = 0. **D** E = 0, B = 0.

Q100. A circular loop is kept in that vertical plane which contains the north-south direction. It carries a current that is towards north at the topmost point. Let A be a point on the axis of the circle to the east of it and B a point on this axis to the west of it. The magnetic field due to the loop **1 Mark**

A Is towards east at A and towards west at B.
B Is towards west at A and towards east at B.
C Is towards east at both A and B.
D Is towards west at both A and B.

Q101. A rod AB moves with a uniform velocity v in a uniform magnetic field as shown in figure. **1 Mark**



A The rod becomes electrically charged.
B The end A becomes positively charged.
C The end B becomes positively charged.
D The rod becomes hot because of Joule heating.

Q102. Which of the following particles will experience maximum magnetic force circle when projected with the same velocity perpendicular to a magnetic field? **1 Mark**

A Electron **B** Proton **C** He^+ **D** Li^{++}

Q103. A charged particle is whirled in a horizontal circle on a frictionless table by attaching it to a string fixed at one point. If a magnetic field is switched on in the vertical direction the tension in the string. **1 Mark**

A Will increase.
B Will decrease.
C Will remain the same.
D May increase or decrease.

Q104. A long, straight wire carries a current along the z-axis, One can find two points in the x−yplane such that: **1 Mark**

A The magnetic fields are equal.
B The directions of the magnetic fields are the same.
C The magnitudes of the magnetic fields are equal.
D The field at one point is opposite to that at the other point.

Q105. Find the true statement. **1 Mark**

A Ammeter is an instrument used to measure potential difference across any element in a circuit.
B Voltmeter is an instrument used to measure current in a circuit.
C Galvanometer constant is dimensionless.
D Current sensitivity is expressed as the exact reverse of the galvanometer constant.

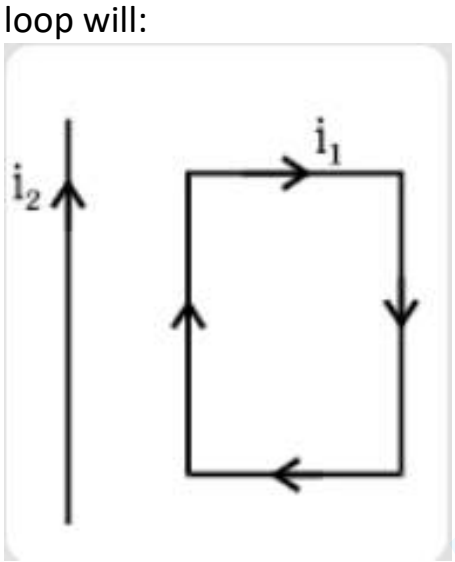
Q106. The magnetic dipole moment of a current loop is independent of: **1 Mark**

A Magnetic field in which it is lying.
B Number of turns.
C Area of the loop.
D Current in the loop.

Q107. It two parallel wires carry current in opposite directions: **1 Mark**

A The wires attract each other.
B The wires repel each other.
C The wires experience neither attraction nor repulsion.
D The forces of attraction or repulsion do not depend on current direction.

Q108. A rectangular loop carrying a current i_1, is situated near a long straight wire carrying a steady current i_2. The wire is parallel to one of the sides of the loop and is in the plane of the loop as shown in the figure. Then the current loop will: **1 Mark**



A Move away from the wire
B Move towards the wire
C Remain stationary
D Rotate about an axis parallel to the wire

Q109. How will two parallel beams of electron behave while moving in the same direction? **1 Mark**

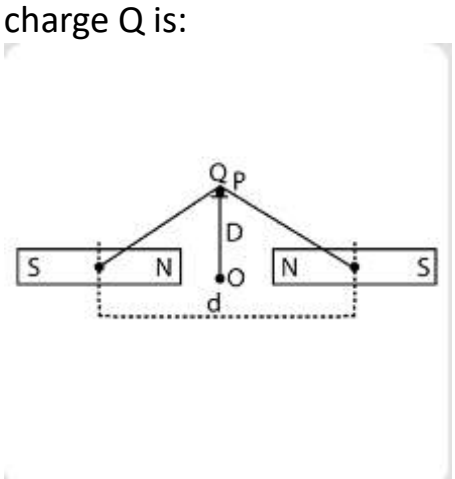
A Repel each other
B Attract each other
C Not interact with each other
D Annihilate each other

Q110. Two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion (A): Voltmeter is connected in parallel with the circuit.
Reason (R): Resistance of a voltmeter is very large.

A Both A and R are true and R is the correct explanation of A.
B Both A and Rare true but R is NOT the correct explanation of A.
C A is true but R is false.
D A is false and R is also false.

Q111. Two identical bar magnets are fixed with their centres at a distance d apart. A stationary charge Q is placed at P in between the gap of the two magnets at a distance D from the centre O as shown in the figure. The force on the charge Q is: **1 Mark**



A Zero
B Directed along OP
C Directed along PO
D Directed perpendicular to the plane of paper

Q112. 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 and R_2 respectively. The ratio of masses of X to that of Y is: **1 Mark**

A $\left(\frac{R_1}{R_2}\right)^{\frac{1}{2}}$
B $\left(\frac{R_2}{R_1}\right)$
C $\left(\frac{R_1}{R_2}\right)^{2}$
D $\left(\frac{R_1}{R_2}\right)$

Q113. Lorentz force is given by the formula: **1 Mark**

A F = q(v + B + E)
B F = q(v – B – E)
C F = q(v × B × E)
D F = q(v × B + E)

Q114. Identify the quantity which changes when a charged particle moves through a magnetic field? **1 Mark**

A Energy
B Mass
C Speed
D Direction of motion

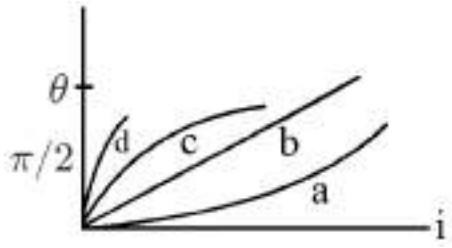
Q115. In ballistic galvanometer, the frame on which the coil is wound is non - metallic to: **1 Mark**

A Avoid the production of induced emf.
B Avoid the production of eddy currents.
C Increase the production of eddy currents.
D Increase the production of induced emf.

Q116. When a charged particle moves through a magnetic field, the quantity which is not affected in the magnetic field is: **1 Mark**

A Particle velocity
B Particle acceleration
C Linear momentum of the particle
D Kinetic energy of the particle

Q117. Which of the following four graphs may best represent the current-deflection relation in a tangent galvanometer? **1 Mark**



A b
B a
C d
D c

Q118. A current carrying loop is placed in a uniform magnetic field. The torque acting on it does not depend upon: **1 Mark**

A Shape of the loop.
B Area of the loop.
C Value of the current.
D Magnetic field.

Q119. Best method to increase the sensitivity of the moving coil galvanometer is to decrease: **1 Mark**

A Radius of the coil
B Number of turns of the coil
C External magnetic field
D Couple per unit twist

Q120. What is the work done by the magnetic field on the moving charge? **1 Mark**

A No work is done by the magnetic field on the moving charge.
B Work done will be maximum.
C Work done will be minimum.
D Both A and B

Q121. The radial magnetic field is used in a suspended coil galvanometer to provide: **1 Mark**

A A uniform torque on the coil.
B Maximum torque on the coil in all positions.
C A uniform and maximum torque in all positions of the coil.
D A non uniform torque on the coil.

Q122. In cyclotron the gyro radius is: **1 Mark**

A Proportional to momentum.
B Proportional to energy.
C Inversely proportional to momentum.
D Inversely proportional to energy.

Q123. Pick the correct options: **1 Mark**

A Magnetic field is produced by electric charges only.
B Magnetic poles are only mathematical assumptions having no real existence.

C A north pole is equivalent to a clockwise current and a south pole is equivalent to an anticlockwise current.

D A bar magnet is equivalent to a long, straight current.

Q124. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion: A disc-shaped magnet is deviated above a superconducting material that has been cooled by liquid nitrogen.

Reason: Superconductors repel a magnet.

A Both A and R are true and R is the correct explanation of A.

B Both A and R are true but R is not the correct explanation of A.

C A is true but R is false.

D A is false and R is also false.

Q125. The SI unit of magnetic dipole moment is'. **1 Mark**

A Ampere **B** Ampere metre^2 **C** Tesla **D** None of these

Q126. An electron is moving along the positive x-axis. You want to apply a magnetic field for a short time so that the electron may reverse its direction and move parallel to the negative x-axis. This can be done by applying the magnetic field along: **1 Mark**

A y-axis. **B** z-axis. **C** y-axis only. **D** z-axis only.

Q127. An electric current i enters and leaves a uniform circular wire of radius a through diametrically opposite points. A charged particle q moving along the axis of the circular wire passes through its centre at speed v. The magnetic force acting on the particle when it passes through the centre has a magnitude: **1 Mark**

A $\mathrm{qv}\frac{\mu_0 \mathrm{i}}{2\mathrm{a}}$

B $\mathrm{qv}\frac{\mu_0 \mathrm{i}}{2\pi \mathrm{a}}$

C $\mathrm{qv}\frac{\mu_0 \mathrm{i}}{\mathrm{a}}$

D Zero

Q128. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion: In high latitudes one sees colourful curtains of light hanging down from high altitudes

Reason: The high energy charged particles from the sun are deflected to polar regions by the magnetic field of the earth.

A Both A and R are true and R is the correct explanation of A.

B Both A and R are true but R is not the correct explanation of A.

C A is true but R is false.

D A is false and R is also false.

Q129. A particle of mass m and charge q enters a magnetic field B perpendicularly with a velocity v. The radius of the circular path described by it will be: **1 Mark**

A Bq/mv. **B** mq/Bv. **C** mB/qv. **D** mv/Bq.

Q130. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion: Electromagnetic are made of soft iron.

Reason: Coercivity of soft iron is small.

A Both A and R are true and R is the correct explanation of A.

B Both A and R are true but R is not the correct explanation of A.

C A is true but R is false.

D A is false and R is also false.

Q131. Consider three quantities $\mathrm{x} = \frac{\mathrm{E}}{\mathrm{B}}$, $\mathrm{y} = \sqrt{\frac{1}{\mu_0 \epsilon_0}}$ and $\mathrm{z} = \frac{1}{\mathrm{CR}}$. Here, l is the length of a wire, C is a capacitance and R is a resistance. All other symbols have standard meanings. **1 Mark**

A x, y have the same dimensions.

B y, z have the same dimensions.

C z, x have the same dimensions.

D None of the three pairs have the same dimensions.

Q132. An electron is ejected from the surface of a long, thick straight conductor carrying a current, initially in a direction perpendicular to the conductor. The electron will: **1 Mark**

A Ultimately return to the conductor.

B Move in a circular path around the conductor.

C Gradually move away from the conductor along a spiral.

D Move in a helical path, with the conductor as the axis.

Q133. Two parallel wires carrying currents in the same direction attract each other because of: **1 Mark**

A Potential difference between them.
B Mutual inductance between them.
C Electric forces between them.
D Magnetic forces between them.

Q134. A positively charged particle projected towards east is deflected towards north by a magnetic field. The field may be: **1 Mark**

A Towards west. **B** Towards south. **C** Upward. **D** Downward.

Q135. Magnetic dipole moment of a rectangular loop is: **1 Mark**

A Inversely proportional to current in loop.
B Inversely proportional to area of loop.
C Parallel to plane of loop and porportional to area of loop.
D Perpendicular to plane of loop and porportional to area of loo.

Q136. If a charged particle kept at rest experiences an electromagnetic force: **1 Mark**

A The electric field must not be zero.
B The magnetic field must not be zero.
C The electric field may or may not be zero.
D The magnetic field may or may not be zero.

Q137. A deuteron of kinetic energy 50 keV is describing a circular orbit of radius 0.5 metre in a plane perpendicular to the magnetic field B. The kinetic energy of the proton that describes a circular orbit of radius 0.5 metre in the same plane with the same B is: **1 Mark**

A 25 keV. **B** 50 keV. **C** 200 keV. **D** 100 keV.

Q138. Consider a long, straight wire of cross-sectional area A carrying a current i. Let there be n free electrons per unit volume. An observer places himself on a trolley moving in the direction opposite to the current with a speed $\mathrm{v} = \frac{\mathrm{i}}{\mathrm{nAe}}$ and separated from the wire by a distance r. The magnetic field seen by the observer is very nearly: **1 Mark**

A $\frac{\mu_0 \mathrm{i}}{2\pi \mathrm{r}}$
B Zero
C $\frac{\mu_0 \mathrm{i}}{\pi \mathrm{r}}$
D $\frac{2\mu_0 \mathrm{i}}{\pi \mathrm{r}}$.

Q139. A charged particle enters in a uniform magnetic field with a certain velocity. The power delivered to the particle by the magnetic field depends on: **1 Mark**

A Force exerted by magnetic field and velocity of the particle.
B Angular speed w and radius r of the circular path.
C Angular speed w and acceleration of the particle.
D None of these.

Q140. If a charged particle projected in a gravity-free room deflects: **1 Mark**

A There must be an electric field.
B There must be a magnetic field.
C Both fields cannot be zero.
D Both fields can be non zero.

Q141. Two parallel circular coils of equal radii having equal number of turns placed coaxially and separated by a distance equal to the radii of the coils carrying equal currents in same direction are known as: **1 Mark**

A Biot-savart's coils. **B** Ampere's coils **C** Helmholtz coils. **D** Oersted's coils.

Q142. The coil of the moving coil galvanometer is wound over an aluminium frame: **1 Mark**

A Because aluminium is a good conductor.
B Because aluminium is very light.
C Because aluminium is comparatively cheaper.
D To provide electro-magnetic damping.

Q143. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**
Assertion: We cannot think of a magnetic field configuration with three poles
Reason: A bar magnet does exert a torque on itself due to its own field.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false and R is also false.

Q144. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**
Assertion: A paramagnetic sample display greater magnetisation (for the same magnetic field) when cooled.

Reason: The magnetisation does not depend on temperature.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false and R is also false.

Q145. If a current is passed through a spring then the spring will: **1 Mark**

A Expand. **B** Compress. **C** Remains same. **D** None of these.

Q146. A particle is projected in a plane perpendicular to a uniform magnetic field. The area bounded by the path described by the particle is proportional to: **1 Mark**

A The velocity. **B** The momentum. **C** The kinetic energy. **D** None of these.

Q147. For two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below. **1 Mark**

Assertion: The ferromagnetic substance do not obey Curie's law.
Reason: At Curie point a ferromagnetic substance start behaving as a paramagnetic substance.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false and R is also false.

Q148. Scale used in moving coil galvanometer is: **1 Mark**

A Function scale **B** Linear scale **C** Exponential scale **D** None of these

Q149. Let $\overrightarrow{E}$ and $\overrightarrow{B}$ denote electric and magnetic fields in a frame S and $\overrightarrow{E}$ and $\overrightarrow{B}$ in another frame S moving with respect to S at a velocity $\overrightarrow{v}$. Two of the following equations are wrong. Identify them. **1 Mark**

A $B_y, = B_y + \frac{vE_z}{c^2}$
B $E_y, = E_y + \frac{vB_z}{c^2}$
C $B'_y = B_y + vE_z$
D $E'_y = E_y + vB_z$

Q150. There are two conductors X and Y carrying a current I and moving in the same direction. p and q are two electron beams also moving in the same direction. Will there be attraction or repulsion between the 2 conductors and between the two electron beams separately? **1 Mark**

A The electron beams will repel each other and conductors attract each other.
B The electron beams will attract each other and the conductors also attract each other.
C The electron beams will attract each other and the conductors repel each other.
D The electron beams will repel each other and the conductors also repel each other.

Q151. An electron moving with a velocity of $15ms^{-1}$ enters a uniform magnetic field of 0.2 T, along a direction parallel to the field. What would be its trajectory in this field? **1 Mark**

A Elliptical **B** Straight path **C** Helical **D** Circular

Q152. The length of a solenoid is 0.4m and the number turns in it is 500. A current of 3 amp, is flowing in it. In a small coil of radius 0.01m and number of turns 10, a current of 0.4 amp. is flowing. The torque necessary to keep the axis of this coil perpendicular to the axis of solenoid will be: **1 Mark**

A 5.92×10^{-6}N-m. **B** 5.92×10^{-4}N-m. **C** 5.92×10^{-6}dyne-cm. **D** 5.92×10^{-4}dyne-cm.

Q153. An electron is projected with uniform velocity along the axis of a current carrying long solenoid. Which of the following is true? **1 Mark**

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.

Q154. The restoring couple in the moving coil galvanometer is due to: **1 Mark**

A Current in the coil
B Magnetic field of the magnet.
C Material of the coil.
D Twist produced in the suspension wire.

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