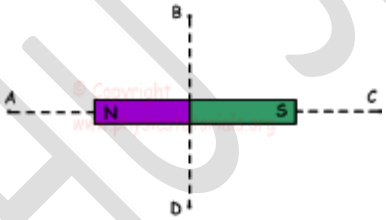
1. Which are of the following will describe the smallest circle when projected with the same velocity v perpendicular to the magnetic field B (i) α particle and (ii) β particle?
2. A compass needle, pivoted about the horizontal axis, and free to move in the magnetic meridian, is observed to point along the
    a. vertical direction at place A
    b. horizontal direction at a place B. Give the value of the angle of dip at these two places.
3. Name the quantity represents minimum magnetic moment of a revolving electron. Write its expression.
4. Two wires of equal lengths are bent in the form of two loops. One of the loops is square shaped whereas the other loop is circular. These are suspended in a uniform magnetic field and the same current is passed through them. Which loop will experience greater torque? Give reasons.
5. The vertical component of earth's magnetic field at a place is √3 times the horizontal component. What is the value of angle of dip at the place?
6. What is the nature of magnetic field in a moving coil galvanometer?
7. What type of magnetic material is used in making permanent magnets?
8. Horizontal component of Earth's magnetic field at a place is 3 times the vertical component. What is the value of angle of dip at this place?
9. Why do magnetic lines of force prefer to pass through iron than through air?
10. An electron is moving at 106m/s in a direction parallel to a current of 5 A, flowing through an infinitely long straight wire, separated by a perpendicular distance of 10 cm in air. Calculate the magnitude of the force experienced by the electrons.
11. Draw the directions of magnetic field lines at point A, B, C and D in the figure given below.



12. Describe the principle, of a moving coil galvanometer.
13. A circular coil of radius r is carrying current I. At what distance from the centre of loop on the axis magnetic field is one light the magnetic field at the centre
14. An electron moving through a magnetic field does not experiences a force. Under what condition is this possible?
15. Define magnetic susceptibility of a material. Name two elements one having positive susceptibility and other having negative susceptibility.
16. Define the terms 'Magnetic Dip' and 'Magnetic Declination' with the help of relevant diagrams.
17. How can you turn a galvanometer into a voltmeter? Give the necessary equation.
18. A galvanometer having a coil resistance 100 Ω gives a full scale deflection when a current of 1 mA is passed through it. What is the value of the resistance which can convert this galvanometer into a meter giving full scale deflection for a potential difference of 10 V?
19. Give two advantages of the presence of a soft iron core in a moving coil galvanometer.
20. An electron does not suffer any deflection while passing through a region. Are sure that there is no magnetic field?

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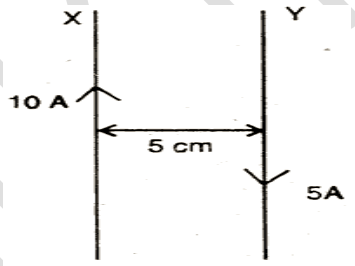
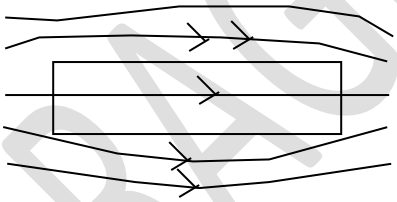
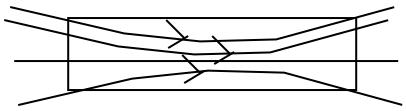
21. An electron beam projected along +X axis, experiences a force due to a magnetic field along the + Y-axis. What is the direction of the magnetic field?
22. How will a dia & ferro magnetic material behave when kept in a non-uniform external field? Give two examples each.
23. Why should the spring/suspension wire in a moving coil galvanometer have low torsional constant?
24. Define magnetic susceptibility of a material. Name two elements one having positive susceptibility and other having negative susceptibility.
25. A straight wire carries a current of 3A.Calulate the magnitude of the magnetic field at a point 10cm away from the wire. Draw diagram to show the direction of the magnetic field.
26. A galvanometer coil has a resistance of 12 Ω and it shows full scale deflection for a Current of 3mA. How will you convert the galvanometer into a voltmeter of range 0 to 18 volt?
27. P and Q are long straight conductors r distance a part N is a point in the place of wires r/4 distance away from P carrying current I. What is the magnitude & direction of current in the wire Q, so that net magnetic field at N is zero.
28. A bar magnet of magnetic moment Nv held in magnetic field of strength B what is (a) Maximum torque on the magnet (b) Work done in turning it from stable equilibrium to unstable equilibrium.
29. Two long parallel straight wires X and Y separated by a distance of 5 cm in air carry currents of 10 A and 5 A respectively in opposite directions. Calculate the magnitude and direction of the force on a 20 cm length of the wire Y



30. Use Ampere's circuital law to derive the formula for the magnetic field due to an infinitely long straight current carring wire.
31. Two protons are entering a magnetic field perpendicular to the magnetic field with velocities in the ration 1:2. What is the ratio of their angular frequencies?
32. The current is set up in a long copper pipe. Is there a magnetic field (i) inside (ii) outside the pipe?
33. An electron does not suffer any deflection while passing through a region of uniform magnetic field. What is the direction of the magnetic field?
34. The permeability of magnetic material is 0.9983 .Name the type of magnetic material it represents.
35. A magnetic needle free to rotate in a vertical parallel to the magnetic meridian has its north tip down at 60^0 with the horizontal. The horizontal component of the earth's magnetic field at the place is known to be 0.4G.Determine the magnitude of the earth's magnetic field at the place.
36. A circular coil of100 turns, radius 10 cm carries a current of 5 A. it is suspended vertically in a uniform horizontal magnetic field of 0.5 T, the field lines making an angle of 600 with the of the plane of the coil. Calculate of the torque must be applied on it to prevent it from turning.

37. Define angle of dip. If the ratio of the horizontal component of earth's magnetic field to the resultant magnetic field at a place is $1/\sqrt{2}$, what is the angle of dip at that place?.
38.
39. No force is exerted by a stationary charge when placed in a magnetic field. Why?
40. a galvanometer of resistance of 15Ω gives full scale deflection for a current of 2mA . calculate the shunt resistance needed to convert it to an ammeter of range 0—5A.
41. State Biot-savart law. An electron is moving at 106 m/s in a direction parallel to a current of 5 A flowing through an infinitely long wire at a perpendicular distance of 10 cm in air. Calculate the magnitude of force experienced by an electron.
42. Deduce an expression for torque experienced by a circular coil of radius 'r' carrying current " I " is placed in presence of uniform magnetic field of strength 'B'. Using this expression show that the deflection in galvanometer is directly proportional to the current flowing through it.
43. Give one possible alignment of vectors $\vec{B}$, $\vec{v}$ and $\vec{E}$ such that a charged particle moving with velocity $\vec{v}$ shows helical motion. None of the vectors are zero in magnitude.
44. What is the radius of the path of an electron moving at a speed of 3×10^7 m/s in a magnetic field of 6×10^{-4} T perpendicular to it?
45. A bar magnet, held horizontally, is set into angular oscillations in Earth magnetic field. It has time periods T1 and T2 at two places, where the angles of dip are θ1 and θ2 respectively. Deduce an expression for the ratio of the resultant magnetic fields at the two places.
46. An electron is moving with a speed of 10^8 m/sec enters a magnetic field of 5×10^{-3} T at right angles to the magnetic field. Find :-
    a. frequency of revolution of electron.
    b. Time period of revolution of electron
47. Deduce an expression for the cyclotron frequency and show that it does not depend on the speed of the charged particle.
48. Prove that in a radial magnetic field, the deflection of the coil is directly proportional to the current flowing in the coil.
49. A uniform magnetic field gets modified as shown below, When two specimens X and Y are placed in it.





    Identify the two specimens X and Y
50. What do you mean by the statement that susceptibility of Fe is more than that of cu?
51. Which one of the two – an ammeter or a milli-ammeter, has greater resistance, when made from identical galvanometers?
52. Force is given by F=q*(V*B) of these name the pairs of vector which are always at right angles to each other.
53. **If the current sensitivity of a moving coil – galvanometer is increased by 20%, its resistance also increase by 1.5 times, How will the voltage sensitivity of the galvanometer be affected** य़

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54. A straight wire of mass 200 g and length 1.5 m carries a current of 2 A. It is suspended in mid-air by a uniform horizontal magnetic field B. What is the magnitude of the magnetic field?
55. A solenoid of length 0.5 m has a radius of 1 cm and is made up of 500 turns. It carries a current of 5 A. What is the magnitude of the magnetic field inside the solenoid?
56. A 100 turn closely wound circular coil of radius 10 cm carries a current of 3.2 A. (a) What is the field at the centre of the coil? (b) What is the magnetic moment of this coil? the coil is placed in a vertical plane and is free to rotate about a horizontal axis which coincides with its diameter. A uniform magnetic field of 2T in the horizontal direction exists such that initially the axis of the coil is in the direction of the field. The coil rotates through an angle of 90º under the influence of the magnetic field. (c) What are the magnitudes of the torques on the coil in the initial and final position? (d) What is the angular speed acquired by the coil when it has rotated by 90º? The moment of inertia of the coil is kg m2.
57. A toroid has a core (non-ferromagnetic) of inner radius 25 cm and outer radius 26 cm, around which 3500 turns of a wire are wound. If the current in the wire is 11 A, what is the magnetic field (a) outside the toroid, (b) inside the core of the toroid, and (c) in the empty space surrounded by the toroid.
58. An electron travelling west to east enters a chamber having a uniform electrostatic field in north to south direction. Specify the direction in which a uniform magnetic field should be set up to prevent the electron from deflecting from its straight line path.
59. A straight horizontal conducting rod of length 0.45 m and mass 60 g is suspended by two vertical wires at its ends. A current of 5.0 A is set up in the rod through the wires. (a) What magnetic field should be set up normal to the conductor in order that the tension in the wires is zero? (b) What will be the total tension in the wires if the direction of current is reversed keeping the magnetic field same as before? (Ignore the mass of the wires.) g = 9.8 m s–2.
60. The wires which connect the battery of an automobile to its starting motor carry a current of 300 A (for a short time). What is the force per unit length between the wires if they are 70 cm long and 1.5 cm apart? Is the force attractive or repulsive?
61. A uniform magnetic field of 1.5 T exists in a cylindrical region of radius10.0 cm, its direction parallel to the axis along east to west. A wire carrying current of 7.0 A in the north to south direction passes through this region. What is the magnitude and direction of the force on the wire if, (a) the wire intersects the axis, (b) the wire is turned from N-S to northeast-northwest direction, (c) the wire in the N-S direction is lowered from the axis by a distance of 6.0 cm?
62. A solenoid 60 cm long and of radius 4.0 cm has 3 layers of windings of 300 turns each. A 2.0 cm long wire of mass 2.5 g lies inside the solenoid (near its centre) normal to its axis; both the wire and the axis of the solenoid are in the horizontal plane. The wire is connected through two leads parallel to the axis of the solenoid to an external battery which supplies a current of 6.0 A in the wire. What value of current (with appropriate sense of circulation) in the windings of the solenoid can support the weight of the wire? g = 9.8 m s–2.
63. A galvanometer coil has a resistance of 15 Ω and the metre shows full scale deflection for a current of 4 mA. How will you convert the metre into an ammeter of range 0 to 6 A?
64. A short bar magnet placed with its axis at 30º with an external field of 800 G experiences a torque of 0.016 Nm. (a) What is the magnetic moment of the magnet? (b) What is the work done in moving it from its most stable to most unstable position? (c) The bar magnet is replaced by a solenoid of cross-sectional area 2 × 10–4 m2 and 1000 turns, but of the same magnetic moment. Determine the current flowing through the solenoid.

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65. A solenoid has a core of a material with relative permeability 400. The windings of the solenoid are insulated from the core and carry a current of 2A. If the number of turns is 1000 per metre, calculate (a) H, (b) M, (c) B and (d) the magnetising current Im.
66. A domain in ferromagnetic iron is in the form of a cube of side length 1mm. Estimate the number of iron atoms in the domain and the maximum possible dipole moment and magnetisation of the domain. The molecular mass of iron is 55 g/mole and its density is 7.9 g/cm3. Assume that each iron atom has a dipole moment of 9.27×10–24 Am^2.
67. A closely wound solenoid of 800 turns and area of cross section 2.5 × 10–4 m2 carries a current of 3.0 A. Explain the sense in which the solenoid acts like a bar magnet. What is its associated magnetic moment?
68. If the solenoid in is free to turn about the vertical direction and a uniform horizontal magnetic field of 0.25 T is applied, what is the magnitude of torque on the solenoid when its axis makes an angle of 30° with the direction of applied field?
69. At a certain location in Africa, a compass points 12º west of thegeographic north. The north tip of the magnetic needle of a dip circle placed in the plane of magnetic meridian points 60º above the horizontal. The horizontal component of the earth's field is measured to be 0.16 G. Specify the direction and magnitude of the earth's field at the location.
70. a magnetic dipole is under the influence of two magnetic fields. The angle between the field directions is 60º, and one of the fields has a magnitude of 1.2 × 10–2 T. If the dipole comes to stable equilibrium at an angle of 15º with this field, what is the magnitude of the other field?
71. Why does a paramagnetic sample display greater magnetization (for the same magnetising field) when cooled? (b) Why is diamagnetism, in contrast, almost independent of temperature? (c) If a toroid uses bismuth for its core, will the field in the core be (slightly) greater or (slightly) less than when the core is empty?
72. State Biot savart law .use it to derive an expression for the magnetic field due to a current carrying circular loop of N turns and radius R, at a point distance x from its centre on the axis of the loop.
73. Two circular coils X and Y having radii R and R /2 respectively are placed in horizontal plane with their centers coinciding with each other. Coil X has a current I flowing through it in the clockwise sense. What must be the current in coil Y to make the total magnetic field at the common centre of the two coils, zero? With the same currents flowing in the two coils, if the coil Y is now lifted vertically upwards through a distance R, what would be the net magnetic field at the centre of coil Y?
74. State Biot-Savart's Law. Using this law, derive the expression for the magnetic field due to current carrying circular loop of radius R, at a point, which is at a distance X from its center along the axis of loop. Consider two parallel co-axial circular coils of same radius R and number of turns N, carrying same current I in same direction, separated by a distance R Show that the field on the axis around the mid-point between the coils in uniform over a distance that is small as compared to R is given by B= (0.72μ_0NI) / R
75. write the expression for biot savart's law for the magnetic field due to a small current carrying element . using this theorem calculate magnetic field at the centre of current carrying circular coil of radius R having 'n' number of turns.
76. Explain the principle and working of a cyclotron with the help of a labelied diagram. A cyclotron's oscillator frequency is 10 Mhz. What should be the operating magnetic field for accelerating protons? If the radius of its 'dees' is 60 cm, what is the kinetic energy of the proton beam produced by the accelerator? Express your answer in units of Me V. $(e = 1.6\times10^{-19} C, m_p = 1.67\times10^{-27} Kg, 1\,Me\,V = 1.602\times10^{-13} J)$

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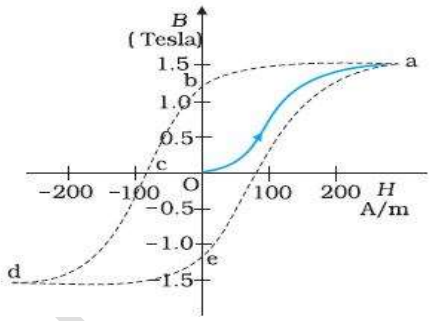
77. A beam of electrons passes unelected through mutually perpendicular electric and magnetic fields E and B respectively. If the electric field is cut-off ,the electron beam moves in a circular path of radius 'r'.Derive the expression for e/m of electrons in terms of r,E and B.
78. Explain briefly the cause for helical motion of charged particles in presence of a magnetic field $\vec{B}$ and derive the expression for the pitch when a particle enters the magnetic field with velocity $\vec{v}$.
79. Name the physical quantity which has the unit J/Tesla. Derive the magnetic field intensity at a given point due to straight conductor or coil carrying current. On a smooth inclined plane at 300 with the horizontal a thin current carrying metallic rod is placed parallel to the horizontal ground. The plane is located in a uniform magnetic field of 0.15 tesla in the vertical direction .For what value of current can the rod remains stationary? Mass per unit length is 0.30Kg/m
80. State the principle of working of galvanometer. In galvanometer (i) concave shaped poles are used (ii) phosphor-bronze alloy is used for the suspension wire. Explain why? The current sensitivity of moving coil galvanometer is 5 divisions/mA and voltage sensitivity is 20 division/volt. Calculate the resistance of galvanometer.
81. The graph shows the variation of B with H for a ferromagnetic material. What does each of the following represent in the fig? (i) Ob (ii) Oc.Should the area of the graph be less or more in case of a soft iron and why?



82. A straight thick long wire of uniform cross section of radius ‘a’ is carrying a steady current I. Use Ampere’s circuital law to obtain a relation showing the variation of the magnetic field inside and outside the wire with distance r, (r □ a) and (r > a) of the field point from the centre of its cross section. Plot the graph showing the nature of this variation.Calculate the ratio of magnetic field at a point a/2 above the surface of the wire to that at a point a/2 below its surface. What is the maximum value of the field of this wire?

1.Suppose a helical spring is suspended from the roof of a room and very small weight is attached to its lower end what will happen to the spring when a current is passed through it?Give reason to support your answer?
2. One alpha particle and a deuteron entered perpendicularly in a uniform magnetic field with

same velocity. Which one follow the greater circle?
3. Out of Voltmeter and Millivoltmeter, which has the higher resistance?
4. Proton is moving along the axis of a solenoid carrying current of 2 A and 50 number of turns per unit length. What will be the force acting on the particle.
5. Out of Ammeter and Milliammeter, which has the higher resistance?
6. What is the source of magnetic field at point ?
7. Can a Moving Coil Galvanometer can be used to detect an A.C. in a circuit .Give reason.
8. Two wires of equal length are bent in the form of two loops. One loop is square whereas the other is circular. These are suspended in same magnetic field and same current is passed through them. Explain with reason which will experience greater torque?

9. The pole of a magnet is brought near to a stationary charge. What will be the force experienced by pole?
10. A charge particle moving in a magnetic field penetrates a layer of lead and thereby losses half of its kinetic energy. How does the radius of curvature of its path change?
11. A Voltmeter, an ammeter and a resistance are connected in series with a battery. There is some deflection in voltmeter but the deflection of ammeter is zero. Explain why?
12. A Current 'I' flows along the length of an infinitely long straight thin walled pipe. What is the magnetic field at any point on the axis of pipe?
13. The Earth's core contains iron but geologists do not regard this as a source of Magnetic Field, Why?
14.Is the Resistance of Voltmeter larger than or smaller than the resistance of Galvanometer from which it is converted.
15. A Magnetic Field dipole placed in a Magnetic Field experiences a net force. What can you say about the Nature of Magnetic Field?
16. Earth's Magnetic Field does not affect working of moving Coil Galvanometer. Why?
17. Which type of Magnetism exists in all substances?
18.For what orientation P.E. of a Magnetic dipole placed in uniform Magnetic Field minimum?
19. How does a ferromagnetic material change its Magnetic properties if it is heated beyond its curie temperature?
20.A bar magnet is cut into two pieces, along its length. How will its pole strength be affected?
21.What is the work done by a magnetic force, in displacing a charged particle?
22. What is the net magnetic flux from a north (or south) pole of a magnet (dipole) ?
23. Name the device which works under the principle of velocity selector?
24. What is "Meissner effect"?
25. Two long straight wires are set parallel to each other. Each carries a current I in the same direction and the separation between them is 2r. What is the intensity of the magnetic field midway between them?
26.A proton is about 1840 times heavier than an electron. What will be its kinetic energy when it is accelerated by a potential difference of 1KV?
27. . A circular loop of radius R carrying current I ,lies in X-Y plane with its centre at origin.What is the total magnetic flux through X-Y plane?
28. A charge q moving along x axis with a velocity v is subjected to a uniform magnetic field B acting along the Z axis as it crosses the origin O.Trace its trajectory.Does the charge gain kinetic energy as it enters the magnetic field? Justify your answer.
29. A circular current carrying coil has a radius R. What is the distance from the centre of the coil on its axis where the magnetic field is 1/8 th of its value at the centre?
30. A magnetic needle suspended freely in a uniform magnetic field experiences torque but no net force. A nail made up of iron kept near a bar magnet experience a force of attraction and torque .Give reason.
31.What is the work done by a magnetic field on moving a charge? Give reason.
32. A particle with charge q moving with velocity v in the plane of the paper enters a uniform magnetic field B acting perpendicular to the plane of the paper. Deduce an expression for the time period of the charge as it

moves in a circular path in the field . Why does the kinetic energy of the charge not change while moving in the magnetic field.
33. A solenoid of length 0.6m has a radius of 1cm and is made up of 600 turns.It carries a current of 5A.What is the magnetic field inside and at ends of solenoid.?
34. An element dl = dx i is placed at the origin and carries a large current I = 10A.What is the magnetic field on the y axis at a distance of 0.5m,
35. You are given a copper wire carrying current I of length L. Now the wire is turned into circular coil. Find the number of turns in the coil so that the torque at the centre of the coil is to maximum.
36. What is the magnetic field produced at the centre of curvature of an arc of wire of radius r carrying current I subtends an angle P /2radians at its centre.
37. If B is the magnetic field produced at the centre of a circular coil of one turn of length L carrying current I then what is the magnetic field at the centre of the same coil which is made into 10 turns?
38. A copper wire is bent into a square of each side 6cm.If a current of 2A is passed through a wire what is the magnetic field at the centre of the square?
39. Find the magnetic moment of a wire of length l carrying current I bent in the form of a circle.
40. When current is flowing through two parallel conductors in the same direction they attract while two beams of electrons moving in the same direction repel each other. Why?
41. Draw diagrams to show behavior of magnetic field lines near a bar of (i) Alluminium (ii) copper and (iii) mercury cooled to a very low temperature 4.2 K
42. The hysteresis loss for a sample of 6 kg is 150 J/M2/cycle. If the density of iron is 7500 kg/m3, calculate the energy loss per hour at 40cycle.
43. A current carrying solenoid of 100 turns has an area of cross section 10-4 m2 .When suspended freely through its centre, it can turn in a horizontal plane .what is the magnetic moment of the solenoid for a current of 5A.Also calculate the net force and torque on solenoid if a uniform horizontal field of 10x10-2 T is set up at an angle of 30 degree with axis of solenoid when it is carrying the same current.
44. Two concentric circular coils A and B of radii 10 cm and 6 cm respectively, lie in the same vertical plane containing the north to south direction. coil A has 30 turns and carries a current of 10 A . Coil B has 40 turns and carries a current of 15 A .the sense of the current in A is anticlockwise and clockwise in B for an observer looking at the coils facing west. Give the magnitude and direction of net magnetic field
45. The vertical component of earth's magnetic field at a given place is 3 times its horizontal component. If the total intensity of earth's magnetic field at a place is 0.4 G , find the value of horizontal component of earths field and angle of dip.
46. north to south direction.Specify the direction in which the uniform magnetic field should be set up to prevent the electron from deflecting from its straight line path.
47. A straight horizontal conducting rod of length 0.5 m and mass 50 g is suspended by two vertical wires at its ends.A current of 5A is set up in the rod sdthrough the wires.(i) What magbnetric field should be set up normal to the conductor in order that the tension in the wires is zero?(ii)What will be the tension in the wire if the direction of current is reversed keeping the magbetic field same as before?(neglect the mass if wure abd taje g=10m/s2)
48. A circular coil of 20 turns and radius 10cm is placed in a uniform magnetic field of 0.d10T normal to the plane of the coil.If the current in the coil is 5a,What is the (i)Total torque on the coil (ii) total force on the coil (iii) average dsforce on each electron in the coil due to the magnetic field.(coil is made of copper, A= 10-5 m2 ,free electron density in copper is 1029 /m3)
49. A Rowland ring of mean radius 15 cm has 3500 turns of wore wound on a ferromagnetic core of relative permeability 800.What is the magnetic field B in the core for a magnetizing current of 1.2 A?
50. A straight wire of mass 200g and the length 1.5m carries a current of 2A. It is suspended in mid air by a uniform horizontal magnetic field B. What is the magnitude of B in tesla?

51. A rigid circular loop of radius r and mass m lies in the x-y plane of a flat table and has a current I flowing in it. At this particular place the earth's magnetic field is B = Bxi +Bzk. What is the value of I, so that loop starts tilting?
52. In an ammeter, 10% of main current is passing through the galvanometer. If the resistance of the galvanometer is G, then what is the shunt resistance in ohms?
53. The two rails of arailway track insulated from each other and the ground is connected to a milli voltmeter. What is the reading g of the millivolmeter when the train passes at aspeed 180km/hr along the track, given that the vertical component of earth"s magnetic field is 0.2x10-4T and rails are separated by 1m
54. A charged particle moving in a magnetic field penetrates a layer of lead and there by looses half of its kinetic energy.How does the radius of curvature of its path changes? Radius r= mV/qB
54. The velocities of two α particles X and Y entering in an uniform magnetic field are in the ratio 2:1.On entering the field ,they move in different circular paths .Give the ratio of the radii of their paths?
55. In an exercise to increase current sensitivity of a galvanometer by 25 % , its resisitance is increased by 1.5 times . How does the voltage sensititvity of the galvanometer be affected.

UNIT DERIVATIONS

1. **Find the magnetic field at the centre of the circular coil carrying current. Show the sketch of the magnetic field produced.**
2. **Find the magnetic field at a point due to current flowing in a long straight conductor. Show the sketch of magnetic field produced.**
3. **Find the magnetic field at a point on the axis of a circular coil carrying current and hence find the magnetic field at center of circular coil carrying current.**
4. **State and explain ampere's circuital law and by applying it find the magnetic field at a point well inside the solenoid carrying current.**
5. **Derive the expression of magnetic field due to toriod**
6. **State the biot savart law for the magnetic field due to a current carrying element .**
7. **Describe the motion of charge particle in uniform magnetic field (i) when it is moving perpendicular (ii) when it is moving with some angle ɵ, hence find the time period , velocity , radius of the charge particle,**
8. **What is cyclotron? Discuss its construction , working and theory . explain cyclotron frequency.**
9. **Discuss with the help of a neat diagram the construction and theory of moving coil galvanometer.**
10. **Derive the expression for the force acting on a current carrying conductor placed in a uniform field , name the rule which give the direction of the force . write the condition for which this force will have max. and min.**
11. **Find the expression for torque on the current carrying rectangular coil.**
12. **Find the force between two long straight current carrying parallel wire.**
13. **Find the time period , velocity . frequency of the charged particle when it is moving in perpendicular magnetic field.**
14. **How we can convert a galvanometer into ammeter and voltmeter explain.**
15. **Find the expression of magnetic field due to a bar magnet on the axial line and on the equatorial line.**

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16. **Find the expression for torque and potential energy stored in a magnetic dipole in uniform external magnetic field.**
17. **Explain the angle of declination , dip and horizontal component of earth's magnetic field.**
18. **Explain the diamagnetic , paramagnetic and ferromagnetic substance. Give at least four property of these substance.**

Explain the hysteresis curve , how it help to select the ferromagnetic substance.

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