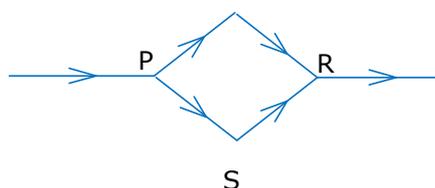


QUESTION BANK

Magnetic effects of current and Magnetism Test 1

1. State two properties of the material of the wire used for suspension of the coil in [1] a moving coil galvanometer?
2. What will be the path of a charged particle moving along the direction of a [1] uniform magnetic field?
3. A steady current flows in the network shown in the figure. What will be the magnetic field at the centre of the network? [2]

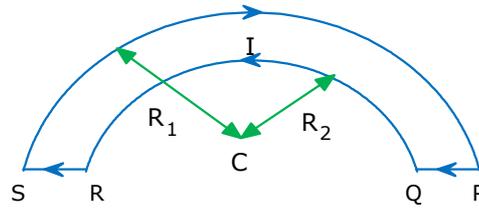


4. An α - particle and a proton are moving in the plane of paper in a region where [2] there is uniform magnetic field B directed normal to the plane of paper. If two particles have equal linear momenta, what will be the ratio of the radii of their trajectories in the field?
5. Derive an expression for the force acting on a current carrying conductor placed [3] in a uniform magnetic field Name the rule which gives the direction of the force. Write the condition for which this force will have (1) maximum (2) minimum value?
6. A straight wire carries a current of 10A. An electron moving at 10^7 m/s is 2.0 cm [3] from the wire. Find the force acting on the electron if its velocity is directed towards the wire?
7. State Biot- Savarts law. Derive an expression for magnetic field at the centre of a [3] circular coil of n-turns carrying current - I?
8. (a) What is cyclotron? Explain its working principle? [5]
(b) A cyclotron's oscillator frequency is 10MHz what should be the operating magnetic field for accelerating protons? If radius of its dees is 20cm, what is the K.E .of the proton beam produced by the accelerator?($e = 1.6 \times 10^{-19}c$, $m_p = 1.6 \times 10^{-27}kg$ 1Mev = $1.602 \times 10^{-13}J$)?

Magnetic effects of current and Magnetism Test 2

1. How does the intensity of magnetization of a paramagnetic material vary with [1] increasing applied magnetic field?
2. An iron bar magnet is heated to 1000°C and then cooled in a magnetic field free [1] space. Will it retain magnetism?

3. Two wires loops PQRSP formed by joining [1] two semicircular wires of radii R_1 and R_2 carries a current I as shown in the figure. What is the magnetic of the magnetic induction at the centre C.?



4. What is the magnetic moment associated with a coil of 1 turns, area of cross- [1] section 10^{-4}m^2 carrying a current of 2A?
5. A circular coil is placed in uniform magnetic field of strength 0.10T normal to the [1] plane of coil. If current in the coil is 5.0A. Find.
 - (a) Total torque on the coil
 - (b) Total force on the coil
 - (c) Average force on each electron due to magnetic field
 (The coil is made of copper wire of cross- sectional area 10^{-5}m^2 and free electron density in copper is 10^{29}m^{-3})
6. A particle of mass m and charge q moving with a uniform speed v normal to a [1] uniform magnetic field B describes a circular path of radius & Derive expressions for (1) Radius of the circular path (2) time period of revolution (3) Kinetic energy of the particle?
7. Using Ampere's circuital law, derive an expression for magnetic field along the [1] axis of a Toroidal solenoid?
8. Write an expression for the force experienced by the charged particle moving in [1] a uniform magnetic field B With the help of labeled diagram explain the working of cyclotron? Show that cyclotron frequency does not depend upon the speed of the particle?

Magnetic effects of current and Magnetism Test 3

1. Two wires of equal lengths are bent in the form of two loops. One of the loop is [1] 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?
2. A cyclotron is not suitable to accelerate electron. Why? [1]
3. Give one difference each between diamagnetic and ferromagnetic substances. [2] Give one example of each?
4. Write the expression for the force acting on a charged particle of charge q moving [2] with velocity v in the presence of magnetic field B . Show that in the presence of this force.
(a) The K.E. of the particle does not change.
(b) Its instantaneous power is zero.
5. An electron of kinetic energy 25KeV moves perpendicular to the direction of a [2] uniform magnetic field of 0.2 millitesla calculate the time period of rotation of the electron in the magnetic field?
6. It is desired to pass only 10% of the current through a galvanometer of resistance [2] 90Ω . How much shunt resistance be connected across the galvanometer?
7. What is radial magnetic field? How it is obtained in moving coil galvanometer? [2] 8. Two straight parallel current carrying conductors are kept at a distance r from [3] each other in air. The direction for current in both the conductor is same. Find the magnitude and direction of the force between them. Hence define one ampere?
9. (a) Draw a labelled diagram of a moving coil galvanometer. Prove that in a [6] radial magnetic field, the deflection of the coil is directly proportional to the current flowing in the coil.
(b) A galvanometer can be converted into a voltmeter to measure upto
(i) V volt by connecting a resistance R_1 series with the coil
(ii) $2V$ volt by connecting a resistance R_2 in series with coil Find R in terms of R_1 and R_2 required to convert – it into a voltmeter that can read upto '2V' volt.

