SAINIK SCHOOL GOPALGANJ
CLASS – XII
ASSIGNMENT – MOVING CHARGES AND MAGNETISM

SECTION A : MULTIPLE CHOICE QUESTIONS (TOTAL 05 QUESTIONS)

1. A long solid steel pipe carries a 5 ampere direct current. The magnetic field associated with the current will be
(a) only inside the pipe

(b) only outside the pipe

(c) neither inside nor outside the pipe

(d) both inside and outside the pipe

2. If a particle is moving in a uniform magnetic field, then
(a) its momentum changes but total energy remains same

(b) both momentum and total energy remains the same

(c) its total energy changes but momentum remains same

(d) both momentum and total energy will change

3. To convert a galvanometer into an ammeter, we connect

(a) high resistance in series

(b) high resistance in parallel

(c) low resistance in parallel

(d) low resistance in series

4. An electron is projected with uniform velocity along the axis of a current carrying long solenoid. Which of the following is true?
(a) The electron will be accelerated along the axis.
(b) The electron path will be circular about the axis.
(c) The electron will experience a force at 45° to the axis and hence execute a helical path.
(d) The electron will continue to move with uniform velocity along the axis of the solenoid.

5. A circular coil of radius 4 cm and of 20 turns carries a current of 3 amperes. It is placed in a magnetic field of intensity of 0.5 weber/m^2. The magnetic dipole moment of the coil is
(a) 0.15 ampere-m^2
(b) 0.3 ampere-m^2
(c) 0.45 ampere-m^2
(d) 0.6 ampere-m^2

SECTION B : SHORT ANSWER QUESTIONS (TOTAL 05 QUESTIONS)

6.Obtain with the help of a necessary diagram, the expression for the magnetic field in the interior of a toroid carrying current.

7. An electron of kinetic energy 25KeV moves perpendicular to the direction of a uniform magnetic field of 0.2 millitesla calculate the time period of rotation of the electron in the magnetic field?

8. It is desired to pass only 10% of the current through a galvanometer of resistance 90Ω . How much shunt resistance be connected across the galvanometer?

9. What is radial magnetic field? How it is obtained in moving coil galvanometer?

10.Define current sensitivity and voltage sensitivity of galvanometer. Increasing the current sensitivity may not necessarily increase the voltage sensitivity of a galvanometer, justify your answer.

SECTION C : LONG ANSWER QUESTIONS (TOTAL 05 QUESTIONS)

11. (a) How is a toroid different from a solenoid?
(b) Use Ampere's circuital law to obtain the magnetic field inside a toroid.
(c) Show that in an ideal toroid, the magnetic field
(i) inside the toroid and
(ii) outside the toroid at any point in the open space is zero.

12.(i) Using Ampere's circuital law, obtain the expression for the magnetic field due to a long solenoid at a point inside the solenoid on its axis.
(ii) In what respect, is a toroid different from a solenoid? Draw and compare the pattern of the magnetic field lines in the two cases.
(iii) How is the magnetic field inside a given solenoid made strong?

13.(i) With the help of a diagram, explain the principle and working of a moving coil galvanometer.
(ii)What is the importance of radial magnetic field and how is it produced?
(iii)Why is it that while using a moving coil galvanometer as a voltmeter, a high resistance in series is required whereas in an ammeter a shunt is used?

14.(i) Two long straight parallel conductors a and b carrying steady currents I_a and I_b respectively are separated by a distance d. Write the magnitude and direction, what is the nature and magnitude of the force between the two conductors?

(ii) Show with the help of a diagram, how the force between the two conductors would change when the currents in them flow in the opposite directions.

15. Derive Expression for force between two parallel current carrying conductors and hence define one Ampere?