LAXMI INTERNATIONAL SCHOOL - SRI BHARADWAJ Edu-Genea

Department of PHYSICS

UNIT III (MAGNETIC EFFECTS of CURRENT and MAGNETISM)

Magnetic Field Due to Electric Current

1. State Biot-Savart law. Using Biot-savart law, find the expression for the magnetic field at the centre of a circular coil having number of turns n, radius r and carrying current I.

2. Using Biot-Savart law, derive an expression for the magnetic field at a point on the axis of a circular coil carrying current.

3. Using Biot-Savart law, derive an expression for the magnetic field at a point due to current flowing through a straight conductor.

4. State and prove Ampere's circuital law.

5. Using Ampere's circuital law, derive an expression for the magnetic field due to current in a toroid.

6. Using Ampere's circuital law, obtain an expression for the magnetic field at a point well inside the solenoid carrying current.

7. Define magnetic field in terms of force acting on a charge moving in a magnetic field. Give the SI unit and dimensional formula of

Motion of Charged Particle in Electric and Magnetic Fields

8. Show that the path of a charged particle moving in uniform electric field with initial velocity perpendicular to the field is parabolic in the electric field.

9. Show that the path of a charged particle moving in a uniform magnetic field with initial velocity perpendicular to the field is circular in the magnetic field.

10. Show that the path of a charged particle moving in a uniform magnetic field with initial velocity making an angle θ to the direction of the field is helical in the magnetic field.

11. Describe the principle, construction and working of a cyclotron.

12. Describe the principle, construction and working of a moving coil galvanometer.

13. Derive an expression for the torque acting on a rectangular current carrying loop placed in a uniform magnetic field.

14. Explain how to convert a galvanometer into (i) an ammeter (ii) a voltmeter ?

15. Write a short note on (i) uses of shunt (ii) advantages of a moving coil galvanometer

16. Define current and voltage sensitivity of a galvanometer. Suggest methods to improve the sensitivity of a galvanometer.

17. Find the expression for the force acting on a current carrying conductor placed in a uniform magnetic field.

18. Derive an expression for the force acting between two long straight parallel conductors carrying currents in the same direction.

19. Derive an expression for maximum force experienced by a straight conductor carrying current when placed in a uniform magnetic field.

Magnets and Earth's Magnetism

20. What is magnetic field? Give the important properties of magnetic lines of forces.

21. Derive an expression for the magnetic field at a point on the axial line of a magnetic dipole.

22. Derive an expression for the magnetic field at a point on the equatorial line of a magnetic dipole.

23. Derive an expression for the torque acting on a bar magnet held at an angle with the direction of magnetic field.

24. Find the potential energy of a magnetic dipole in a uniform magnetic field.

25. Show that a current loop behaves as a magnetic dipole. What is the significance for its magnetic moment?

26. What is Gauss's law in magnetism? Explain its significance?

27. Give three evidences in support of earth's magnetism? What is the cause of earth's magnetism?

28. Explain the three magnetic elements of earth's magnetic field at a place.

Classification of Magnetic Materials

29. Explain the terms (i) magnetic flux (ii) magnetic induction (iii) relative permeability and (iv) magnetic intensity.

30. What are diamagnetic and paramagnetic materials? Write three properties to distinguish their characteristics.

31. Discuss the important properties of diamagnetic, paramagnetic and ferromagnetic materials

32. What are ferromagnetic substances? Explain domain theory of ferromagnetism.

33. What is hysteresis? Explain the B - H curve of a ferromagnetic material.

34. Define retentivity and coercivity. What is their importance in ferromagnetic substances?

35. Sketch the hysteresis loops of soft iron and steel. What conclusions you draw from these loops?

36. Which magnetic material is used for making (i) electromagnets (ii) permanent magnets (iii) cores of transformers? Give reasons.