CHAPTER TEST

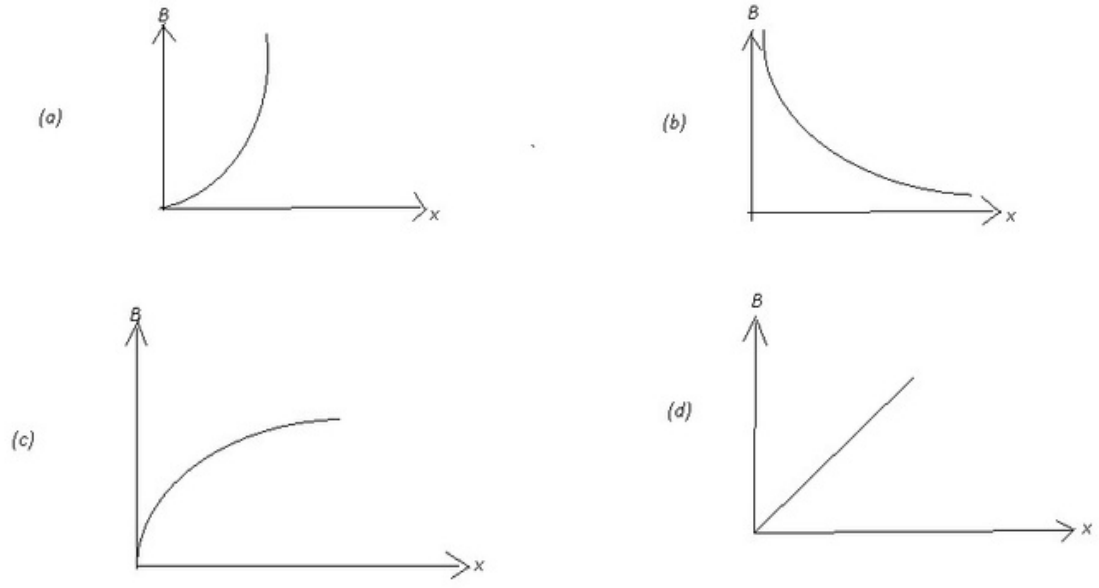
STD: XII PHYSICS –MovingChargesand Magnetism

TIME: 1 HR 15 MIN MARKS: 35

Answer all the questions. Section A carries 1 mark, Section B carries 2 marks, Section C carries 3 marks, Section D carries 5 marks, Section E carries 4 marks.

SECTION – A

1. Guess the unit of:
   a) Magnetic flux density is SI system
   b) Electric field intensity
   c) Magnetic flux density in CGS system
   d) None of the above
2. A metallic wire having length of $2m$ and weight of $4\times10-3N$ is found to remain at rest in a uniform and transverse magnetic field of $2\times10-4$ T. current flowing through the wire is:
   a) $10A$ b) $5A$ c) $2A$ d) $1A$
3. The variation of magnetic field B due to a long straight current –carrying wire with distance x from the wire is represented by the curve given below. Select the correct curve.



4. Whenthe ferromagnetic substance is heated above its curie temperature, then:
   a) Itisdemagnetized
   b) Itbecomes diamagnetic
   c) Itbecomes paramagnetic

d) It remains unaffected

5. Assertion (A): The sensitivity of a moving coil galvanometer is increased by placing a suitable magnetic as a core inside the coil. Reason (R): Soft iron has a 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 and R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.

6. Assertion (A): Gauss theorem is not applicable in magnetism.

   Reason (R): Magnetic monopole does not exist.

   a) Both A and R are true and R is correct explanation of A.

   b) Both A and R are true and R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false and R is true.

SECTION – B

7. Define 'ampere' in terms of the force between two long, straight and parallel conductors carrying current in same direction.
8. A circular of wire having 100 turns, each of the radius 8.0 cm, carries a current of 0.40 A. Find the magnetic field at the centre of the coil.
9. Can we increase or decrease the range of a given ammeter.
10. Distinguish between paramagnetic and diamagnetic materials from their behavior in a uniform magnetic field and in a non-uniform magnetic field.

SECTION – C

11. Write the short note on hysteresis.
12. A rectangular coil of sides 8,0cm and 6.0 cm having 2000 turns and carrying a current 0.20 A is suspended in a uniform magnetic field 0.20 T directed along the positive X−axis. (a) what is the net force on the coil?

    b) What is the maximum torque the coil can experience and in which orientation?

    c) For which orientation of the coil the torque is zero?

    d) When is this equilibrium stable and when is it unstable?
13. Two long parallel wires are placed at a distance of 16 cm from each other in air, each wire has current of 4A. Calculate the field B at mid point between them when the current in them are

    (i) in the same direction.

    (ii) in opposite directions.
14. Derive the relation for the force per unit length between two infinity –long, parallel, straight conductors carrying current.

SECTION – D

15. Write an expression for Biot – Savart's law in the vector from. Derive an expression for magnetic field at the centre of a circular current-carrying coil of radius r with N turns

SECTION – E

16. Case Study Based Questions:

A manufacturing plant relies on large electromagnets to separate scrap iron from waste for recycling. The electromagnets are made by winding several turns of copper wire into a solenoid. Each solenoid is 80 cm long, consists of 2,000 tightly wound turns, and carries a steady current of 5.0 A. Engineers want to ensure the solenoid produces a strong, uniform magnetic field inside, and they regularly use a moving coil galvanometer to monitor the current passing through the wires. Assume the solenoid is ideal (length much greater than its diameter) and the permeability of free space, $\mu 0$, is $4\pi \times 10{-}7\ T\ m\ A{-}1$.

Answer the following based on the above situation:

i) State the expression used to calculate the magnetic field inside a long, straight solenoid.

ii) Using the data given, calculate the magnetic field inside the solenoid.

iii) Explain how increasing the number of turns in the solenoid, keeping all else constant, would affect the magnetic field inside.

iv) Engineers use a moving coil galvanometer to detect weak currents. State the principle on which this device operates, and give one reason why a radial magnetic field is used in such a galvanometer.