SS PRITHVI

IMPORTANT PROBLEMS 12TH PHYSICS CHAP 3
FIRST MID TERM 2024-2025

EXAMPLE 3.5

The repulsive force between two magnetic poles in air is 9×10^{-3} N. If the two poles are equal in strength and are separated by a distance of 10 cm, calculate the pole strength of each pole.

EXAMPLE 3.6

A short bar magnet has a magnetic moment of 0.5 J T^{-1}. Calculate magnitude and direction of the magnetic field produced by the bar magnet which is kept at a distance of 0.1 m from the centre of the bar magnet along (a) axial line of the bar magnet and (b) normal bisector of the bar magnet.

EXAMPLE 3.8

Compute the intensity of magnetisation of the bar magnet whose mass, magnetic moment and density are 200 g, 2 A m^2 and 8 g cm^{-3}, respectively.

EXAMPLE 3.10

Two materials X and Y are magnetised whose values of intensity of magnetisation are 500 A m^{-1} and 2000 A m^{-1} respectively. If the magnetising field is 1000 A m^{-1}, then which one among these materials can be easily magnetized?.

EXAMPLE 3.14

A coil of a tangent galvanometer of diameter 0.24 m has 100 turns. If the horizontal component of Earth's magnetic field is 25×10^{-6} T then, calculate the current which gives a deflection of 60^0.

EXAMPLE 3.19

An electron moving perpendicular to a uniform magnetic field 0.500 T undergoes circular motion of radius 2.50 mm. What is the speed of electron?

EXAMPLE 3.23

Suppose a cyclotron is operated to accelerate protons with a magnetic field of strength 1 T. Calculate the frequency in which the electric field between two Dees could be reversed.

EXAMPLE 3.26

The resistance of a moving coil galvanometer is made twice its original value in order to increase current sensitivity by 50%. Find the percentage change in voltage sensitivity

IV. Numerical problems

3. A circular coil with cross-sectional area 0.1 cm^2 is kept in a uniform magnetic field of strength 0.2 T. If the current passing in the coil is 3 A and plane of the loop is perpendicular to the direction of magnetic field. Calculate

(a) total torque on the coil

(b) total force on the coil

(c) average force on each electron in the coil due to the magnetic field. (The free electron density for the material of the wire is 10^{28} m^{-3}).

4. A bar magnet is placed in a uniform magnetic field whose strength is 0.8 T.If the bar magnet is oriented at an angle 30^o with the external field experiences a torque of 0.2 Nm. Calculate:

(i) the magnetic moment of the magnet

(ii) the work done by the applied force in moving it from most stable configuration to the most unstable configuration and also compute the work done by the applied magnetic field in this case.

6. Calculate the magnetic field at the centre of a square loop which carries a current of 1.5 A, length of each side being 50 cm.