Bajaj College of Science, Wardha

Practice Sheet During Lockdown

B.Sc. Sem II

Subject: Physics

Topic : Magnetostatics

Each of 3 marks

State and explain Lorentz force equation.

Derive an equation for force acting on a current carrying straight conductor in magnetic field.

State Biot- Savart's law and express it in mathematical form.

State and explain Ampere's circuital law.

Discuss Gauss's law of magnetization.

Each of 5 marks

Obtain an expression for torque acting on a rectangular current loop placed in a magnetic field.

Obtain the relationship between B, H and M. Hence, show that $1+ \lambda = \mu$.

Using Ampere circuital law, derive the expression for the magnetic field acting on the current carrying toroidal ring.

Using Ampere circuital law, derive the expression for the magnetic field acting on the axis of solenoid.

Each of 7 marks

State Biot- Savart's law and express it in mathematical form. Hence apply it to obtain an expression for magnetic field at a point on the axis of a current carrying circular coil of radius r. Show that the maximum field will be at the center of the coil.

Using Biot- Savart's law obtain an expression for the magnetic field due to steady current I in a long straight wire at a point at a distance r from it. Discuss the different cases.

Using Biot- Savart's law obtain an expression for the magnetic field due to steady current I along the axis of solenoid.

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Numericals:

1) A wire of length 1m carrying current of 5A placed perpendicular to a uniform magnetic field of 1T. Find the magnitude of force on the wire.

2) A long straight wire carries a current of 50A. An electron travelling at 10m/s is 5 cm from the wire. Calculate the force acting on the electron if the velocity is directed towards the wire.

3) In H atom, electron circles around the nucleus with radius of 0.5×10^{-10} m and frequency of 6.8×10^{15} Hz. Find the value of B at the center of the orbit.

4) A 10cm long wire carrying a current of 10A is held at an angle 30^0 w.r.t. the direction of uniform magnetic field of strength $1Wb/m^2$. Calculate the force acting on the wire.

5) Calculate the magnetic field due to a circular coil of radius 10cm and having 200 turns at the center the coil when the current circulating in it is 500 mA.

6) Calculate the magnetic field due to a long thin wire carrying a current of 15A at a distance of 1cm from wire.

7) The magnetic susceptibility of a medium is 940×10^{-4} . Calculate its absolute and relative permeability.

8) Current in a solenoid produces a magnetizing field of 167A/m. What is the agnetic

induction inside it, if it has an iron core of magnetic susceptibility of 5000?

9) In a 40cm length of solenoid, there are 500 turns. If it carries a current of 1A, calculate the intensity of magnetic field inside it.

10) A long wire carries a current of 5m A. Find the line integral of B around the path enclosing the wire.

Quiz on Magnetism: t.ly/ADMwp

Quiz on Estimation: t.ly/1jzOr

Quiz on Mental Ability: t.ly/kZ8b5

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