Haldia Institute of Technology
Department of Applied Science

Assignment - III
Course: PH 301/PH 401
Module 2: Magnetostatics and time varying field

1. State Biot-Savart law. Using Biot-Savart law Calculate the magnetic
2. field at the centre of a circular current carrying coil.
3. Magnetic field along the axis of a solenoid.
4. magnetic field due to a long straight wire.
5. Show that the induced field at the end of a solenoid is half of that at the center.
6. State Ampere's circuital law and using Ampere's circuital
7. Magnetic field along the axis of a solenoid.
8. Magnetic field due to a long straight wire.
9. Define magnetic Scalar and magnetic vector potential.
10. Prove that $\vec{\nabla}.\vec{B} = 0$
11. Define steady current and current density.
12. Write the equation of continuity and its physical significance.
13. What you mean by Lorentz force define and explain.
14. If a charged particle of 1 c charge is moving with a velocity $2\hat{i} + 3\hat{j} + \hat{k}$ m/s through an electric field $\vec{E} = 10\hat{i} + 10\hat{k}$ and magnetic field of induction $\vec{B} = 2\hat{i} - 6\hat{j} - 6\hat{k}$, then find
    a. The force experienced by the particle in electri field
    b. The force experienced by the particle in magnetic field and
    c. total Lorentz force.
15. Write the poissions and Laplace equation for a vector and scalar potential.
16. What are the physical significance of vector and scalar potentials
17. Write the Faraday's law of electromagnetic induction. Express it in differential form. Show that the electric field can be expressed as $\vec{E} = -\vec{\nabla}\phi - \frac{\partial \vec{A}}{\partial t}$ where A vector potential and ϕ scalar potential.