MSE 862 Electronic and Magnetic Materials

CHs: **3**

Pre-requisites: **Nil**

Course Objectives:

The student should have understanding of :

- Different types of magnetism (ferromagnetic, antiferromagnetic, diamagnetic, paramagnetic etc..)
- To understand structure of materials and learn about semiconductors, metal and insulators
- Should understand the use of electronic and magnetic materials in engineering applications.

Course contents:

- Classification of materials according to magnetic properties,
- Origin of magnetic moment of atoms, magnetization curves, magnetic domains,
- Soft magnetic materials, hard magnetic materials, magnetic materials processing,
- Cast and sintered magnets, magnetostriction, metallic and ceramic magnets,
- Extra high field strength magnets for special applications, semiconductors,
- Binary and tertiary semiconductor materials, growth of single crystal,
- Doping techniques, characterization of doped layers,
- VLSI technology & Semiconductor devices.

Course Outcomes:

- The student should have full understanding of crystal structures in relation to electronic and magnetic properties.
- Using this basic understanding, he should carry out research related to further understanding of theories about band gap and spintronics which can be used for development of new electronic and magnetic devices.

Recommended Text / Reference Books:

- Introduction to the Electronic Properties of Materials (David Jiles)
- Electronic properties of Materials (Rolf E Hummel)
- VLSI Technology (S M Sze)
- Solid State Electronic Devices (Ben G. Streetman)
- Introduction to Solid State Physics (Charles Kittel)
- Magnetic Materials: Fundamentals and Device Applications (Nicola A. Spaldin)
- Introduction to Magnetic Materials (B D Cullity, C D Graham)