

## **MSE-201 Materials Engineering Lab I**

**Credit Hours:** 0-1

**Pre-requisites:** None

### **Course Objectives**

- To introduce about the basic of labs lay out, identification of materials, XRD, specimen metallography, Hardness tests and Heat Treatment,

### **Course Contents**

- Introduction & layout of all labs, Identification of Engineering materials
- Introduction to XRD, Braggs Law, Method of Identification of XRD Unknown pattern
- Determination of (h,k,l) values, d-spacing, lattice parameter (a), crystal structure, theoretical density and porosity of given material from XRD data for F.C.C materials
- Measurement of packing factor make use of theory of errors
- Specimen preparation for metallography , Metallographic (Quantitative Analysis)
- Brinell Hardness Test , Heat Treatment of steel samples in Muffle furnace
- To find coefficient of performance(COP) of Mechanical heat pump, To study the effect of water flow rates on condenser and evaporation of refrigeration cycle demonstration Unit
- Line tracing of Mechanical Heat Pump , Line tracing of Thermal Expansion Unit

### **Course Outcome**

- After attending this course students will be aware of general layout of various labs, X- Ray Diffraction, and Specimen preparation for Metallography, Hardness and Heat Treat.

### **List of Practicals**

- Introduction to Engineering Materials Labs and to prepare layout of the laboratories.

- Identification of different Engineering Materials (for example: ferrous, copper and aluminum alloys)
- Introduction to XRD, Braggs Law, Method of Identification of XRD Unknown pattern
- Determination of (h,k,l) values, d-spacing, lattice parameter (a), crystal structure, theoretical density and porosity of given material from XRD data for F.C.C materials (like Al).
- To learn the basic steps of optical microscopy of the given metallic sample for metallographic studies.
- To find coefficient of performance(COP) of Mechanical heat pump
- To study the effect of water flow rates on condenser and evaporation of refrigeration cycle demonstration Unit.
- Line tracing of Mechanical Heat Pump.
- Line tracing of Thermal Expansion Unit.

### **Suggested Books**

- Consult the books related to the subjects covered in semester 3