

## **MSE-303 Materials Engineering Lab III**

**Credit Hours:** 0-2

**Pre-requisites:** None

### **Course Objectives**

- To know about the Melt Flow Index , Hardness, Impact & Tensile Tests , Introduction to AFM, XRD, Optical Microscopy SEM, XRF, Heat Treatment processes, Particle Size Analysis, Surface area and porosity analysis using BET, Edge & lap joint using Arc Welding, Use of TIG welding technique, Nondestructive testing.

### **Course Contents**

- Melt Flow Index
- Rockwell hardness
- Vickers Hardness Testing
- Atomic Force Microscope
- Demonstration of XRD
- Optical Microscopy of the metallic samples
- Demonstration of SEM
- Demonstration of XRF
- Heat Treatment processes
- Annealing, Normalizing
- Quenching, Air Quenching
- Making of Butt Joint using Arc Welding
- Charpy Impact Test
- Tensile Testing
- Particle Size Analysis
- Surface area and porosity analysis using BET
- Edge & lap joint using Arc Welding
- Use of TIG welding technique
- Nondestructive testing

### **Course Outcome**

- Student will have basic idea about Melt Flow Index , Hardness, Impact & Tensile Tests , AFM, XRD, Optical Microscopy SEM, XRF, Heat Treatment processes,

Particle Size Analysis, Surface area and porosity analysis using BET, Edge & lap joint using Arc Welding, Use of TIG welding technique, Nondestructive testing.

### **List of Practicals**

- To determine the hardness of different metallic samples by Brinell Hardness Testing Machine.
- To determine the hardness of different metallic samples by Rockwell hardness testing machine.
- To determine the hardness of different metallic samples by Vickers Hardness Testing Machine.
- To prepare tensile test specimen of mild steel according to ASTM A370-03 / ASTM E8 standard.
- To carry out Tensile Testing on prepared mild steel samples.
- To carry out Charpy impact test and Izod impact test on given metallic samples.
- To carry out 3-point Bend test on given polymeric sheet.
- To carry out Tensile Test on given polymeric sample.
- Demonstration of Atomic Force Microscope.
- Demonstration of X-Rays Diffraction machine.
- Demonstration of Scanning Electron Microscope.
- Demonstration of X-Ray Fluorescence
- Demonstration of BET Surface Area and Porosity Analyzer
- To carry out different Heat Treatment processes (Annealing, Normalizing, Quenching, Air Quenching,) on mild steel specimen.
- To measure the particle size distribution of Alumina samples using Particle Size Analyzer.
- Sample Preparation Of 1020 Steel and Etchant preparation for metallographic studies.
- Optical Microscopy Of 1020 Steel samples at different magnification.
- How to make different joints (Butt, Lap, Edge etc) using Arc Welding.
- How to make T Joint using Gas Welding.
- To carry out TIG welding of Mild Steel (MS) using MS filler rod.
- To carry out TIG welding of Stainless Steel (SS) using SS filler rod.
- To carry out Soldering and Brazing of copper and carbon steels.

### **Suggested Books**

- Consult the books related to the subjects covered in semester 5