

MSE-304 Materials Engineering Lab IV

Credit Hours: 0-2

Pre-requisites: None

Course Objectives

- To know about Fabrication and tensile, Impact, bend testing of composites, and various parameters effecting the corrosion of steel samples, Use of Positional Resistance Transducers Wheatstone Bridge Measurement, Temperature Sensors, light Measurement, Linear Position or Force Application, Rotational speed or position Measurement, Sound Measurements, Use of the critical speed of Ball Mill, Surface energy study by using Ball Mill, Sample preparation for Gamry® Setup.

Course Contents

- Fabrication and tensile, Impact, bend testing of composites
- Effect of Moisture on mechanical properties of composite
- Corrosion Electrical conductivities of liquids, localized corrosion effects, effect of pH of solutions on corrosion rate of steel samples
- The effect of concentration of solutions on corrosion rate of steel samples
- The effect of mechanical working / stresses on rate of corrosion of steel samples
- Positional Resistance Transducers Wheatstone Bridge Measurement
- Temperature Sensors, light Measurement
- Linear Position or Force Application
- Rotational speed or position Measurement
- Sound Measurements
- The critical speed of Ball Mill, Surface energy study by using Ball Mill, Sample preparation for Gamry Setup / Cold mounting of small complex samples
- The corrosion rate with the help of Gamry® EChem framework Euro Cell kit (Demonstration)

Course Outcome

- Student will be able to fabricate and test the composites, and will be able to observe the various parameters effects on the corrosion of steel samples,

- Use of Positional Resistance Transducers Wheatstone Bridge Measurement,
- Temperature Sensors, light Measurement,
- Linear Position or Force Application,
- Rotational speed or position Measurement,
- Sound Measurements,
- Use of the critical speed of Ball Mill,
- Surface energy study by using Ball Mill,
- Sample preparation for Gamry Setup.

List of Practicals

- Formation of Epoxy-glass plain fiber Polymer matrix composite by using Hand Lay-Up method.
- Sample preparation and Tensile testing of Epoxy-glass plain fiber Polymer matrix composite material which is made by hand lay-up method.
- Sample preparation and Charpy Impact testing of Epoxy-glass plain fiber Polymer matrix composite material which is made by hand lay-up method.
- Sample preparation and Bend testing of Epoxy-glass plain fiber Polymer matrix composite.
- Fabrication of woven cloth Polymer matrix composites by using Hand Lay-Up method.
- Sample preparation and Tensile testing of woven cloth Polymer matrix composite material which is made by hand lay-up method.
- Sample preparation and Charpy Impact testing of woven cloth Polymer matrix composites.
- Sample preparation and Bend testing of woven cloth Polymer matrix composites.
- Effect of Moisture on mechanical properties of Polymer Matrix composite.
- To determine the corrosion rate of different materials in "Tap Water" using weight loss method at room temperature.
- To measure the electrical conductivities of liquids(De ionized water, Tap Water, salt solution, spirit)
- To study the effect of different environments like air, vacuum, salt solution, water, inhibitors etc on rate of corrosion of steel samples.
- To illustrate the Relative energy levels of different metals by measurement of potential difference.
- To illustrate the effect of temperature upon energy levels by measurements of potential difference.
- To illustrate regions of different energy within metals and how these lead to localized corrosion effects.
- To examine the effect of pH of solutions on corrosion rate of steel samples.

- To examine the effect of concentration of solutions on corrosion rate of steel samples.
- To study the effect of cold working on rate of corrosion of steel samples.
- Demonstration on Variable resistors construction.
- To find the variation of output voltage with setting of Rotary and Slide Potentiometer.
- Effect of Loading on the Potentiometer output voltage and to find the variation of output voltage with setting of Servo Potentiometer.
- Measurement of unknown resistance and voltage using Wheatstone bridge.
- To find the critical speed and to study the surface energy using Ball Mill.

Suggested Books

- Consult the books related to the subjects covered in semester 6