

MECHANICS OF SOLIDS & MATERIAL SCIENCE LAB

Course Code	23ME3351	Year	II	Semester	I
Course Category:	Professional Core	Branch:	ME	Course Type	Lab
Credits:	1.5	L-T-P:	0-0-3	Prerequisites	Engineering Mechanics
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes: Upon successful completion of the course, the student will be able to

COs	Statements	Blooms Level	LAB
CO1	Understand the stress strain behavior of different materials.	L2	Mechanics of Solids
CO2	Evaluate the hardness of different materials.	L4	Mechanics of Solids
CO3	Explain the relation between elastic constants and hardness of materials.	L1	Mechanics of Solids
CO4	Identify various microstructures of steels and cast irons.	L3	Material Science
CO5	Evaluate hardness of treated and untreated steels.	L4	Material Science

Contribution of Course outcomes towards achievement of programme outcomes & Strength of correlations (High:3, Medium: 2, Low:1)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	2	1					2	3	1
CO2	2	2	2	3	2	1					2	3	1
CO3	3	2	2	2	2	1					2	3	1
CO4	2	2	2	2	2	1					2	3	1
CO5	2	2	2	3	2	1					2	3	1

Syllabus	
Course Content	MAPPED COs
<p>NOTE: Any 6 experiments from each section A and B.</p> <p>A) MECHANICS OF SOLIDS LAB:</p> <ol style="list-style-type: none"> 1. Tensile test 2. Bending test on <ol style="list-style-type: none"> a) Simply supported beam b) Cantilever beam 	CO1, CO2, CO3

<ol style="list-style-type: none"> 3. Torsion test 4. Hardness test <ol style="list-style-type: none"> a) Brinell's hardness test b) Rockwell hardness test c) Vickers hardness test 5. Test on springs 6. Impact test <ol style="list-style-type: none"> a) Charpy test b) Izod test 7. Punch shear test 8. Liquid penetration test <p>B) MATERIAL SCIENCELAB:</p> <ol style="list-style-type: none"> 1. Preparation and study of the Microstructure of pure metals. 2. Preparation and study of the Microstructure of Mild steel, medium carbon steels, and High carbon steels. 3. Study of the Microstructures of Cast Irons. 4. Study of the Microstructures of Non-Ferrous alloys. 5. Study of the Microstructures of Heat treated steels. 6. Hardenability of steels by Jominy End Quench Test. 	<p>CO3 & CO4</p>
---	---

Virtual lab:

1. To investigate the principal stresses σ_a and σ_b at any given point of a structural element or machine component when it is in a state of plane stress. (<https://virtual-labs.github.io/exp-rockwell-hardness-experiment-iiith/objective.html>)
2. To find the impact resistance of mild steel and cast iron. (<https://sm-nitk.vlabs.ac.in/exp/izod-impact-test>).
3. To find the impact resistance of mild steel. (<https://sm-nitk.vlabs.ac.in/exp/charpy-impact-test/index.html>)
4. To find the Rockwell hardness number of mild steel, cast iron, brass, aluminum and spring steel etc. (<https://sm-nitk.vlabs.ac.in/exp/rockwell-hardness-test>)
5. To determine the indentation hardness of mild steel, brass, aluminum etc. using Vickers hardness testing machine. (<https://sm-nitk.vlabs.ac.in/exp/vickers-hardness-test>).