LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
(AUTONOMOUS)
Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)
Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF MECHANICAL ENGINEERING

SOLID MECHANICS LABORATORY

Lab Introduction: Solid Mechanics Laboratory is well equipped with destructive testing machineries. This lab is offered for the second-year students of various departments like Mechanical engineering, Aerospace and Civil Engineering. Students will be able to understand the basic concepts of Solid Mechanics and enable to apply them to practical problems in this laboratory. Different types of tests are conducted in this laboratory as per standards (ASTM and IS) for mechanical properties of various materials such as Young's Modulus, Shear Modulus, Hardness, Toughness, Stiffness, etc. Many students of Final year are utilizing this laboratory for their project works for testing of various materials like composite materials, ferrous and nonferrous alloys, etc.

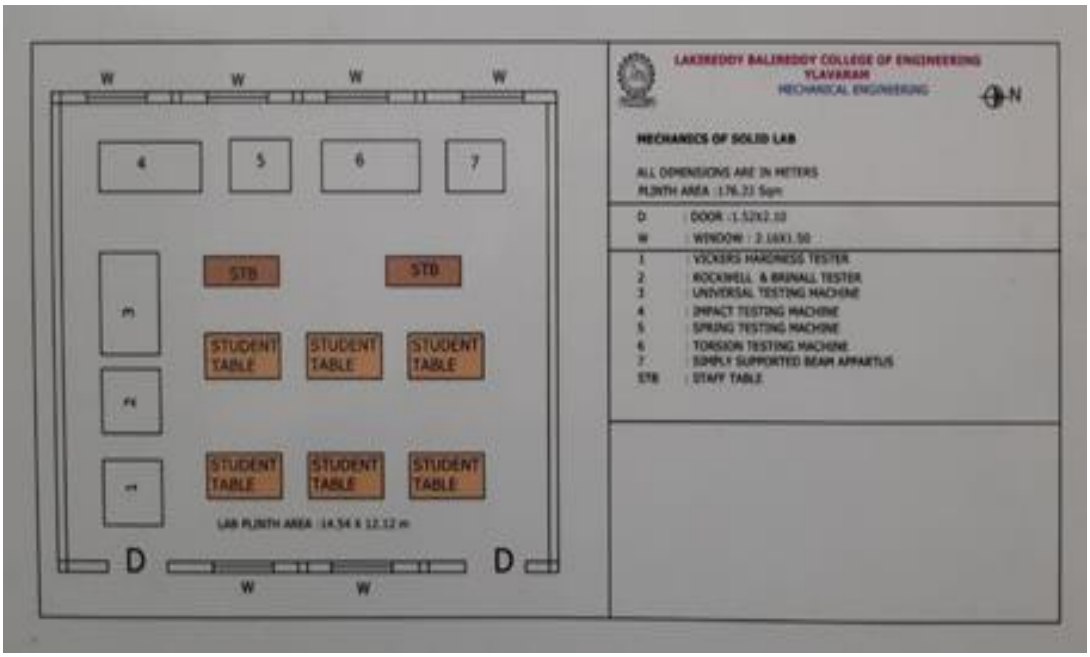
17ME64 -MATERIALS TESTING LAB (III SEM – Mechanical Engineering)

PRE-REQUISITES: Engineering Mechanics

COURSE EDUCATIONAL OBJECTIVE:
The objective of this course is to make the students observe the response of the materials under different loads and measure various mechanical properties.

COURSE OUTCOMES: After completion of the course students will be able to
CO1: Observe the behaviour of materials by conducting Tension, Compression & Shear tests.
CO2: Evaluate the Impact Strength of Material.
CO3: Determine the Hardness of a given material.
CO4: Determine Elastic constants of a given material using flexural and torsion tests.

Lab Layout:



Mechanics of Solids Laboratory

Equipment details in Solid Mechanics lab:

S. No	Name of the Equipment with Specifications	Qty	Rate Rs.	Price
1	Universal Testing Machine (40 Ton) with Accessories	01	3,39,723/-	3,39,723/-
2	Rockwell cum Brinell Hardness Tester	01	23,040/-	23,040/-
3	Vicker's Hardness Tester	01	88,644/-	88,644/-
4	Impact Testing Machine	01	53,471/-	53,471/-
5	Torsion Testing Machine	01	89222/-	89,222/-
6	Spring Testing Machine	01	72,303/-	72,303/-
7.	Deflection Beam Apparatus	01	11,129/-	11,129/-
Total Cost				**6,77,532/-**

List of Experiments in Solid Mechanics Lab:

S. No	Name of the Experiment
1	Compression test on helical spring.
2	Tension test on mild steel rod.
3	Double shear test on metals.
4	Torsion test on mild steel rod.
5	Impact test on metal specimen. (a) Izod Impact Test (b) Charpy Impact Test
6	Hardness test on metals. (a) Rockwell Hardness Test(b) Brinell Hardness Test
7	Deflection test on beams. (a) Cantilever Beam(b) Simply Supported beam
8	Compression test on brittle materials

SOLID MECHANICS LABORATORY EQUIPMENT DETAILS:

Vickers Hardness Testing Machine:

Technical specifications:

Model	: VM-50
Test Loads	: 5, 10, 20, 30, 50 Kgs
Magnification of Optical Microscope	: 70X
Maximum Test Height	: 200 mm
Scale Least Count	: 0.001 mm
Throat Depth	: 135 mm
Machine dimension	: L585 x W290 x H860 mm
Weight(approx.)	: 70 Kgs
Make	: FUEL INSTRUMENTS & ENGINEERS PVT. Ltd.

Description: This equipment is used to determine the Vicker's Hardness of materials. A maximum of 50 Kgf load can be applied for the test with a diamond indenter.

Rockwell cum Brinnel Hardness Tester:

Technical specifications:

Model	: RAB- 250
Test Loads	: 60,100,150,187.5,250 Kgs
Initial Load	: 10 Kgs
Maximum Test Height	: 295 mm
Scale Least Count	: 0.001mm
Throat Depth	: 150 mm
Maximum Depth of Elevating	: 150 mm
Screw below base	: 310 mm
Machine dimension	: L474 x W210 x H850 mm
Weight (approx.)	: 100 Kgs
Make	: SAROJ ENGINEERING UDYOG PVT. LTD.

Description: This is used to determine the Rockwell & Brinell Harnesses of materials. For Rockwell test ½" ball & diamond indenters may be used. For Brinell test 2.5mm & 5mm balls may be used. Provisions to apply major loads of 60 Kg, 100 Kg, 150 Kg, 187.5 Kg & 250mm.

Universal Testing Machine:

Technical specifications:

Model	: UTE- 40
Maximum Capacity	: 40 Tonnes
Clearance for tensile at fully descended	
Working piston	: 50- 700 mm
Straining/ Piston speeds	: 0-150 mm/min
Clamping Jaws for round bars and flats	: 10-25, 25-40 mm
Specimen thickness	: 0-15, 15-30, W65 mm
Pair of compression plates for	
Compression test	: 120 mm
Pair of adjustable rollers for	
Transverse test	: 160 mm
Dia. of Rollers	: 32 mm
Clearance between rollers	: 500 mm
Radius of punch tops	: 12, 16 mm
Weight (approx.)	: 2,500 Kgs
Make	: Fuel Instruments & Engineers Pvt. Ltd.

Description: The machine is used to perform Tensile, Compressive, Shear & Bend tests. It operates on Hydraulic loads & controlled manually.

Impact Testing Machine:

Technical specifications:

Model	: IT-30
Maximum Impact Energy of Pendulum	: 300 Joules
Minimum value of scale graduation	: 2 Joules
Distance between Supports (mm)	: 0.2 mm to 40 mm
Angle of test specimen supports	: $78^0 – 80^0$
Angle of inclination supports	: 0^0
Radius of supports	: 1 mm – 1.5 mm
Maximum width of striker	: 10 -18 mm
Angle of striking of edge	: 90^0 & 135^0
Radius of curvature of striking edge	: 2 – 2.5 mm
Weight (approx.)	: 415 Kgs
Make	: Fuel Instruments & Engineers Pvt. Ltd

Description: This is used to study the toughness or energy absorbing properties of various materials under two types of impact tests i.e. Izod &Chapy impact tests.

Tensile Testing Machine:

Technical specifications:

Model	: 1.4 F
Maximum capacity	: 10,000 N
Scales and Least count	: 0-1000 N x 2 N, 0–2000N x 5N, 0 –10,000 N x 20 N
Elongation Scale least Count	: 1 mm
Traverse speed	: 100 mm/min
Grip separation	: 25 – 750 mm
Weight (approx.)	: 350 kg
Make	: KAMAL METAL INDUSTRIES

Description: This is used to obtain the stiffness & rigidity modulus by compressing a closed coil helical spring.

Torsion Testing Machine:

Technical specifications:

Model	: TT- 6
Maximum Torque capacity	: 60 Nm
Torque ranges	: 30, 60 N
No. of divisions on dial	: 600
Torsion speed	: 1.5 RPM
Clearance between grips	: 0 - 420 mm
Grips for round bars	: 4-8, 8-12 mm
Weight (approx.)	: 250 kg
Make	: FUEL INSTRUMENTS & ENGINEERS PVT. LTD

Description: This is used to obtain twisting moment –twist relationship of a specimen & to determine Shear Modulus. The torsion testing machine allows the application of torsional loading by twisting a test specimen.

Simply Supported & Cantilever beams setup:

Laboratory Utilization:

S. No	Laboratory Name	Branch(s)
1	Materials Testing Lab	B.Tech III Semester Mechanical Engineering
2	Solid Mechanics Lab	B.Tech III Semester Civil Engineering
3	Strength of Materials Lab	B.Tech III Semester Aerospace Engineering

Lab In-charge:

Faculty In-charge: **Mr. K. V. Viswanadh** **M.Tech, (Ph.D)**

Sr.Technician: **G. Subrahmanya Charyulu**