



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

METROLOGY LABORATORY

LAB INTRODUCTION: In science and engineering, objects of interest have to be characterized by measurement and testing. Measurement is the process of experimentally obtaining quantity values that can reasonably be attributed to a property of a body or substance. Metrology is the science of measurement. Metrology is also a fine avenue for discussing accuracy, error, and calibration. Testing is the technical procedure consisting of the determination of characteristics of a given object or process, in accordance with a specified method in metrology (the science of measurement), a standard is an object, system, or experiment that bears a defined relationship to a unit of measurement of a physical quantity.

Metrology, the science of measurement, helps manufacturers to attain the proper fit and finish for their products. It embraces both experimental and theoretical measurements and determinations at any level of uncertainty in any field of science and technology. Metrology Lab plays a crucial role for a student who wants to pursue his career in industrial engineering and shop floor control. Metrology lab's list of experiment are chosen in such a way to familiarize our B. Tech final year students in various kinds of measuring tools/instruments, measuring techniques, measurement methods, calibration procedures, SQC procedures. The students learn the measurement procedure in basic measuring instruments such as thread micrometre, gear tooth vernier, lever dial gauge, GO-NO gauges and normal micrometre and vernier calliper used in shop floor. The calibration exercise makes them to find the standard error involved in the measuring instrument using set of slip gauges.

COURSE EDUCATIONAL OBJECTIVES:

The objectives of this course are to:

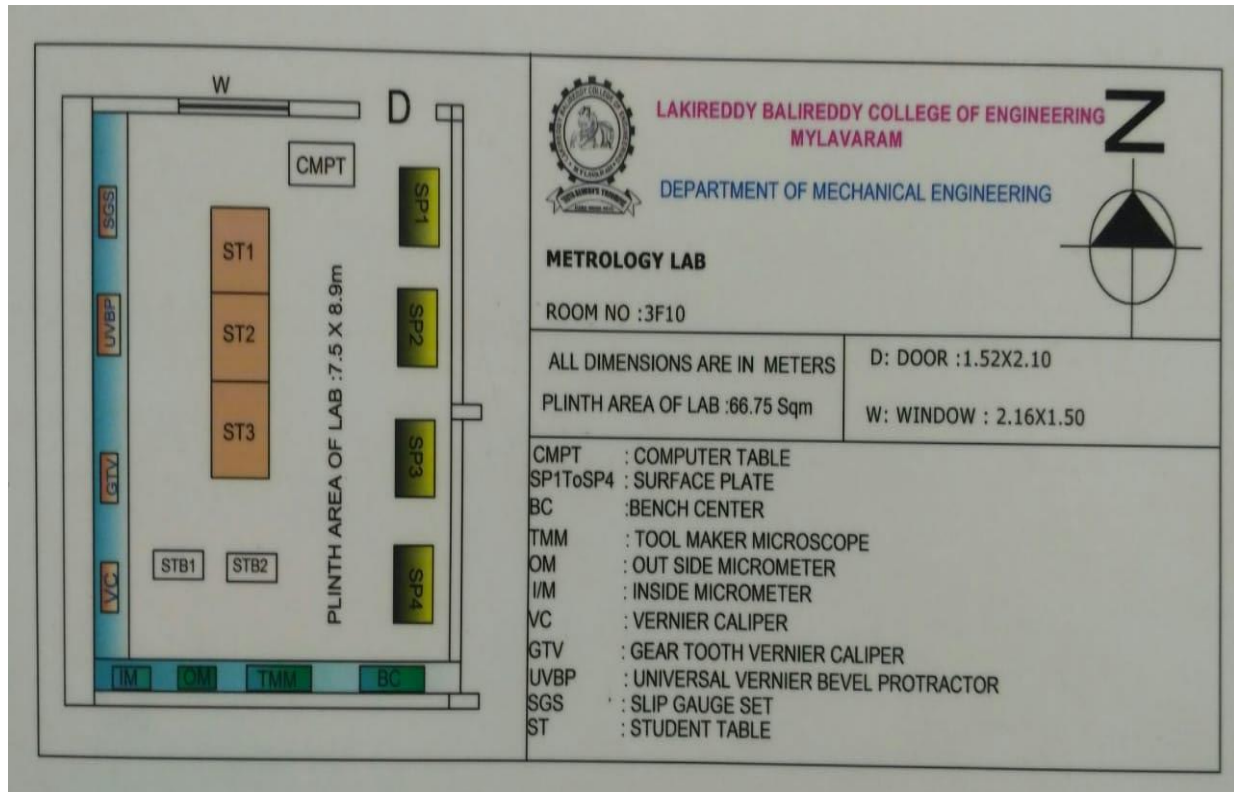
1. Learn the main principle on which different instruments operate and provide hands on experience on them.
2. Generate knowledge and skill in use of precision instruments.
3. Learn a basic understanding of various instruments used in linear and angular Measurements.
4. Get familiarize with usage of tool makers microscope.
5. Learn a basic understanding of the instruments used for measurement of pressure, Temperature, flow etc.

COURSE OUTCOMES:

After completion of the course student will be able to:

1. Develop quality standards of engineering products in industries.
2. Demonstrate work in quality control departments of industries and to ensure quality of products.
3. Analyze the measurement of the surface roughness and perform alignment tests.
4. Develop the ability to apply the principles in instruments and measuring techniques.
5. Demonstrate work in designing the instrumentation for a particular purpose and Special purpose devices.

Lab Layout:



Equipment details in Metrology Laboratory:

S.No.	Name of the equipment	Date of Purchase	No. of available	Cost Each in Rs	Total Cost in Rs
1.	Vernier Calliper L.C = 0.02mm	15-05-01	03	2,260/-	6,780/-
			03	4,620.33/-	13,861/-
2.	Vernier Height Gauge Size 300mm, L.C = 0.02mm	15-05-01	01	12,555/-	12,555/-
3.	Dial Vernier Caliers Size 150mm, L.C = 0.02mm	15-05-01	02	2,611.5/-	5,223/-
4.	OutsideMicrometre Size 0-25mm, L.C = 0.01mm a) Size 25-50mm, L.C =	15-05-01	03	1,305.67/-	3,917/-
			03	1,757.67/- 3,782/-	5,273/- 9,464/-

5.	Inside Micrometer Size 5-25mm	15-05-01 07-02-18	02 01	7,834.5/- 6,978/-	15,669/- 6,978/-
6.	Gear Tooth Micrometer Size 0-25mm,	15-05-01	02	3,616/-	7,232/-
7.	Gear Tooth Vernier Caliper,	15-05-01	02	6,528.5/-	13,057/-
8.	Dial Gauge Range = 10mm, L.C = 0.01mm	15-05-01	04 02	1,280.5/- 2,611.5/-	5,122/- 5,223/-
9.	Magnetic Stand	15-05-01	06	1,004.33/-	6,026/-
10.	Lever Type Dial Test Indicator,	15-05-01	01	2,712/-	2,712/-
11.	Depth Micrometer- Range = 0 -100mm, L.C = 0.01mm	15-05-01	01	4,520/-	4,520/-
12.	Vernier Depth Gauge, Range = 0 – 300mm, L.C = 0.02mm	15-05-01	01	5,926/-	5,926/-
13	Bevel Protractor, Width 150mm & 300mm blades	15-05-01	02	9,843/-	19,686/-
14	SineBar Size = 100mm	15-05-01	03	1,707.33/-	5,122/-
15	Sprit Level Size =200mm, L.C =	15-05-01	02	6,528.5/-	13,057/-
16	Three Wire Set withMicrometre	15-05-01	03 sets	3,515.33/-	10,546/-
17	a) Slip Gauge Set - Workshop Grade, set of 83 pieces	15-05-01	02	6,528.5/-	13,057/-
18	Screw Thread Plug Gauge, GO/NO GO	15-05-01	02	753.5/-	1,507/-
19	Screw Thread Ring Gauge, GO/NO GO	15-05-01	02	1,908.5/-	3,817/-
20	Plain Ring Gauge - Size = 12mm	15-05-01	03	853.67/-	2,561/-
21	Plain Plug Gauge - Size = 12mm	15-05-01	03	552.33/-	1,657/-
22	Taper Plug Gauge	15-05-01	02	1,557/-	3,114/-
23	Taper Ring Gauge	15-05-01	02	2,209.5/-	4,419/-
24	Adjustable Snap Gauge, 19- 25mm	15-05-01	02	753.50/-	1,507/-
25	Steel V-Block, Size 100x80x80mm	15-05-01	01	2,812/-	2,812/-
26	Magnetic V-Block, Size 100mmx 80mmx 80mm	15-05-01	01	8,537/-	8,537/-
27	Dial Bore Indicator a) Range = 18 – 35mm, LC = 0.01	15-05-01	02 02	5,825.5/- 5,825.5/-	11,651/- 11,651/-
28	Granite Surface Plate Size = 630mm x 630mm	15-05-01 16-12-08	04	8,537/- 9,360/-	17,074/- 18,720/-

29	Precession Bench Center Size 300mm x 125mm	15-05-01	01	12,053/-	12,053/-
30. *	Tool Makers Microscope with magnification 25x, 30x, 75x,150x,300x. along with all standard accessories:	15-05-01	01	67,797/-	67,797/-
31. *	Portable Surface Roughness Tester	06-11-09	01	93,282/-	93,282/-
Total					5,23,089/-

Metrology Lab Photographs:



Fig.1 METROLOGY LAB



Fig.2 METROLOGY LAB VIEW



Fig.3 TOOL MAKERS MICROSCOPE

Specifications:

S.No	Parameter	Description
1	Eye piece Magnification	12.5 X
2	Objective magnification	2 X
3	Total Magnification	25 X
4	Field of view	6.5 mm
5	Working Distance	70 mm
6	Distance centre to pillar	105 mm
7	State size	150x150 mm
8	Measuring range	25 mmx 25 mm
9	Glass plaate Diameter	80 mm
10	Protractor graduation	1 ⁰
11	Rotation	360 ⁰
12	Angle reading	6 ^I
13	Power supply	220 v
14	Weight	19.25 kg



Fig.4 BENCH CENTER

Specifications:

Paramter	Description
Max. Workpiece Height	300 mm
Max workpiece dia.	150 mm
Masss	13 kg



Fig. 5 SLIP GUAGES SET

Specifications:

The sizes include: Metric 8 pieces

3.1, 6.5, 9.7, 12.5, 15.8, 19.0, 21.9 & 25.0 mm

Metric 10 pieces

2.5, 5.1, 7.7, 10.3, 12.9, 15.0, 17.6, 20.2, 22.8 & 25.0 mm

Imperial 8 pieces

0.130", 0.250", 0.385", 0.500", 0.615", 0.750", 0.870" & 1.0"

10-pieces set ensures close test of progressive and periodical errors than the 8-piece set.

Additional slip gauges of 50, 75 or 100 mm (2, 3 or 4 inch) can be used to calibration micrometers of larger sizes.



Fig. 6. Surface Roughness Tester

Specifications:

Parameter	Description	Display Range	
Model	SJ-201	Ra,Rq	0.01-0.75 μm
Order no	178-950E	Ry,Rz,Rp	0.02-300 μm
Drive method	Auto return	PC	2.5-5000 μm
Drive speed	0.25 mm/s	Measuring range	300 μm
Return	0.8 mm/s	Resolution	0.01,0.04,0.08,0.32 μm
Drive range	21 mm	Cut-off length	0.25-25mm
Detector function	Stylus up	display	Large LCD
Detecting Method	Direct induction	output	SPC
Measuring Force	4mN	Dimension	156.5x62x50
Stylus material	Diamond		
Tip Radius	5 μm		
Radius of curvature	40 mm		
Operating Temperature	5-40°C		
Mass	290 gm		



Fig. 7SURFACE PLATE

Specifications:

S. No	Surface Plate Size (in mm)	Accuracy As Per IS-7327-2003	Weight (in Kgs)	Weight with Box (in Kgs)
1	400X400X60	4.5 μ m	30	40
2	630X400X80	5.0 μ m	65	90
3	630X630X80	5.0 μ m	100	125
4	800X500X100	5.0 μ m	120	150



Fig. 7DIAL TEST INDICATOR

Specifications:

S.No	Graduation	Probe Depth	Mass	Range
1	0.001	47 mm	255 g	6-10 mm 10-18.5 mm
2	0.01 mm	100 mm	268 g	6-10 mm 10-18.5 mm



Fig. 8VERNIER HEIGHT GAUGE

Specifications:

Range	Vernier reading	accuracy	Adjustable range
Left scale	Left scale	-	-
0-300 mm	0.02 mm	+0.04 mm	15 mm



Fig. 9BEVEL PROTRACTOR

S.No	Dial Graduation	Vernier graduation	Blade length
1	1	5 min	6
2	1	5 min	12



Fig. 10. Dial Bore Gauge

Specifications :

Parameter	Description	Parameter	Description
Measuring range	0.7-1.4 ¹¹	Measuring range	1.4"-2.5"
Number of Anvils	9	Number of Anvils	6
Number of Spacers	2	Number of Spacers	4

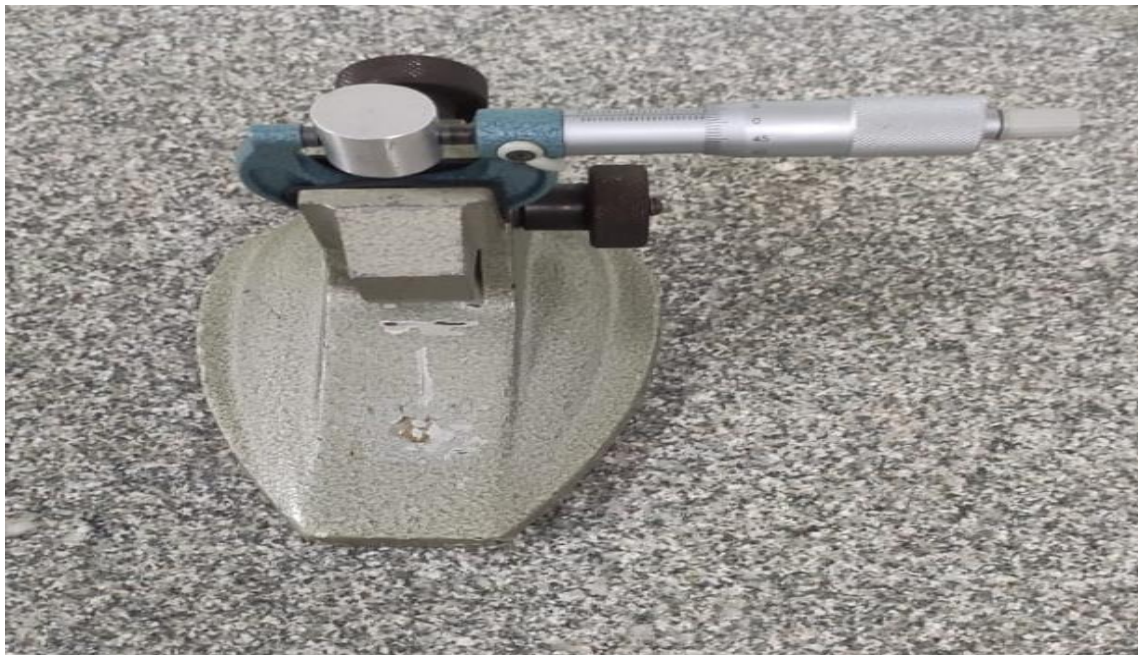


Fig. 11. Micrometer

Specifications:

Range	Order no	Graduation	Accuracy
0-25 mm	193-101	0.01 mm	+2 μm
	193-111	0.001 mm	+2 μm

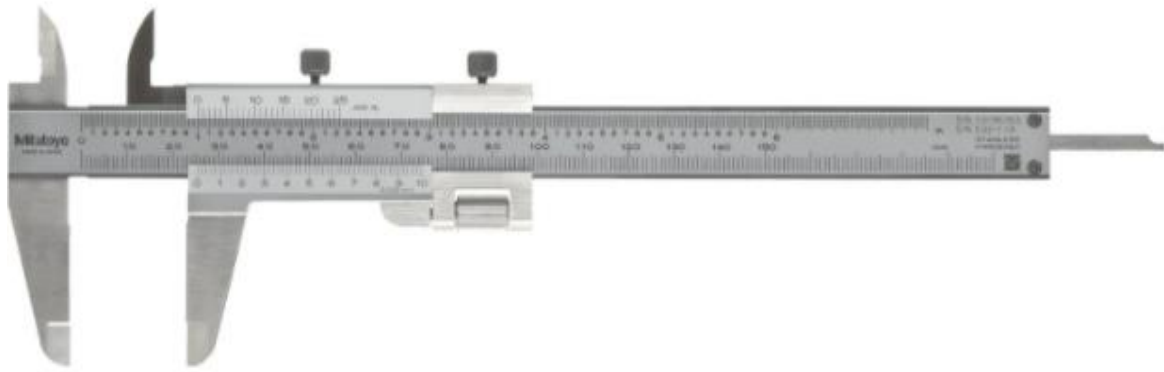


Fig. 12. Vernier Caliper

Specifications:

Parameter	Description
<u>Range</u>	
<u>Lower scale</u>	<u>Upper scale</u>
<u>0-130 mm</u>	<u>0-5"</u>
<u>Vernier resolution</u>	
<u>Lower scale</u>	<u>0.02 mm</u>
<u>Upper scale</u>	<u>0.001"</u>
<u>Accuracy</u>	<u>+0.0015"</u>
<u>L.C</u>	<u>0.01 mm</u>



Fig. 13.Spirit Level

Specifications:

Parameter	Description	Sec's	Mm/min
Sensitivity	1 Div	4	0.02
Base length	150	10	0.05



Fig. 13. Vernier Depth Gauge

Specifications:

Parameter	Description
Range	0-150 mm
Vernier reading	0.05 mm
Accuracy	+0.05 mm
Mass	240 g



Fig. 14. V-Block Fig. 15. GO-NOGO & Ring Gauges

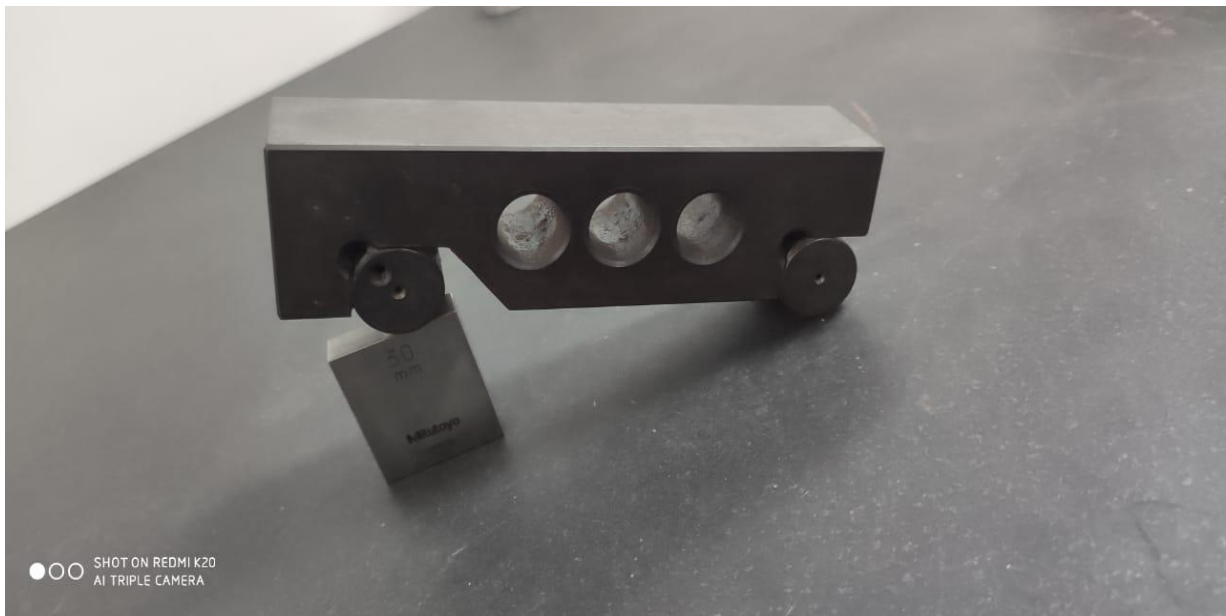


Fig. 16. Sine Bar

Specifications:

Parameter	Description
Bar size	100 mm
Distance Between Roller Axes	0.0025 mm
Equality of Mean Diameter of Rollers	0.0025 mm
Flatness of Upper Working Surface	0.0015 mm
Parallelism of Upper Working Surface to Lower Surface of Rollers	0.002 mm

Laboratory Utilization:

S. No	Laboratory Name	Branch(s)
1	Metrology & Instrumentation Lab	B.Tech VII Semester (ME)

Lab In-charge:

Faculty In-charge: Mr.V.Venkatrami Reddy, Asst. Professor

Sr. Technician: SK. Jany