G. S. Mandal's

MARATHWADA INSTITUTE OF TECHNOLOGY, AURANGABAD

DEPARTMENT OF MECHANICAL ENGINEERING

Laboratory Name and Location: Metrology and Mechanical Measurement (Room No 215)

Lab In-charge: Mr. Milind D. Gayakwad (Asst. Professor)

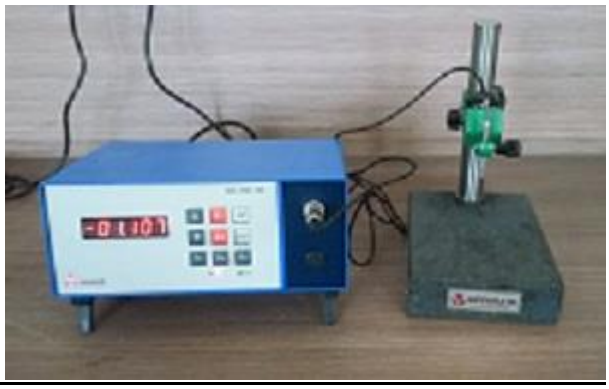
Lab Area: 76 sqM **Total Investment (INR):** Rs. 20,27282/-

List of Major Equipments:

Sr. No.	Name & Specifications of the Equipment	Photograph of the Equipment
1.	Floating Carriage Diameter Measuring Machine Technical Specifications Model : Mechanical Resolution: 0.0002mm Capacity: 0-100mm Length between centers:215mm	

2.	<u>Autocollimeter with Angle Dekkor for Measurement of precision angles and flatness of surface.</u> Objective focal length 300 mm • Magnification 10 X • Reticule scale with 1 minute LC. • Micrometer with 10 second LC. • With 180 X 250 mm harden & ground base plate. • Precision reflector mounted on stand • Optical square prism • Three angle gauges	
3.	<u>Monochromatic light Source with specimen set and optical flat for recognizing type of machined surface</u> 1. Light source : 35 watts sodium vapour lamp 2. Ballast : Copper Ballast for longer life. 3. Unit : Beautifully finished Steel Fabricated box with scratch less powder coating. 4. Diffuser : Milky white acrylic sheet is used to get uniform intensity. **SPECIMEN SET FOR DEMONSTRATION.** Test pieces - 50mm dia. (useful for demonstration to students of engineering) 1. Optical Flat 2. Concave Surface 3. Convex surface 4. Cylindrical 5. Tourf Formation 6. Steel Master	

4.	Profile Projector. **(Model 300T)** Magnification **:**10x lens. Rotary screen diameter 300 mm Screen clamps for checking templates by trace paper.	
5	**Angle Gauge Kit (13 pcs) Set consists of** 1. Degree Gauges: 6 nos. 41°, 27°, 9°, 9°, 3°, 1° 2. Minutes Gauges: 4 nos. 27', 9', 3' 1' 3. Second Gauges: 3 nos. 30", 18", 6" Material: H.C.H.Cr Hardness: 60 – 62 HRC	

6	**Electronic Comparator** A) Electronic Digital Type Display Unit having :-Twin Channel Display System Range/L.C. +/-200 µm/0.0001µm +/-200 µm/0.0005 µm. +/- 2000 µm/0.001 µm. Contact & Non-Contact Gauging RS 232 Output to PC Connectivity Static / Dynamic Reading Model Max, Min, Avg, Tir Metric / Inches Readings Single Tri Colour LED B) Axial Probe ±1 mm. (Make Solartron Uk) : 1No. C) Dial Gauge Stand (1No.) Size : 0-200 mm., Granite Base	
7.	**Dial Calibration Tester** Measuring Range: 25mm Resolution: 0.1 µm Electronic Dial Accuracy over range :5 µm Repeatability: 1 µm Resolution :1 µm	

8	**Tool Makers Microscope.** Magnification: 30x X-Y Table : 150 X 150 mm Travel : 50 mm X 50 mm Micrometer : 0.25 mm L.C. 0.01 mm Light Source : Diascopic & Epidiascpic 360 ' Graduated ring with 6 minutes vernier Filter : Green View Field : 6 mm Electronic regulator to control light intensity.	
9	**Slip Gauge Block** **M88 steel Grade 1** Nominal Value in mm Steps mm No. of pieces 1.0005 1 1.001 to 1.009 0.001 9 1.01 to 1.49 0.01 49 0.5 to 9.5 0.50 19 10 to 100 10 10	

Laboratory: Metrology and Mechanical Measurement

Significance of the course: This course demonstrates use of precision and non precision measuring instruments for the measurement of linear and angular measurement also introduce use of control charts for the study of process capability.

List of Experiment	CO
Experiment No.01: Determination of linear and angular dimensions of given composite part using precision/non precision measuring instruments. **Aim and Objective:** Determination of linear and angular dimensions of given composite part using vernier callpier, micrometer and vernier height gauge. **Outcomes:** students will be able to demonstrate methodology of using measuring instruments for the purpose linear and angular measurement **Experimentation:** Measuring the dimensions and Calculating average dimensions. **Result:** Student will measure linear and angular dimensions of a given components	CO1, CO2, CO3,
Experiment No.02: Error determination with linear / angular measuring instruments **Aim and Objective:** To compare the results obtained and find the errors in measuring instrument like vernier calliper, vernier height gauge, bevel protractor. **Outcomes:** Student will be able to do selection of measuring instruments on the basis of required precision. **Experimentation:** Measuring the given dimension with the help of vernier calliper and then compare result with precision measuring instruments to find error in the instruments. **Result & Discussion:** To find out error in the instruments by comparing.	CO1, CO2, CO3,
Experiment No.03: Calibration of measuring instrument. Example – Dial gauge, Micrometer, Vernier (any one) **Aim and Objective:** Calibration of dial gauge. **Outcomes:** students will be able to demonstrate the procedure of calibration of dial gauge. **Experimentation:** Carrying out the process of calibration of dial gauge. **Result & Discussion:** Students will be to study calibration process of dial gauge.	CO1, CO2, CO3,
Experiment No.04: Verification of dimensions & geometry of given components using Mechanical & Pneumatic comparator. **Aim and Objective:** To measure the dimensions and compare the dimensions using mechanical comparator. **Outcomes:** Student will be able to demonstrate use of comparator. **Experimentation:** Measuring dimensions with non precision instruments and measure the same dimensions using mechanical comparator and compare the results.	CO1, CO2, CO3,

Result & Discussion: Students will be able to know difference between measurements using instrument and comparator.	
Experiment No.05: Machine tool alignment testing on any two machines. **Aim and Objective:** Machine tool alignment test on lathe and drilling machine Outcomes: students will be able to demonstrate the process of machine tool alignment for lathe and drilling machine. **Experimentation:** students have to carry flatness checking of lathe and drilling machine bed and spindle alignment test for lathe and drilling machine **Result & Discussion:** Methods of alignment] and flatness checking is studied and measured.	CO1, CO2, CO3,
Experiment No.06: Identification of surfaces using optical flat/interferometers and measure surface roughness using surface roughness tester. **Aim and Objective:** Study of different surfaces using optical flat. **Outcomes:** Students will be able to recognize the type of machined surface using optical flats. **Experimentation:** Students will be using optical flat and monochromatic light source to get the interference pattern and decide type of pattern on the basis of pattern. **Result & Discussion:** students will be able to identify the type of surface on the basis of interference pattern observed.	CO1, CO2, CO3,
Experiment No.07: Determination of geometry & dimensions of given composite object using profile projector and measurement of various angles of single point cutting tool using tool maker's microscope. **Aim and Objective:** To measure single point cutting tool angles using tool makers microscope **Outcomes:** Students will be able to demonstrate the use of tool maker's microscope for measurement of angles. **Experimentation:** single point cutting tool is observed under tool makers microscope and angular measurements are carried out. **Result & Discussion:** different tool angles will be measured and its values are found.	CO1, CO2, CO3,
Experiment No.08: Measurement of thread parameters using floating carriage diameter measuring machine. **Aim and Objective:** To study measurements of screw thread parameters using floating carriage micrometer. **Outcomes:** To demonstrate the use of two wire method principle for measurement of effective diameter of thread. **Experimentation:** Carryout the measurements of outside diameter, effective diameter and root diameter of thread using floating carriage machine. **Result & Discussion:** The measured values of screw thread diameters will be measured.	CO1, CO2, CO3,

Experiment No.09: Measurement of spur gear parameters using Gear Tooth Vernier, Span, Gear Rolling Tester **Aim and Objective:** To measure the tooth thickness and depth of spur gear tooth using gear tooth vernier calliper. **Outcomes:** students will be able to demonstrate use of gear tooth vernier callpier for the measurement of gear tooth parameters. **Experimentation:** Measurement of gear tooth thickness and depth of tooth using gear tooth vernier calliper is carried out. **Result & Discussion:** the measured values of gear tooth thickness and depth are stated.	CO1, CO2, CO3,
Experiment No.10: Determination of process capability from given components and plot variable control chart/ attribute chart. **Aim and Objective:** Study of process capability of machine from given statistical data **Outcomes:** To decide about process capability on the basis of control charts. **Experimentation:** calculate mean, mode, standard deviation and then plotting the control charts like X bar and R bar. **Result & Discussion:** The process capability will be decided on the basis of control charts observations.	CO1, CO2, CO5,