



GOVERNMENT OF TAMILNADU
DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI
STATE PROJECT COORDINATION UNIT
(Established under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	MECHANICAL MEASURING TOOLS AND CALIBRATION
Course Code	ME/2020/005
Course Duration	40 Hours
Minimum Eligibility Criteria	ITI/10th/+2/Diploma/Graduates
Pre-requisites (if any)	-
Course Objectives	Training module has been designed to provide the participants to • Learn the various component of linear measurement using vernier calipers, micrometers and slip gauges • Understand various components of angle measurement using sine bar and bevel protractor. • Understand the geometrical dimensions of V-thread and spur gear. • Identify the given specimen by viewing the micro structure using metallurgical microscope. • Calibrate different mechanical measuring tools.
Course Outcomes	At the end of training, the participants will be able to • Measure various component Measuring tools • Identify error in measuring tools • Perform Calibration techniques
Expected Job Roles	Tool and Calibrator Technician

TEACHING AND SCHEME OF EXAMINATION

Course Code	Course Name	Hours		Assessment Marks		Duration of the Examination
				Min	Max	
ME/2020/005	MECHANICAL MEASURING TOOLS AND CALIBRATION	Theory	18	10	20	3 Hours
		Practical	22	40	80	
		Total	40	50	100	

ME/2020/005- MECHANICAL MEASURING TOOLS AND CALIBRATION
DETAILED SYLLABUS

Unit No.	Modules	No. of Hours	
		Theory	Practical
I	INTRODUCTION TO MEASURING TOOLS	15 Hours	
1.1	Construction and working -Steel rule-Caliper's	07	
1.2	Combination set Feeler gauge Pitch screw gauge		
1.3	Construction and working Micrometer - Inside micrometer - Thread Micrometer		
1.4	Slip gauges requirement Indian standard care and use Sine bar types uses limitations		
1.5	Working principle of colinometers -Auto colinometers -angle decker.		
1.6	Practical ➤ Safety Practices and Demonstration of Measuring tools ➤ Exercise on Calliper's, Micrometer and collimeters ➤ Measuring geometric dimensions of V - Threads ➤ Identify and marking angel by using angel decker		08
II	PRESSURE MEASUREMENTS	5 Hours	
2.1	Different types of Manometers	03	
2.2	Pressure gauges		
2.3	Calibration of pressure gauge by using Dead weight pressure gauge		
2.4	Practical ➤ Safety introduction to pressure measuring tools and equipment ➤ Measure the pressure of fluid by using venturi meter, orifice meter ➤ Pressure measurements using pressure gauge		02
III	METROLOGY	10 Hours	
3.1	Definition of metrology - need of inspection	04	
3.2	Precision-Accuracy-Sensitivity-Magnification-Repeatability		
3.3	Mechanical Comparator -Optical Comparator-Electrical Comparator Pneumatic Comparator		
3.4	Practical ➤ Introduction to working of comparator ➤ Identify the Precision, Accuracy, Sensitivity, Magnification, Repeatability of given workpiece		06
IV	CALIBRATION OF MEASURING INSTRUMENTS	10 Hours	
4.1	Calibration of vernier caliper-Vernier Height gauge	04	
4.2	Calibration of Micrometer -Bevel Protractor		
4.3	Calibration of Slip gauge -Dial gauge.		

4.4	Practical ➤ Calibrate the vernier using slip gage to find zero error ➤ Calibrate the Micrometer using slip gage to find zero error ➤ Calibrate pressure gauge using death weight gauge		06
Total Theory and Practical hours		18	22
Total hours		40	

HARDWARE REQUIREMENT

S. NO.	LIST OF TOOLS /EQUIPMENTS
1.	Vernier Caliper
2.	Digital Vernier Caliper
3.	Dial Vernier Caliper
4.	Micrometer
5.	Digital Micrometer
6.	Slip gauge
7.	Universal bevel Protractor
8.	Sine bar
9.	Thread micrometer
10.	Surface plate
11.	Vernier height gauge
12.	Metallurgical Microscope
13.	Die penetration
14.	Magnetic particle test
15.	Abrasive belt grinder
16.	Polishing machine
17.	Mounting machine
18.	Granite plate
19.	Master Gauge Block set
20.	Calibrated Micrometer of similar range as instrument
21.	Gage oil
22.	Cleaning solution
23.	Hard Arkansas stone
24.	Lint free cloth
25.	Dead Weight Pressure Gauge Tester
26.	Monometers
27.	Pressure Gauge
28.	Mechanical Comparator
29.	Angle detector
30.	Pneumatic Comparator

REFERENCE BOOKS

S. NO.	NAME OF THE BOOK	AUTHOR	PUBLISHER
01	Engineering Metrology	R.K.Jain	Khana
02	Engineering Metrology	I. C. Guptha	Dhanpath Rai
03	Material Science and Metrology	O P Khanna	Dhanpath Rai
04	Introduction to Physical Metallurgy	Sydney Aver	Mc Graw Hill
05	Metrology & Measurements	Anandk.Bewoor & Vinaykulkarni	Mc Graw Hill

ASSESSMENT AND CERTIFICATION

S. No.	Criteria for Assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 word/objective type questions)
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The passing criteria for successful completion of training is every trainee should score 50% of marks in theory and practical examination.
6.	On successful completion of training , Certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION

ALLOCATION OF MARKS

S.NO	Description	Max.Marks
1.	Theory Examination	20
2.	Practical Examination	
	a)Aim and Procedure	20
	b)Demonstration / Execution	25
	c) Result & Viva Voce	15
	d)Record	20
Total Marks		100

THEORY MODEL QUESTION PAPER

ME/2020/005 – MECHANICAL MEASURING TOOLS AND CALIBRATION

(Maximum Marks: 20)

(N.B: Answer any **Twenty** questions)

20x1= 20 Marks

1. What is least count of Vernier Caliper?
2. How many divisions are graduated on the thimble of Micrometer?
3. Name the instrument to measure the Height of the block.
4. Write any two direct Measuring Instrument.
5. Write advantage of Vernier Caliper over the Micrometer.
6. What is least count of bevel protector?
7. What is the use of ratchet stop in micrometer?
8. Write any two type of pressure measurement Devices.
9. What is meant by Atmospheric Pressure?
10. How to Calibrate the Pressure gauge?
11. What is meant by Piezometer?
12. Dead weight gauge is used for the measurement of pressure of _____
13. What is meant by Positive Pressure?
14. What is meant by Metrology ?
15. What is Accuracy?
16. What is Precision?
17. Write the use of Dial Gauge?
18. Write advantage of diaphragm Gauge?
19. What is meant by Vacuum?
20. Write Formula for Error of Measurement.
21. What is Calibration?
22. Why Is Calibration Important?
23. What is Traceability?
24. How to check Equipment is calibrated?
25. Write Steps to calibrate the Height gauge.