



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Production

Course / Subject Code : ME01000561

Course / Subject Name : Metrology and Computer Aided Inspection

w. e. f. Academic Year:	2024-25
Semester:	1 st Semester
Category of the Course:	PEC

Prerequisite:	Nil
Rationale:	The purpose of this course is to teach the students basic concepts in various methods of engineering measurement techniques and applications, understand the importance of measurement and inspection in manufacturing industries. This will also make the students capable of learning to operate and use advanced metrological devices with ease in industrial environments.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	Understand the advanced measurement principles with ease.	Understanding
2	Operate sophisticated measurement and inspection facilities.	Evaluate
3	Design and develop new measuring methods	Analyze
4	Demonstrate Computer Aided Laser Metrology	Analyze
5	Evaluate Image Processing for Metrology	Evaluate

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Concepts of Metrology: Terminologies, Standards of measurement, Errors in measurement, Interchangeability and Selective assembly, Accuracy and Precision, Calibration of instruments, Basics of Dimensional metrology and Form metrology	9	20



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Production

Course / Subject Code : ME01000561

Course / Subject Name : Metrology and Computer Aided Inspection

2.	Measurement of Surface Roughness: Definitions, Types of Surface Texture: Surface Roughness Measurement Methods, Comparison, Contact and Non-Contact type roughness measuring devices, 3D Surface Roughness Measurement, Nano Level Surface Roughness Measurement, Instruments.	11	25
3.	Interferometry: Introduction, Principles of light interference, Interferometers, Measurement and Calibration, Laser Interferometry.	8	15
4.	Computer Aided and Laser Metrology: Tool Makers Microscope, Microhite, Coordinate Measuring Machines, Applications, Laser Micrometer, Laser Scanning gauge, Computer Aided Inspection techniques, In-process inspection, Machine Vision system-Applications.	10	25
5.	Image Processing for Metrology: Overview, Computer imaging systems, Image Analysis, Preprocessing, Human vision system, Image model, Image enhancement, gray scale models, histogram models, Image Transforms - Examples.	7	15
Total		45	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	15	25	25	10

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Bewoor, A.K. and Kulkarni,V.A.,”Metrology and Measurement”, Tata Mc Graw-Hill, 2009.
2. Galyer, F.W. and Shotbolt, C.R., “Metrology for engineers”, ELBS, 1990.
3. Smith,G.T., “Industrial Metrology”, Springer, 2002
4. Whitehouse,D.J., "Surface and their measurement", Hermes Penton Ltd, 2004.
5. “ASTE Handbook of Industries Metrology”, Prentice Hall of India Ltd., 1992.
6. Rajput,R.K., “Engineering Metrology and Instrumentations”, Kataria & Sons Publishers, 2001.
7. Sonka,M., Hlavac,V. and Boyle.R., “Image Processing, Analysis, and Machine Vision”, CengageEngineering, 2007.



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Production

Course / Subject Code : ME01000561

Course / Subject Name : Metrology and Computer Aided Inspection

List of Laboratory/Learning Resources Required:

1. The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and TierII Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester.
2. NPTEL

* * * * *