

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Mechanical (Production Engg.)

Semester: II

Subject Name: **Metrology & Computer Aided Inspection (Major Elective - III)**

Subject Code: **1722804**

Sr. No.	Course Content
1	Metrology and Techniques: Standards in metrology-definition, Traceability, Characteristics Length & Angular measurements-Review of standard instruments, GD and tolerance procedure-Review of dimension & form tolerance and methods of measurement, Tolerance analysis.
2	Surface and form metrology - flatness, roughness, waviness cylindricity, etc., Methods of improving accuracy & surface finish, Influence of forced vibration on accuracy, Dimensional wear of cutting tools and its influences on accuracy.
3	Standards for length measurement standards and their calibration - Light interference - Method of coincidence - Measurement errors. Various tolerances and their specifications, gauging assembly, comparators. Angular measurements - principles and measuring instruments.
4	Laser Applications in Metrology: LASER light source, LASER interferometer, LASER alignment telescope, LASER micrometer, On-line and in-process measurements of diameter, Roundness and surface roughness using LASER, Micro holes and topography measurements, straightness and flatness measurement.
5	Special Measuring Instruments and Techniques: Optoelectronic devices, contact and non-contact types, Applications in on-line and in-process monitoring systems, Tool wear measurement, Surface measurement, Machine vision, shape identification, Edge detection techniques, Normalisation, gray scale correlation, Template Techniques, Surface roughness using vision system, Interfacing robot and image processing system.
6	Sensors in Inspection: Manufacturing applications of photo detectors, deflection methods-beam detection, Reflex detection, & Proximity detection, Applications of Inductive and Capacitive proximity sensors, Understanding microwave sensing applications laser sensors and limit switches. Advanced sensor technology-Bar code systems, Principles and applications of Colour sensors, electro-magnetic identifier, Tactile sensors, Ultrasonic sensors, Odour sensors
7	Computer Aided Metrology - Principles and interfacing, soft metrology - Application of lasers in precision measurements- laser interface, laser scanners, Coordinate measurement machine (CMM), Type of CMM & applications,
8	Non contact CMM, Electro optical sensors for dimension, contact sensors for surface finish measurements. Image processing and its Metrology, Acoustical measurements, Digital techniques in mechanical measurements, Assessing and presenting experimental DATA

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References Book:

1. Fundamentals of dimensional Metrology T. Busch and R. Harlow Delmar, 3e
2. Engineering Metrology G. Thomas and G. Butter Worth PUB
3. Sensors and Control systems in Manufacturing Sabne Soloman McGraw Hill Book
4. Measurement systems: Applications & Design Doebelin International Student Edition
5. Optoelectronics for Technology and Engineering Robert G. Seippel Prentice Hall India
6. Interface Technology for Computer Controlled Manufacturing processes Ulrich-Rembold, Armbruster and Ulzmann Marcel Dekker Publications, NY
7. study manual on tolerance stacks, vol.1 Second edition ASME. 1994
8. Dimensioning and tolerancing of mass Production Spotts Prentice Hall, 1983