GUJARAT TECHNOLOGICAL UNIVERSITY

Syllabus for Bachelor of Vocation (B.Voc.), 5th Semester
Branch: Production Technology
Subject Name: Mechanical Metrology-II
Subject Code: 21150301

Type of course: Core
Prerequisite: Zeal to learn the subject

Rationale: Metrology deals with the application of science in Engineering. It provides a means of assessing the suitability of measuring instruments, their calibration, and the quality control of manufactured products.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical		
L	T	P	C	ESE (E)	PA(M)	ESE (V)	PA (I)	
3	0	0	3	50	0	0	0	50

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment

Contents:

Sr. No.	Content	Total Hrs.	Module % Weightage
01	**Measurement of screw thread and gear:** Terminology of screw threads, measurement of major diameter, minor diameter, pitch, angle and effective diameter of screw threads by 2-wire and 3- wire methods, best size wire. Screw thread gauges, Tool maker's microscope. Gear tooth terminology, tooth thickness measurement using constant chord method and base tangent method, measurement of pitch. Gear roll tester for composite error.	10	20
02	**Measurement of Force, Torque and Strain:** Force measurement: load cells, cantilever beams, proving rings, differential transformers. Measurement of torque: Torsion bar dynamometer, servo controlled dynamometer, absorption dynamometers. Power Measurements. Measurement of strain: Mechanical strain gauges, electrical strain gauges, strain gauge: materials, gauge factors, theory of strain gauges and method of measurement, bridge arrangement, temperature compensation.	12	25
03	**Temperature measurement:** Thermocouples, Resistance Temperature Detectors, Thermistor, Liquid in glass Thermometers, Pressure Thermometers, Pyrometer, Bimetallic strip.	08	20
04	**Pressure measurement:** principle, pitot tube, pressure gauges, pressure transducers, use of elastic members, Bridgeman gauge, McLeod gauge, Pirani gauge.	07	20
05	**Metrology of Surface finish:** Surface Metrology Concepts and terminology, Method of measuring surface finish: Stylus	05	15

	system of measurement, Stylus probe instruments, Wave length,		
05	Frequency and cut off, other methods for measuring surface roughness: Pneumatic method, Light Interference microscopes, Mecrin Instruments.	05	15
	Total	**42**	**100**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	20	-	-	-

R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Course Outcomes:

Sr. No.	CO Statement	Marks % Weightage
CO 1	Students will discriminate between various Screws and Gears by measuring their dimensions.	20
CO 2	Students will describe methods of measurement for various quantities like force, torque and strain.	25
CO 3	Students will select appropriate temperature and pressure measuring device for various applications	40
CO 4	Students will discriminate capabilities of machining process by measuring surface finish of the component produced	15

Reference Books:

1. Mechanical Measurement and Metrology by R K Jain, Khanna Publisher Mechanical Measurement & Control by D.S. Kumar
2. A course in Mechanical Measurements and Instrumentation, A K Sawhney, Dhanpat Rai Publications
3. Mechanical Measurements and Instrumentations, Er. R K Rajput, Kataria Publication(KATSON)
4. Metrology and Measurement, Anand Bewoor & Vinay Kulkarni McGraw-Hill

List of Open Source Software/learning website:

www.nptel.ac.in