



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech / Mechanical Engineering		
Course Title	Metrology and Measurements		
Course Code	MEPC21	No. of Credits	3
Course Code of Pre-requisite subject(s)	NIL		
Session	July 2022	Section (if, applicable)	B
Name of Faculty	Mr. Kandukuri Sri Ram Varun Teja (Dr. Sreejith Mohan)	Department	Mechanical Engineering
Official Email	411120051@nitt.edu	Telephone No.	8074817555
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		Telephone No.	
Course Type	Core course		
Syllabus (approved in BoS)			
<p>Introduction to Metrology- Introduction to Metrology, Fundamental principles and definitions, measurement standards / primary and tertiary standards, distinction between precision and accuracy.Limits, fits and tolerances, Tolerance grades, Types of fits, IS919, GO and NO GO gauges – Taylor’s principle, design of GO and NO GO gauges, filler gauges, plug gauges and snap gauges.</p> <p>Comparators - Constructional features and operation of mechanical, optical, electrical/electronic and pneumatic comparators, advantages, limitations and field of applications. Principles of interference, concept of flatness, flatness testing, optical flats, optical interferometer and laser interferometer. Surface Texture Measurement - importance of surface conditions, roughness and waviness, surface roughness standards specifying surface roughness parameters- Ra, Ry, Rz, RMS value etc., surface roughness measuring instruments - Tomlinson and Taylor Hobson versions, surface roughness symbols.</p> <p>Screw Thread Measurement - Two wire and three wire methods, floating carriage micrometer. Gear Measurement – Gear tooth comparator, Master gears, measurement</p>			



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using rollers and Parkinson's Tester. Special Measuring Equipment – Principles of measurement using Tool Maker's microscope profile projector & 3D coordinate measuring machine.

Generalized instrumentation system - Error theory - Calibration of instruments - Range resolution – Span - Linearity, Sensitivity - Signal conditioning systems. Error analysis - Uncertainty propagation - Oscilloscope for analysis of dynamic and transient events.

Principles and analysis of measurement systems used for measurement of flow, power, pressure and temperature.

COURSE OBJECTIVES

1. Describe the evolution of quality standards and metrology.
2. Provide knowledge of limits, fits, tolerances and gauging.
3. Introduce measurement systems and methods with emphasis on different transducers, intermediate modifying and terminating devices.

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. Demonstrate different measurement techniques.	1, 2
2. Reproduce the fundamental knowledge on metrology techniques.	1, 2, 3
3. Identify suitable metrological methods for measuring the components.	1, 2, 3
4. Explain the acceptance test for machines.	1, 2, 3
5. Outline the working of various optical measuring instruments.	1, 2, 3, 4

COURSE PLAN – PART II

COURSE OVERVIEW

COURSE TEACHING AND LEARNING ACTIVITIES

(Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	1st week	Introduction to Metrology, Fundamental principles and definitions, measurement standards / primary and tertiary standards	PPT/ Chalk and Talk
2	2 nd week	Distinction between precision and accuracy. Limits, fits, and tolerances, Tolerance grades, Types of fits, IS919	PPT/ Chalk and Talk
3	3 rd week	GO and NO GO gauges – Taylor's principle, design of GO and NO GO gauges, filler gauges, plug gauges and snap gauges.	PPT/ Chalk and Talk



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4	4 th week	Constructional features and operation of mechanical, optical, electrical/electronic and pneumatic comparators, advantages, limitations and field of applications.	PPT/ Chalk and Talk
5	5 th week	Principles of interference, concept of flatness, flatness testing, optical flats, optical interferometer and laser interferometer.	PPT/ Chalk and Talk
6	6 th week	Surface Texture Measurement - importance of surface conditions, roughness and waviness,	PPT/ Chalk and Talk
7	7 th week	surface roughness standards specifying surface roughness parameters- Ra, Ry, Rz, RMS value etc.	PPT/ Chalk and Talk
8	8 th week	surface roughness measuring instruments - Tomlinson and Taylor Hobson versions, surface roughness symbols.	PPT/ Chalk and Talk
9	9 th week	Screw Thread Measurement - Two wire and three wire methods, floating carriage micrometer.	PPT/ Chalk and Talk
10	10 th week	Gear Measurement – Gear tooth comparator, Master gears, measurement using rollers and Parkinson's Tester.	PPT/ Chalk and Talk
11	11 th week	Special Measuring Equipment – Principles of measurement using Tool Maker's microscope profile projector & 3D coordinate measuring machine.	PPT/ Chalk and Talk
12	12 th week	Generalized instrumentation system - Error theory - Calibration of instruments.	PPT/ Chalk and Talk
13	13 th week	Range resolution – Span - Linearity, Sensitivity - Signal conditioning systems	PPT/ Chalk and Talk
14	14 th week	Error analysis - Uncertainty propagation - Oscilloscope for analysis of dynamic and transient events.	PPT/ Chalk and Talk
15	15 th - 16 th week	Principles and analysis of measurement systems used for measurement of flow, power, pressure and temperature.	PPT/ Chalk and Talk



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COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week	Duration	% Weightage
1	CT1	6 th		20
2	Assignment 1		-	10
3	CT2	10 th		20
CPA	Compensation Assessment*	As per the academic schedule		20
4	Final Assessment *		3 hours	50
*mandatory; refer to guidelines on page 5				
COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)				
<ol style="list-style-type: none">1. Students can meet the faculty at any stage in the course duration in case he/she finds difficulty in understanding the concept.2. Feedback form issued to students to express their comments about the course after completing the syllabus. Students are requested to give genuine feedback about the course.3. Student knowledge about the topic covered in this course will be judged based on marks obtained in the written examination.				
COURSE POLICY (including compensation assessment to be specified)				
<ul style="list-style-type: none">• Students must attend classes regularly.• Students should submit the assignment as per the instruction given at the class. Late submission is not permitted.• The institute follows relative grading with flexibility given to teachers to decide the mark ranges for grades.• All assessments of the course will be done on the basis of marks.				
<u>MODE OF CORRESPONDENCE</u> Email: 411120051@nitt.edu , Mobile: 8074817555				
<u>COMPENSATION ASSESSMENT POLICY</u> One compensation assessment in the form of viva voce shall be conducted for the students failed in appearing for assessment I, II or both I & II.				
<u>ATTENDANCE POLICY</u> (A uniform attendance policy as specified below shall be followed)				
<ul style="list-style-type: none">➤ At least 75% attendance in each course is mandatory.➤ A maximum of 10% shall be allowed under On Duty (OD) category.				



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- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

FOR APPROVAL



Course Faculty



CC- Chairperson



HOD


12/01/2022