

**DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

COURSE PLAN – PART I			
Name of the Programme and Specialization	M.TECH – PROCESS CONTROL AND INSTRUMENTATION		
Course Title	MEASUREMENT SYSTEMS		
Course Code	CL 651A	No. of Credits	3
Course Code of Pre-requisite subject(s)	NIL		
Session	JULY. 2021	Section (if, applicable)	NA
Name of Faculty	DR. B VASUKI	Department	ICE
Email	bvas@nitt.edu	Telephone No.	0431-2503358 9443186478
Name of Course Coordinator(s) (if, applicable)	NIL		
Course Type	Core course		
SYLLABUS (approved by BOS)			
<p>General concepts and terminology of measurement systems, static and dynamic characteristics, errors, standards and calibration.</p> <p>Introduction, principle, construction and design of various active and passive transducers.</p> <p>Introduction to semiconductor sensors and its applications; Design of signal conditioning circuits for various Resistive, Capacitive and Inductive transducers and piezoelectric transducer.</p> <p>Introduction to transmitters, two wire and four wire transmitters, Smart and intelligent Transmitters. Design of transmitters.</p> <p>Introduction to EMC, interference coupling mechanism, basics of circuit layout and grounding, concept of interfaces, filtering and shielding.</p> <p>Introduction to safety, electrical hazards, hazardous areas and classification, non-hazardous areas, enclosures – NEMA types, fuses and circuit breakers. Protection methods: Purging, explosion proofing and intrinsic safety</p>			
COURSE OBJECTIVES			
This course is primarily to introduce various measurement techniques to students from non-circuit branches			
COURSE OUTCOMES (CO)			
Course Outcomes	Aligned Programme Outcomes PO)		
CO1 Basic measurement techniques	PO2, PO5, PO6, PO7, PO12		
CO2 Sensing and transducing various physical quantities	PO1, PO2, PO3, PO5, PO6, PO7, PO8, PO10, PO12		
CO3 Electromagnetic interference and data transfer	PO1, PO2, PO3, PO5, PO6, PO7, PO8, PO10, PO12		
CO4 Safety in handling industrial instruments	PO2, PO3, PO4, PO6, PO7, PO8, PO10, PO12		

COURSE PLAN – PART II

COURSE OVERVIEW

The aim of the course is to provide students with a knowledge of basic measurement systems, how the process parameters are measured by active and passive transducers along with its signal conditioning circuits. The course also covered the EMC and safety principles followed in industries.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Cont act Hours	Topic	Mode of Delivery
1	Week 1	General concepts of measurement systems. Static and dynamic characteristics, errors	Online mode
2	Week 2	Standards and calibration. Principle, construction and design of various active transducers	
3	Week 3	Principle, construction and design of passive transducers. Design of signal conditioning circuits for transducers	
4	Week 4	Introduction to transmitters, two wire and four wire transmitters concepts	
5	Week 5	Smart and intelligent Transmitters. Design of transmitters	
6	Week 6	Introduction to EMC, Interference Coupling mechanism,	
7	Week 7	Basics of circuit layout and grounding. Concept of interfaces.	
8	Week 8	Filtering and Shielding.	
9	Week 9	Introduction to safety, electrical hazards, hazardous areas and classification.	
10	Week 10	Enclosures – NEMA types	
11	Week 11	Fuses and circuit breakers. Protection methods: Purging, explosion proofing.	
12	Week 12	Intrinsic Safety	

COURSE ASSESSMENT METHODS

1. The assessment in this course has one component, viz, theory
2. The assessment involves two tests and final end semester exam
3. The total marks for this course is 100. Letter grades will be awarded.
4. Out of 100, the end semester carry 30 marks, two assessments carry 50 marks and assignment/presentation /./quiz components carry 20 marks.

S.No.	Mode of Assessment	Week	Duration	% Weightage
1	Assessment 1	5	90 minutes	25 marks
2	Assessment 2	10	90 minutes	25 marks
3	Presentation/ assignment/quiz	4 ,6 ,8 and10	30 minutes	20 marks
4	Compensation Assessment	11	90 minutes	25 marks
5	End Semester Exam	12	2.5 hours	30 marks

COURSE EXIT SURVEY

Feedback may be provided during the Class Committee Meeting.
Descriptive feedback will be collected by the faculty during the middle of the course.
A formal online feedback will be collected by the Institute at the end of the course.

COURSE POLICY

MODE OF CORRESPONDENCE (email/ phone etc)

As given in page 1

COMPENSATION ASSESSMENT POLICY

One Compensation Assessment is permitted.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC HONESTY & PLAGIARISM

- 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.

ADDITIONAL INFORMATION

Faculty is available for discussion after class hours. Students are advised to meet the faculty at a mutually convenient time through online mode. Contact details (email/mobile number) are provided in the page 1 of the course plan.

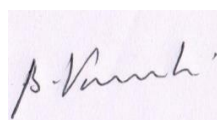
TEXT BOOKS:

1. John P. Bentley, Principles of Measurement Systems, Third edition, Addison Wesley Longman Ltd., UK, 2000.
2. Doebelin E.O, Measurement Systems - Application and Design, Fourth edition, McGraw- Hill International Edition, New York, 1992.

REFERENCES:

1. M. Sze, Semiconductor sensors, John Wiley & Sons Inc., Singapore, 1994.
2. Noltingk B.E., Instrumentation Reference Book, 2nd Edition, Butterworth Heinemann, 1995.
3. L.D.Goettsche, Maintenance of Instruments and Systems – Practical guides for measurements and control, ISA, 1995.

FOR APPROVAL



06.08.2021
Course Faculty



CC-Chairperson _____ HOD _____



Guidelines:

- a) The number of assessments for a course shall range from 4 to 6.
- b) Every course shall have a final assessment on the entire syllabus with at least 30% weightage.**
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. This is not applicable for project work/industrial lectures/internship.**
- d) The policy for attendance for the course should be clearly specified.
- e) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.