

DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGG.
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech in Instrumentation and Control Engineering		
Course Title	Industrial Instrumentation - (IV Semester)		
Course Code	ICPC17 -(IV semester)	No. of Credits	03
Course Code of Pre-requisite subject(s)			
Session	January 2019	Section (if, applicable)	A
Name of Faculty	Dr. Karthick P.A	Department	ICE
Email	pakarthick@nitt.edu	Telephone No.	
Name of Course Coordinator(s) (if, applicable)			
E-mail		Telephone No.	
Course Type	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
Syllabus (approved in BoS)			
Temperature measurement: Introduction to temperature measurements, Thermocouple, Resistance Temperature Detector, Thermistor and its measuring circuits, Radiation pyrometers and thermal imaging. Pressure measurement: Introduction, definition and units, Mechanical, Electro-mechanical and electronic pressure measuring instruments. Low pressure measurement. Transmitter definition types, I/P and P/I Converters. Level measurement: Introduction, Differential pressure level detectors, Capacitance level sensor, Ultrasonic level detectors and Radar level transmitters and gauges. Flow measurement: Introduction, definition and units, classification of flow meters, differential pressure and variable area flow meters, Positive displacement flow meters, Electro Magnetic flow meters. Flow measurement: Hot wire anemometer, laser Doppler anemometer, ultrasonic, vortex and cross correlation flow meters, and measurement of mass flow rate.			
COURSE OBJECTIVES			
1. To expose the students to the importance of process variable measurements. 2. To expose the students to various measurement techniques used for the measurement of temperature, flow, pressure and level in process industries. 3. To make the students knowledgeable in the design, installation and trouble shooting of process instruments.			

COURSE OUTCOMES (CO)			
Course Outcomes			Aligned Programme Outcomes (PO)
1. The students will be familiar with the different temperature, pressure, flow and level measurement techniques used in process industries.			1,2,3
2. The student will be able to select and make measurements of temperature, flow, pressure and level in any process industry.			1,3,5
3. The students will be able to identify or choose temperature, flow, pressure and level measuring device for specific process.			5,6,8,12
COURSE PLAN – PART II			
COURSE OVERVIEW			
Industrial Instrumentation course for engineering students are shaped by a variety of applications including control, quality assurance, performance testing, design and research.			
COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	1 and 2 (6 Contact hours)	Temperature measurement: Introduction to temperature measurements, Thermocouple, Resistance Temperature Detector	Chalk & Talk/ Power point presentation
2	3 and 4 (6 Contact hours)	Thermistor and its measuring circuits, Radiation pyrometers and thermal imaging.	Chalk & Talk/ Power point presentation
3	5 (2 contact hours)	Pressure measurement: Introduction, definition and units, Mechanical, Electro-mechanical and electronic pressure measuring instruments	Chalk & Talk/ Power point presentation
4	5 (1 contact hour)	Assessment –1: Written exam (20% Weightage)	-
5	6 (3 contact hours)	Low pressure measurement, Transmitter definition types	Chalk & Talk/ Power point presentation
6	7 (3 contact hours)	I/P and P/I Converters. Level measurement: Introduction	Chalk & Talk/ Power point presentation
7	8 (3 contact hours)	Differential pressure level detectors, Capacitance level sensor	Chalk & Talk/ Power point presentation
8	9 (3 contact hours)	Ultrasonic level detectors and Radar level transmitters and gauges.	Black/white board Power point presentation

9	10 (3 contact hours)	Flow measurement: Introduction, definition and units, classification of flow meters Differential pressure meters	Black/white board Power point presentation
10	11 (3 contact hours)	Variable area flow meters & Positive displacement flow meters	Black/white board Power point presentation
11	12 (1 contact hour)	Assessment -2: Written exam (20% Weightage)	-
12	12 (2 contact hour)	Electro Magnetic flow meters & tutorials	Black/white board Power point presentation
13	13 (3 contact hours)	Hot wire anemometer, laser Doppler anemometer.	Black/white board Power point presentation
14	14 (3 contact hours)	Ultrasonic, vortex and cross correlation flow meters. Measurement of mass flow rate	Black/white board Power point presentation

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1.	First Assessment (written exam)	5 th week	One hour	20%
2.	Assignment -1	6 th week	--	5%
3.	Second Assessment (Written Exam)	12 th week	One hour	20%
4.	Compensation Assessment (Written Exam)-CPA	13 th week	One hour	20%
5.	Assignment -2	13 th week	---	5%
6.	Final assessment (Written Exam)	15 th week	Three hour	50%

ESSENTIAL READINGS : Textbooks, reference books, Website addresses, journals, etc.

Text Books:

1. Ernest.O.Doebelin and Dhanesh.N.Manik, Doebelin's Measurement Systems, McGraw Hill Education, 6th Edition, 2011.
2. B.G.Liptak, Process Measurement and Analysis, CRC Press, 4th Edition, 2003.
3. Patranabis D, Principles of Industrial Instrumentation, Tata McGraw Hill, 3rd Edition, 2010.

Reference Books:

1. B.E.Noltingk, Instrumentation Reference Book, Butterworth Heinemann, 2nd Edition, 1995.
2. Douglas M. Considine, Process / Industrial Instruments & Controls Handbook, McGraw Hill, Singapore, 5th Edition, 1999.
3. Andrew W.G, Applied Instrumentation in Process Industries – A survey, Vol I & Vol II, Gulf Publishing Company, Houston, 2001

4. Spitzer D. W., Industrial Flow measurement, ISA press, 3rd Edition, 2005.
5. Tony.R.Kuphaldt, Lessons in Industrial Instrumentation, Version 2.02, April 2014.

COURSE EXIT SURVEY

1. Indirect feedback through questionnaire.
2. Direct feedback from the students.
3. Feedback from the students during the class committee meetings.

COURSE POLICY (preferred mode of correspondence with students, policy on attendance, compensation assessment, academic honesty and plagiarism etc.)

MODE OF CORRESPONDENCE (email/ phone etc.)

Any suggestions, Queries and feedback can be emailed to the Course Coordinator directly at pakarthick@nitt.edu

COMPENSATION ASSESSMENT

Only one compensation will be conducted during the 13th week for the student absent for assessment due to medical, on-duty and other genuine reasons. The decision of faculty will be the final to decide about retest. The exam will be conducted based on entire syllabus. The duration of the exam is 1 hours. If the student absents themselves for more than one assessment, other assessment marks will be awarded as zero.

Passing Criteria /Awarding Grade

35% marks or half of the class average marks whichever is higher is the minimum passing criteria for this subject. If student not met above mentioned criteria after reassessment or absent for reassessment, he/she should undergo formative assessment. Other grades are awarded with relative grades as per institute norms.

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

1. **At least 75% attendance in each course is mandatory.**
2. **A maximum of 10% shall be allowed under On Duty (OD) category.**
3. Students with **less than 65% of attendance** shall be prevented from writing the final assessment and **shall be awarded 'V' grade.**

ACADEMIC DISHONESTY & PLAGIARISM

1. Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
2. Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
3. 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

Students can meet any time depends on their mutual availability. The course faculty will be available in ICE Department ground floor inside Process control lab in his cabin.
Minor doubts will be clarified during the class hours.

FOR APPROVAL

Course Faculty P.A. Wadhvani CC-Chairperson [Signature] 28/11/19 HOD [Signature] 28/11/19