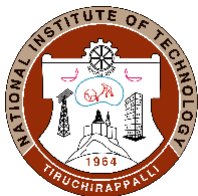




DEPARTMENT OF CHEMICAL ENGINEERING

<b>COURSE PLAN – PART I</b>			
<b>Name of the programme and specialization</b>	<b>BTech and Chemical Engineering</b>		
<b>Course Title</b>	<b>Process Instrumentation</b>		
<b>Course Code</b>	<b>CLOE16</b>	<b>No. of Credits</b>	<b>3</b>
<b>Course Code of Pre-requisite subject(s)</b>	--		
<b>Session</b>	<b>January 2022</b>	<b>Section (if, applicable)</b>	-
<b>Name of Faculty</b>	<b>Dr K Sankar</b>	<b>Department</b>	<b>Chemical Engineering</b>
<b>Official Email</b>	<b>shankark@nitt.edu</b>	<b>Telephone No.</b>	<b>+91 - 431 - 2503105</b>
<b>Name of Course Coordinator(s) (if, applicable)</b>	<b>Dr. P. Kalaichelvi</b>		
<b>Official E-mail</b>	<b>kalai@nitt.edu</b>	<b>Telephone No.</b>	<b>+91 - 431 - 2503109</b>
<b>Course Type (please tick appropriately)</b>	<b>Open Elective (OE)</b>		
<b>Syllabus (approved in BoS)</b>			
<p>Characteristics of Measurement System -Elements of instruments, static and dynamic characteristics, basic concepts and qualities of measurement, basic concepts of response of first order type instruments, mercury in glass thermometer</p> <p>Pressure measurement: Pressure, Methods of pressure measurement, Manometers, Elastic pressure transducers, Measurement of vacuum, Force-balance pressure gauges, Electrical pressure transducers, Pressure switches, Calibration of pressure measuring instruments, Maintenance and repair of pressure measuring instruments, Troubleshooting</p> <p>Temperature measurement: Temperature, Temperature scales, Methods of temperature measurement, Expansion temperature, Filled-system thermometers, Electrical temperature instruments. Pyrometers: Radiation and optical</p> <p>Flow Measurement: Methods of flow measurement, Inferential flow measurement, Quantity flowmeters, Mass flowmeters, Calibration of flowmeters, Selection of flowmeters.</p> <p>Level measurement: Methods of liquid level measurement, Direct methods, level measurement in pressure vessels, measurement of interface level, level of dry materials. Instruments for Analysis - recording instruments, indicating and signaling instruments, instrumentation diagram.</p>			



Methods of composition analysis: Spectroscopic analysis, Absorption spectroscopy, Emission spectroscopy, Mass spectroscopy, chromatography

**REFERENCE BOOKS**

1. D. P. Eckman, *Industrial Instrumentation*, Wiley Eastern Ltd., 2004
2. J. P. Bentley, *Principles of Measurement Systems*, Longman
3. G. C. Barney, *Intelligent Instrumentation*, PHI Pvt Ltd.
4. D. Patranabis, *Principles of Industrial Instrumentation*, 2nd Edition, Tata McGraw Hill Publishing Company, New Delhi, 1999.
5. William C. Dunn, *Fundamentals of Industrial Instrumentation and Process Control*, 1<sup>st</sup> Edition, Tata McGraw-Hill Education Private Limited, 2009.
6. A. K. Sawhney, *A course in electrical and electronic measurements and instrumentation*.

**COURSE OBJECTIVES**

The course aims to learn the students the concepts and principles of measurement systems, including components of measurement systems, the actual systems used for measurement, the devices used for testing, displaying, explore the classification of signals and their analysis and technologies used for acquiring the data.

**MAPPING OF COs with POs**

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. analyze repeatability, precision and accuracy of the instruments	1, 2, 3, 4, 6, 7, 8, 9, 11, 12
2. understand the measurement techniques for pressure	1, 2, 3, 4, 8, 9, 11
3. understand the measurement techniques for temperature	1, 2, 3, 4, 8, 9, 11
4. understand the measurement techniques for flow and Level	1, 2, 3, 4, 8, 9, 11
5. understand the measurement techniques for composition	1, 2, 3, 4, 8, 9, 11

**COURSE PLAN – PART II**

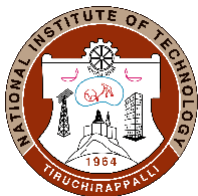
**COURSE OVERVIEW**

Globalization has placed increasing demands on modern process control in terms of quality, safety, flexibility and costs. However, more efficient control can only be achieved through better measurement – when the process instrumentation provides the correct information.

This course provides an insight into modern instrumentation practices covering the elements of pressure measurement, level measurement, temperature measurement, flow measurement, and analytical instrumentation practices. Finally this course is designed to give students the introductory skills and knowledge required to operate in such environments.



COURSE TEACHING AND LEARNING ACTIVITIES			( Add more rows)
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1	Characteristics of Measurement System - Elements of instruments, static and dynamic characteristics	PPT, Online
2	Week 2	basic concepts and qualities of measurement, basic concepts of response of first order type instruments, mercury in glass thermometer	PPT, Online
3	Week 3	Pressure measurement: Pressure, Methods of pressure measurement, Manometers, Elastic pressure transducers,	PPT, Online
4	Week 4	Measurement of vacuum, Forcebalance pressure gauges, Electrical pressure transducers, Pressure switches,	PPT, Online
5	Week 5	Calibration of pressure measuring instruments, Maintenance and repair of pressure measuring instruments, Troubleshooting	PPT, Online
6	Week 6	Temperature measurement: Temperature, Temperature scales, Methods of temperature measurement,	PPT, Online
7	Week 7	Expansion temperature, Filled system thermometers, Electrical temperature instruments.	PPT, Online
8	Week 8	Pyrometers: Radiation and optical, Flow Measurement: Methods of flow measurement, Inferential flow measurement	PPT, Online
9	Week 9	Quantity flowmeters, Mass flowmeters, Calibration of flowmeters, Selection of flowmeters.	PPT, Online
10	Week 10	Level measurement: Methods of liquid level measurement, Direct methods, level measurement in pressure vessels, measurement of interface level, level of dry materials.	PPT, Online
11	Week 11	Instruments for Analysis - recording instruments, indicating and signaling instruments, instrumentation diagram.	PPT, Online



12	Week 12	Methods of composition analysis: Spectroscopic analysis, Absorption spectroscopy, Emission spectroscopy, Mass spectroscopy, chromatography	PPT, Online
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**COURSE ASSESSMENT METHODS** (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assesment I	Week 5	1 hour	25
2	Assessment II (Seminar)	Week 6	--	10
3	Assesment III	Week 8	1 hour	25
4	Assesment IV Assignment	Week 9	--	10
CPA	Compensation Assessment*	Week 11	1 hour	25
5	Final Assessment *	Week 13	2 hour	30

\*mandatory; refer to guidelines on page 4

**COURSE EXIT SURVEY** (mention the ways in which the feedback about the course shall be assessed)

Through online classroom by means of polling questions/messages/CC meeting

**COURSE POLICY** (including compensation assessment to be specified)

The course syllabus can be covered within 12 weeks. There are 5 assessments will be conducted to evaluate the student performance. Compensation assessment can be conducted before the final exam date.

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

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

**ACADEMIC DISHONESTY & PLAGIARISM**

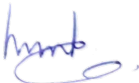



## NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI


- 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

  
**Dr K Sankar**  
Course Faculty

  
CC- Chairperson Dr.T.Sivasankar

  
HOD \_\_\_\_\_



**Guidelines**

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory 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. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.