

**DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING**

**NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

<b>COURSE PLAN – PART I</b>			
<b>Name of the Programme and Specialization</b>	<b>M.TECH – PROCESS CONTROL AND INSTRUMENTATION</b>		
<b>Course Title</b>	<b>INDUSTRIAL INSTRUMENTATION</b>		
<b>Course Code</b>	<b>CL 656</b>	<b>No. of Credits</b>	<b>3</b>
<b>Course Code of Pre-requisite subject(s)</b>	<b>NIL</b>		
<b>Session</b>	<b>Jan. 2021</b>	<b>Section (if, applicable)</b>	<b>NA</b>
<b>Name of Faculty</b>	<b>DR. B VASUKI</b>	<b>Department</b>	<b>ICE</b>
<b>Email</b>	<b>bvas@nitt.edu</b>	<b>Telephone No.</b>	<b>0431-2503358 9443186478</b>
<b>Name of Course Coordinator(s) (if, applicable)</b>	<b>NIL</b>		
<b>Course Type</b>	<b>Core course</b>		
<b>SYLLABUS (approved by BOS)</b>			
<p><b>Review of Industrial Instrumentation</b> -Measurement of Velocity, Acceleration, Pressure, Temperature, Flow, Level, Humidity &amp; Moisture (Qualitative Treatment Only).</p> <p><b>Measurement in thermal power plant</b> -Selection, Installation and maintenance of Instruments used for the measurement of fuel flow, Air flow, Drum level, Steam pressure, Steam temperature and other parameters in thermal power plant – Analyzers - Dissolved Oxygen Analyzers- Flue gas Oxygen Analyzers-pH measurement- Coal/Oil Analyzer – Pollution Controlling Instruments</p> <p><b>Measurement in Petrochemical Industry</b>- Parameters to be measured in refinery and petrochemical Industry-Temperature, Flow and Pressure measurements in Pyrolysis, catalytic cracking, reforming processes-Selection and maintenance of measuring instruments – Intrinsic safety.</p> <p><b>Instrumentation for energy conservation &amp; management and safety</b> -Principle of energy audit, management &amp; conservation and measurement techniques –Instrumentation for renewable energy systems – Energy management device (Peak load shedding) – Electrical and intrinsic safety -</p>			

Explosion suppression and deluge systems – Flame arrestors, conservation vents and emergency vents – Flame, fire and smoke Detectors- Metal detectors.	
<b>Special Purpose Instrumentation</b> -Toxic gas monitoring - Detection of Nuclear radiation – Water quality monitoring- Monitor measurement by neutron-Thermo-luminescent detectors – Measurement of length, mass, thickness, flow, level using nuclear radiation.	
<b>COURSE OBJECTIVES</b>	
To enable the students to understand the fundamentals of various types of industrial measurements	
<b>COURSE OUTCOMES (CO)</b>	
<b>Course Outcomes</b>	<b>Aligned Programme Outcomes (PO)</b>
To have an adequate knowledge on basic industrial instrumentation.	PO2, PO3, PO4, PO5, PO6, O7, PO8, PO10, PO12
2. Ability to prepare design documentation and execute the instrumentation requirements in various process industries	PO2, PO3, PO4, PO5, PO6, O7, PO8, PO10, PO12

<b>COURSE PLAN – PART II</b>			
<b>COURSE OVERVIEW</b>			
The aim of the course is to provide students with a knowledge of theoretical principles and techniques followed in the measurement of various process parameters like temperature, flow, level, humidity and moisture content related to thermal and petrochemical industries.			
The course also cover the energy management practice and safety principles followed in industries. Also, it covers the special instruments used in industries.			
<b>COURSE TEACHING AND LEARNING ACTIVITIES</b>			
<b>S.No.</b>	<b>Week/Contact Hours</b>	<b>Topic</b>	<b>Mode of Delivery</b>
1	Week 1	Measurement of Velocity, Acceleration, Pressure, Temperature, Flow, Level, Humidity & Moisture (Qualitative Treatment Only).	Online mode
2	Week 2	Selection, Installation and maintenance of Instruments used for the measurement of fuel flow, Air flow, Drum level, Steam pressure, Steam temperature and other parameters in thermal power plant –	

3	Week 3	Analyzers - Dissolved Oxygen Analyzers-Flue gas Oxygen Analyzers-pH measurement
4	Week 4	Coal/Oil Analyzer – Pollution Controlling Instruments
5	Week 5	Parameters to be measured in refinery and petrochemical, Industry-Temperature, Flow
6	Week 6	Pressure measurements in Pyrolysis, catalytic cracking, reforming processes
7	Week 7	Selection and maintenance of measuring instruments – Intrinsic safety
8	Week 8	Principle of energy audit, management & conservation and measurement techniques
9	Week 9	Instrumentation for renewable energy systems – Energy management device (Peak load shedding) – Electrical and intrinsic safety
10	Week 10	Explosion suppression and deluge systems Flame arrestors, conservation vents and emergency vents – Flame, fire and smoke Detectors- Metal detectors
11	Week 11	Toxic gas monitoring - Detection of Nuclear radiation – Water quality monitoring- Monitor measurement by neutron-
12	Week 12	Thermo-luminescent detectors – Measurement of length, mass, thickness, flow, level using nuclear radiation

#### **COURSE ASSESSMENT METHODS**

1. The assessment in this course has one component, viz, theory
2. The assessment involves two cycle tests and end semester
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.

<b>S.No.</b>	<b>Mode of Assessment</b>	<b>Week</b>	<b>Duration</b>	<b>% Weightage</b>
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.
- 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 HONESTY & 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.

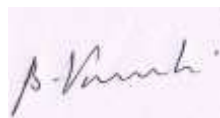
### **ADDITIONAL INFORMATION**

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/land line/mobile number) are provided in the page 1 of the course plan.

**Text / Reference Books:**

- 1.D. Patranabis, Principles of Industrial Instrumentation, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1999.
2. John G Webster, Measurement, Instrumentation and Sensors Handbook, CRC press IEEE press
3. Liptak B.G, Instrumentation Engineers Handbook (Measurement), Chilton Book Co., 1994.
4. Reay D.A, Industrial Energy Conservation, Pergamon Press, 1977.
5. Hodge B.K, Analysis and Design of energy systems, Prentice Hall, 1988.
6. Liptak B.G, Instrument Engineers Handbook, Clinton Book Company, 1982
7. Ness S.A. Air monitoring for Toxic explosions, Air integrated Approach, Von Nostrand,1991.
8. Ewing G., Analytical Instrumentation hand book, Dekker,1991.

**FOR APPROVAL**



**08.02.2021**  
**Course Faculty**



K Muthukumar 09.02.2021

**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.