



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

## COURSE CONTENT

INSTRUMENTATION, CONTROL SYSTEMS & PRODUCTION DRAWING PRACTICE LABORATORY								
VII Semester: ME								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AMEC49	Core	0	0	3	1.5	30	70	100
		Contact Classes: Nil			Tutorial Classes: Nil		Practical Classes: 36	
Prerequisite: Machine Tools and Metrology Laboratory								
<p><b>I. COURSE OVERVIEW:</b>            Instrumentation is the division of engineering science which deals with measuring techniques, devices and their associated problems. The primary objective of this laboratory course is to measure parameters related to linear and angular displacement, temperature, pressure, vacuum, speed, strain, and vibration using appropriate transducer. The transducer converts input signal to digital output which will be compared with appropriate mechanical type measuring instruments such as dial gauges, micrometers and pressure gauges, tachometer etc. At end of the this course the students can calibrate measuring instrument so as to maintain the devices in working condition.</p> <p><b>II COURSE OBJECTIVES:</b>  <b>The students will try to learn:</b></p> <ol style="list-style-type: none"> <li>I. The measurement of physical quantities and converting them into digital signals.</li> <li>II. Calibration of instruments related for measurement of displacement, temperature, pressure, vacuum, flow, speed, strain and vibration.</li> <li>III. Conventional representation of various parts, estimation of limits and surface roughness representation.</li> <li>IV. Part drawing, production drawing practices.</li> </ol> <p><b>III. COURSE SYLLABUS:</b></p> <p><b>A) INSTRUMENTATION &amp; CONTROL SYSTEMS LAB</b></p> <ol style="list-style-type: none"> <li>1. Calibration of capacitive transducer for angular measurement.</li> <li>2. Study and calibration of LVDT transducer for displacement measurement.</li> <li>3. Study of resistance temperature detector for temperature measurement.</li> <li>4. Calibration of thermister for measurement.</li> <li>5. Calibration of thermocouple for temperature measurement.</li> <li>6. Calibration of Pressure gauges.</li> <li>7. Calibration of strain gauge for temperature measurement.</li> <li>8. Study and calibration of photo speed pickups for the measurement of speed.</li> <li>9. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various Loads.</li> <li>10. Calibration of Mcleod gauge for low pressure.</li> <li>11. Study and calibration of magnetic speed pickups for the measurement of speed.</li> </ol> <p><b>B) PRODUCTION DRAWING PRACTICE LAB</b></p> <ol style="list-style-type: none"> <li>1. <b>COVENTIONAL REPRESENTATION OF MATERIALS:</b>            Conventional representation of parts-screw joints, welded joints, springs, gears, electrical, hydraulic and pneumatic circuits- methods of indicating notes on drawing.            Limits, Fits and Tolerances: Types of fits, exercises involving selection / interpretation of fits and estimation of limits from tables.</li> <li>2. <b>FORM AND POSITIONAL TOLERANCES:</b>            Introduction an indication of form and position tolerances on drawings, types of run out and their indication.</li> </ol>								

3. **SURFACE ROUGHNESS AND ITS INDICATION:**

Definition, types of surface roughness indication- Surface roughness obtainable from various manufacturing processes, recommended surface roughness on mechanical components. Heat treatment and surface treatment symbols used on drawings.

4. **DETAILED AND PART DRAWINGS:**

Drawing of parts from assembly drawings with indication of size, tolerances, roughness, form and position errors etc.

5. **PRODUCTION DRAWING PRACTICE:**

Part drawings using computer aided drafting by CAD software.

**V. TEXT BOOKS**

1. D.S. Kumar, "Measurement Systems: Applications & Design", Anuradha Agencies, 1<sup>st</sup> Edition, 2013.
2. Nakra K.K. Choudary, "Instrumentation, Measurement & Analysis", Tata McGrawHill, 1<sup>st</sup> Edition, 2013.

**VI. REFERENCE BOOKS:**

1. K Padma Raju, Y J Reddy, "Instrumentation and Control Systems", McGraw Hill Education 1<sup>st</sup> Edition, 2016.
2. S W. Bolton, "Instrumentation and Control Systems", Newnes Publisher, 1<sup>st</sup> Edition, 2004.
3. K Singh, "Industrial Instrumentation and Control", McGraw Hill Education, 3<sup>rd</sup> Edition, 2015.

**VII. WEB REFERENCES:**

1. <https://nptel.ac.in/courses/112/103/112103261/>
2. <https://nptel.ac.in/courses/108/105/108105064/>