

Course code	Course name	L-T-P-Credits	Year of Introduction
AE484	INSTRUMENTATION SYSTEM DESIGN	3-0-0-3	2016
<b>Prerequisite : NIL</b>			
<b>Course Objective</b>			
<ul style="list-style-type: none"> <li>To equip the students with the basic Concept of Instrumentation system design</li> <li>To understand the construction and working of different instrumentation system</li> </ul>			
<b>Syllabus</b>			
Temperature measurement- Pressure measurement- Measurement of viscosity- Flow measurement- Anemometers- Target flow meters- Level measurement			
<b>Expected outcome</b>			
The students will be able to understand the concepts behind instrumentation system design and its working			
<b>Text Books</b>			
<ol style="list-style-type: none"> <li>E.O. Dobelin, Measurement Systems Application and Design, McGraw Hill, New York, 2003</li> <li>Harry N Norton, Hand Book of transducers, PHI, 1989</li> </ol>			
<b>Reference Books</b>			
<ol style="list-style-type: none"> <li>Gregory K McMillan, Douglas M Conside, Process and Industrial Instrumentation Control, McGraw Hill, 5ed, 1999</li> <li>John P Bentley, Principles of Measurement Systems, Pearson Education, 2004</li> </ol>			
<b>Course Plan</b>			
Module	Contents	Hours	End Sem. Exam Marks
I	Introduction: Concept of generalized measurement system, functional elements, generalized input-output configuration, static sensitivity, drifts, linearity, hysteresis, threshold, resolution, static stiffness and input-output impedance	7	15%
II	Transducers: Operating principle, construction and design of variable resistive transducers, variable inductive transducers, variable capacitive transducers, piezoelectric transducers, magnetostrictive transducers	7	15%
<b>FIRST INTERNAL EXAMINATION</b>			
III	Hall effect, eddy current, ionization, optical transducers, digital transducers, single shaft encoders, photo voltaic cell, photo conductive, photo emissive, fiber optic sensors, concept of smart and intelligent sensor, bio-sensors	7	15%
IV	Construction and performance of industrially important transducer for measuring displacement, speed, vibrations, temperature, electrical power, strain, torque Force, Design of intelligent instrumentation system.	6	15%
<b>SECOND INTERNAL EXAMINATION</b>			
V	Signal Conditioning & Recording (Part1): Quarter, half and full bridge circuit, active filters, differential instrumentation amplifiers, carrier amplifiers	8	20%
VI	Signal Conditioning & Recording (Part2): design of display elements, LED, bar graph displays, LCDs , nixie tube and their interfacing	7	20%

## END SEMESTER EXAMINATION

### QUESTION PAPER PATTERN:

Maximum Marks: 100

Exam Duration: 3 Hours

#### Part A

Answer any two out of three questions from Module 1 and 2 together. Each question carries 15 marks and may have not more than four sub divisions. (15 x 2 = 30 marks)

#### Part B

Answer any two out of three questions from Module 3 and 4 together. Each question carries 15 marks and may have not more than four sub divisions. (15 x 2 = 30 marks)

#### Part C

Answer any two out of three questions from Module 5 and 6 together. Each question carries 15 marks and may have not more than four sub divisions. (20 x 2 = 40 marks)

