INSTRUMENTATION CONTROL SYSTEMS AND PDP LABORATORY

VII Semester: ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AMEB29	Core	-	-	3	1.5	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

I. COURSE OVERVIEW:

The primary objective of this course is to study and calibrate measuring instruments used in engineer- ing industry. Understanding the principles involved in various measuring transducers used in flow, linear, angular, speed, temperature, Pressure, Strain, Vibration and Selection of suitable measuring instrument for any process control applications.

II. OBJECTIVES:

The course should enable the students to:

I. Configure and calibrate for physical quantities like pressure, temperature, speed, displacement.
II. Experiment for condition monitoring of machine tools and IC engines by using seismic pickup (vibrometer).
III. Study the deflection by using strain gauge on cantilever beam.

III. COURSE OBJECTIVES:

After successful completion of the course, students should be able to:

CO1	**Identify** various elements and their purpose in typical instruments, to identify various errors that would occur in instruments.	Apply
CO2	**Analysis** of errors so as to determine correction factors for eachinstrument.	Analyze
CO3	**Design** an instrument taking into account static and dynamic characteristics of instrument and should be able to determine loadingresponse time.	Apply
CO4	**Choose** Transducer for given range of displacement should be able tospecify it accurate and loading time of that transducer.	Evaluate
CO5	**Design** the thermocouple, The mister and resistance temperature detector (RTD) for temperature measurement and control of furnacetemperature	Create
CO6	**Choose** Optical, Proximity, Tacho Pickups used for the measurement and control of shaft speed.	Create

LIST OF EXPERIMENTS

Week-1	**CALIBRATION OF CAPACTIVE TRANSDUCER**
Calibration of capacitive transducer for angular measurement.	
Week-2	**CALIBRATION OF LVDT**
Study and calibration of LVDT transducer for displacement measurement.	
Week-3	**STUDY OF RESISTANCE TEMPERATURE DETECTOR**
Calibration of thermistor, thermocouple, resistance temperature detector	

Week-4	**CALIBRATION OF PRESSURE GUAGE AND VACCUM**
Calibration of Pressure gauges ,Study and calibration of Mcleod gauge for low pressure.	
Week-5	**CALIBRATION OF STRAIN GUAGE**
Calibration of strain gauge for temperature measurement.	
Week-6	**CALIBRATION OF PHOTO AND MAGNETIC SPEED PICKUP**
Study and calibration of photo and magnetic speed pickups for the measurement of speed.	
Week-7	**CALIBRATION OF ROTAMETER**
Study and calibration of rotameter for flow measurement.	
WeeK-8	**CALIBRATION OF VIBROMETER**
Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.	
Week-9	**CONVENTIONAL REPRESENTATION OF MATERIALS**
Conventional representation of parts screw joints, welded joints, springs, gears, electrical, hydraulic and pneumatic circuits, methods of indicating notes on drawings.	
Week-10	**LIMTS FITS AND TOLERANCES AND FORM AND POSITIONAL TOLERANCES**
Limits, Fits and Tolerances: Types of fits, exercises involving selection, interpretation of fits and estimation of limits from tables; Introduction and indication of form and position tolerances on drawings;	
Week-11	**SURFACE ROUHNESS AND ITS INTRODUCTION, DETAILED AND PART DRAWINGS**
Definition, types of surface roughness indication surface roughness obtainable from various manufacturing processes, recommended surface roughness on mechanical components.	
Week - 12	**DETAILED AND PART DRAWINGS**
Drawing of parts from assembly drawings with indications of size, tolerances, roughness, form and position errors, Part drawings using computer aided drafting by CAD software.	
Reference Books:	
1. D. S. Kumar, “Measurement Systems: Applications & Design”, Anuradha Agencies, 1st Edition, 2013. 2. C. Nakra, K. K. Choudhary, “Instrumentation, Measurement & Analysis”, Tata McGraw-Hill, 1st Edition, 2013. 3. K.L. Narayana, P. Kannaiah, “Production Drawing”, New Age publishers, 3rd Edition, 2009. 4. GouthamPohit, Goutham Ghosh, “Machine Drawing with Auto CAD”, Pearson, 1st Edition, 2004. 5. James D. Meadows, “Geometric Dimensioning and Tolerancing”, CRC Press, 1st Edition, 1995	
Web References:	
1. www.iare.ac.in	