

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

V Semester: ECE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AECB32	PE-I	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			
<p>COURSE OBJECTIVES: Students will try to learn:</p> <ul style="list-style-type: none"> I The construction and operation of AC & DC voltmeters and ammeters, Oscilloscopes, signal generators, signal analyzers, transducers and LCR meters II The application of the principles of electronic measurements to monitor high tension power quality and build spectrum analyzers for scientific and industrial applications III To explore the applications of measuring instrument in environment monitoring and health monitoring of a smart car. <p>COURSE OUTCOMES: After successful completion of the course, Students will be able to:</p> <ul style="list-style-type: none"> CO 1 Recall the schematics of measuring systems and performance characteristics of an instrument. CO 2 Explain the measuring instruments and its working principle by using the instrument D' Arsonval Movement. CO 3 Demonstrates the various types measuring meters like Digital Voltmeters. CO 4 Describe the basic building blocks of Cathode ray oscilloscopes and cathode ray tubes CO 5 Compare various types of special purpose oscilloscopes with its applications. CO 6 Draw Lissajous figures or patterns for the given frequencies. CO 7 Illustrate the working principles of signal generators and signal analysers CO 8 Design a measuring instrument on requirement basis CO 9 Describe Transducers and classify them according to their application CO 10 Extend the concepts of balance bridge to find out the unknown parameter with the given specifications. CO 11 Illustrate the working functionality of strain gauges, LVDT CO 12 Compare wave analyzers and spectrum analyzers based on its working functionality. CO 13 Develop the appropriate Virtual instrument to solve the real world problem and also to measure different physical parameters. 								
UNIT-I	INTRODUCTION TO MEASURING INSTRUMENTS						Classes: 08	
<p>Block schematics of measuring systems, performance characteristics, Static characteristics: Accuracy, resolution, precision, gauss error, types of errors, Dynamic characteristics : Repeatability, reproducibility, fidelity, lag; Analog measuring instruments: D' Arsonval movement, DC voltmeters and ammeter, AC voltmeters and current meters, ohmmeters, multimeters, meter protection, extension of range, digital</p>								

voltmeters: Ramp type, staircase, dual slope integrating type, successive approximation type, specifications of instruments.		
UNIT-II	OSCILLOSCOPE	Classes: 09
Oscilloscopes: CRT, block schematic of CRO, time base circuits, delay lines, high frequency CRO considerations, applications, specifications, special purpose oscilloscopes: Dual trace, dual beam CROs, sampling oscilloscopes, storage oscilloscopes, digital storage CROs, Lissajous figures, frequency measurement, phase measurement, CRO probes.		
UNIT-III	SIGNAL GENERATOR AND SIGNAL ANALYZERS	Classes: 09
Signal Generators: AF and RF signal generators, sine and square wave generators, function generators: arbitrary waveform generator, sweep frequency generators, video signal generators, specifications. Signal Analyzers: AF, HF wave analyzers, heterodyne wave analyzers, harmonic distortion, spectrum analyzers, power analyzers		
UNIT-IV	AC AND DC BRIDGES	Classes: 10
Measurements using DC and AC bridges: Wheat stone bridge, Kelvin bridge, AC bridges, Maxwell, Hay, Schering, Wien, Anderson bridges, Wagner & ground connection.		
UNIT-V	TRANSDUCERS	Classes: 09
Transducers: Classification, strain gauges, force and displacement, transducers, resistance thermometers, hotwire anemometers, LVDT, thermocouples, synchros; Piezoelectric transducers, variable capacitance transducers; Magneto strictive transducers, measurement of physical parameters: Flow measurement, Displacement meters, liquid level measurement, measurement of humidity and moisture, velocity, force, pressure, high pressure, vacuum level, temperature measurements.		
Text Books:		
<ol style="list-style-type: none"> 1. K.LalKishore,-ElectronicMeasurementsandInstrumentation ,PearsonEducation,2ndEdition, 2010. 2. H.S.Kalsi,-ElectronicInstrumentation ,TMH,2ndEdition,2004. 3. A.K.Sawhney,-Electricalandelectronicsmeasurementsandinstrumentation ,19thEdition,2011. 		
Reference Books:		
<ol style="list-style-type: none"> 1. DavidA.Bell,-ElectronicInstrumentationandMeasurements ,OxfordUniversityPress,1stEdition,2007. 2. A.D.Helbins,W.D.Cooper,-ModernElectronicInstrumentationandMeasurementTechniques ,PHI,56th Edition, 2003. 3. B.M.Oliver,J.M.Cage,-ElectronicMeasurementsandInstrumentation ,TMH,Reprint,2009. 4. T.R.Padmanabham,-IndustrialInstrumentation ,Springer,1stEdition,2009. 		
Web References:		
<ol style="list-style-type: none"> 1. https://www.scribd.com/ 2. https://www.worldcat.org/ 3. https://www.infibeam.com/ 4. https://www.abebooks.co.uk 		
E-Text Books:		
<ol style="list-style-type: none"> 1. https://www.vssut.ac.in/lecture_notes/lecture1423813026.pdf 2. fmcet.in/ECE/EC2351_uw.pdf 3. https://books.askvenkat.com/tag/measurement-and-instrumentation-lecture-notes-pdf 4. https://www.jntubook.com/electronics-measurements-instrumentation-textbook-free-d 		