



C.U.SHAH UNIVERSITY

FACULTY OF: - Technology & Engineering
DEPARTMENT OF: -Electrical Engineering
BRANCH: Electrical & Electronics Engineering
SEMESTER: - IV
CODE: - 4TE04EEM1
NAME – Electrical & Electronics Measurement

Teaching & Evaluation Scheme

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE04EEM1	Electrical & Electronics Measurement	4	0	2	6	5	30	1.5	70	3	30	20	---	150

Objectives

- To study fundamentals of different measuring techniques.
- To study the operation and types of various measuring equipments.
- To study the analysis of different types of waveforms and associated equipments.

Pre-requisite

- Fundamentals of Electronics and measuring units.

Course Outlines

Sr. No.	Course Contents	No. of Hours
1.	Errors in Measurement Classification of errors as gross, systematic, random errors & their remedies. Statistical analysis applied for the purpose of quality control. Concept of probability error, accuracy, precision, precision index, Limiting error & class of accuracy. Introduction to the use of IS specifications in measurement work	06
2.	AC Bridges Introduction, Concept of inductance, mutual inductance & capacitance, Loss angle & quality factor. General equation for bridge balance, general form of an ac bridge, Sources and detectors, Measurement of self inductance: Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance: De sauty's bridge, Schering bridge. Measurement of mutual inductance: Heavyside mutual inductance bridge, Campbell's bridge, Carey-Foster bridge Measurement of frequency: Wein bridge, Universal impedance bridge Principle & working of digital LCR meter. Sources of errors in bridge measurements and their minimization	10

3.	Measurement of Resistance Classification of resistance, Measurement of low resistance-methods, Kelvin's double bridge Measurement of medium resistance- ammeter voltmeter method, substitution method, wheastone bridge, Measurement of high resistance-difficulties in measurement of high resistance, direct deflection method, loss of charge method, Megger, Ohmmeter. Measurement of surface resistivity, earth resistance.	08
4.	Instrument Transformers Construction of current transformers. Determination of ratio & phase angle errors. Effect of change in burden & power factor on the ratio & phase angle of CTs. Precautions while using a CT. CT testing requirements & equipment as per IS. Construction of Potential Transformers. Determination of ratio & phase angle errors of PTs. Effect of change in burden & burden power factor on the ratio & phase angle of PTs. Absolute & comparison methods of testing a PT. PT testing requirements & equipment as per IS. Idea about knee point voltage, accuracy class.	08
5.	Magnetic Measurements Flux Meter- construction, operation, use of shunt with flux meter. Measurement of flux density, magnetising force, Magnetic potentiometer, Testing of Ring specimen, Testing of Bar specimen. Determination of B.H.curve, A.C. magnetic testing	04
6.	Location of Cable Faults Blavier test , Earth overlap test , Voltage drop test , Murray loop test . Varley loop test, Test for open circuit fault in cables.	04
7.	Wave Analyzers and Harmonic Distortion Introduction, basic wave analyzer - frequency selective wave analyzer - heterodyne wave analyser , harmonic distortion analyzer-Total harmonic distortion, inter modulation distortion, transient inter modulation distortion, spectrum analyser--basic Spectrum analyzer, Signal conditioning –introduction - basic instrumentation amplifier - applications of instrumentation amplifiers - chopped and modulated dc amplifiers – Modulators	08
8.	Electronic Measurement Electronics Voltmeter, Multimeter, Wattmeter & Energy Meter, Time frequency and phase angle measurements using CRO.	04

Learning Outcomes

- Understand fundamental measurement and analysis principles.
- Have a broad understanding of the applications of various measuring equipments used in industrial applications.
- Develop and apply engineering concepts for a range of problems in day to day life applications.

Books Recommended

1. Electrical and Electronic Measurements and Instrumentation by A. K. Sawhney- Dhanpat Rai Publications
2. Electronic Instrumentation and Measurement techniques by Cooper & Helfrick - Prentice Hall Publications
3. Electronic Instrumentation and Measurement by David A Bell - Prentice Hall Publications
4. Electronic Instrumentation by Jones & Chin - Prentice Hall, Simon & Schuster (Asia)