

# GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VI

Electrical Engineering

Subject Name: **Electrical and Electronic Measurement**

Subject Code: **160905**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
3	0	2	5	70	30	50

Sr. No	Course Content	Total Hrs.
1.	<b>Errors in Measurement:</b>  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	5
2.	<b>AC Bridges:</b>  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.	<b>Measurement of Resistance :</b>  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 mearurement of high resistance, direct deflection method, loss of charge method, Megger, Ohmmeter. Measurement of surface resistivity, earth resistance.	8
4.	<b>Instrument Transformers:</b>  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.	8
5.	<b>Magnetic Measurements:</b>  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	5
6.	<b>Location of Cable Faults :</b>  Blavier test , Earth overlap test , Voltage drop test , Murray loop test . Varley loop test, Test for open circuit fault in cables.	4
7.	<b>Wave Analysers and Harmonic Distortion:</b>  Introduction, basic wave analyser - frequency selective wave analyser - hetrodyne wave analyser , harmonic distortion analyser-Total harmonic distortion, intermodulation distortion, transient intermodulation distortion, spectrum analyser--basic Spectrum analyzer, Signal conditioning – introduction - basic instrumentation amplifier - applications of instrumentation amplifiers - chopped and modulated dc amplifiers – modulators	8

### Text Book:

1. A Course in Electrical and Electronic measurements and Instrumentation- A.K.Sawhney, Dhanpat Rai &Co.

**Reference Books:**

- 1) Golding, E.W., "Electrical Measurement and Measuring Instruments", 3rd Edition, Sir Issac Pitman and Sons, 1960.
- 2) Modern Electronics Instrumentation& Measurement Techniques- W. D. Cooper, Albert D. Helfrick, PHI Pub.