

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - ELECTRICAL ENGINEERING

Semester: II

Subject Name: ELECTRICAL MEASUREMENTS I & II

Sr. No.	Course content
1.	Introduction: Primary & secondary standards, Determination of standards, Units and Dimensions, definitions true value ,accuracy precision, error, sensitivity and resolution.
2.	Indicating Instruments: principle of operation, various operating forces, PMMC, Moving Iron, Moving Coil, Dynamometer type, Induction type, Electrostatic, Rectifier type.
3.	Galvanometer : D'Arsonval Galvanometer:- Construction, Torque equation, Dynamic behaviour. Ballistic Galvanometer:- construction, Theory, calibration.
4.	Wattmeter & Energy meter : Electrodynamometer Wattmeter :- Construction, Theory, shape of scale, Errors. Low power factor Wattmeter. Measurement of power in three-phase circuits. Three phase wattmeter. Measurement of Reactive power. Energy meter for A.C. circuits :- Theory of Induction type meters, single phase Induction type watt-hour meter:- Construction, theory, operation, lag adjustment, friction compensation, creep and errors. Maximum Demand indicator.
5.	Electronics Instruments : Introduction , Electronic Voltmeters , Digital Voltmeter Vacuum tube Voltmeters (VTVMs), Differential amplifier , Differential amplifier type of Electronic Voltmeter , D.C. Voltmeter with direct coupled amplifier , Electronic voltmeters using Rectifiers. True R.M.S. reading voltmeters. Electronic Millimeters , Electronic ohmmeters , Considerations in selecting an analog voltmeter , Differential voltmeter , Vector voltmeter , A.C. Voltage measurements , Current measurements using Electronic Instruments , D.C. & A.C. current measurements. Advanced Electronic Energy measurement., digital tachometer.
6.	AC. & D.C. potentiometers : DC potentiometer -Basic, cromptons,standard cell dial, true zero, Brooks deflection potentiometer, voltage ratio box, application of potentiometer. AC potentiometer , Standardising of A.C. potentiometer, Types A.C. potentiometer. Drysdale polar A.C. potentiometer, Gall Tinsley, Quadrature, Adjustments of currents, Application of A.C. potentiometer.
7.	Special Instruments : Working principle & use of Special Instruments such as Maximum demand indicator , Trivector meter , analog tachometer. Synchroscope, Weston frequency meter , p.f. meters , Phase sequence indicator Analog tachometer, Frequency meters.

8.	Measurement of resistance Classification of resistance, Measurement of low resistance-methods, kelvin's double bridge Measurement of medium resistance- ammeter-voltmeter method, substitution method, wheatstone bridge, Measurement of high resistance-difficulties in measurement of high resistance, direct deflection method, loss of charge method, megger, ohmmeter.
9.	AC Bridge measurement : Concept of Inductance , mutual inductance & capacitance , Loss angle & quality factor. Measurement of self inductance by Maxwell's bridge Anderson's bridge & Hay's bridge, Measurement of mutual inductance by Maxwell's bridge. De Sauty's bridge & modification, , Schering bridge for measurement of capacitance. Wein's bridge for the measurement of an imperfect capacitor. Principle & working of digital LCR meter.

Reference Books:

- (1) Electrical Measurements & Measuring Instruments by Golding & Widdis
(Wheeler's student edition)
- (2) Electrical & Electronics Measurements & Instrumentations by A.K. Sawhney
(Dhanpat Rai & sons)
- (3) Electrical & Electronics Measurements by H. S. Kalsi (T M Hill).
- (4) Electronics Measurements & Instruments by Helfric Coopour.
- (5) Transducers & Instrumentation by Moorthy.