GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 3

Electrical Engineering

Subject Code 130903
Subject Name ELECTRICAL & ELECTRONICS MEASURING INSTRUMENTS

Sr.No	Course content
1.	Introduction: Measurements; Methods of measurement:- Direct and Indirect, Classification of Instruments:- Deflection, Null Analog and Digital. Voltage Standards, Inductance Standards, Resistance Standards, Capacitance Standards. Units and dimensions in S.I. system, measurement of absolute values of current and resistance, standard batteries, characteristics of instruments- definitions true value, accuracy, precision, error, sensitivity and resolution.
2.	Analog Ammeters And Voltmeters : Analog instruments ; classification of analog instruments; principle of operation, various operating forces, PMMC, Moving Iron, Moving Coil, Dynamometer type, Induction type, Thermocouple, Hot Wire, Electrostatic, Rectifier type, Extension of range of instruments
3.	Galvanometer : D'Arsonaval 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 , 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 circuits, Crompton's potentiometers, standard cell dial, true zero, Brooks deflection potentiometer, voltage ratio box, application of DC 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.

Reference Books:

1. Modern Electronic Instrumentation & Measurement Techniques – W.D. Cooper, Albert D. Helfrick , PHI Publication

2. Elect & Electronics Measurements & Instrumentation-A K Sawhney Dhanpat rai &Co.
3. Elect. Meas. & Meas. Instruments: E.W. Golding & Widdies, Wheller Publication