

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: V

POWER ELECTRONICS ENGINEERING

Subject Name: **Electrical Measurement & Electronics Instruments**

Subject Code: **152402**

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
1	Introduction: <ul style="list-style-type: none">• Measurement & Measurement system• Units of Electrical Quantities• Concept of Average, Root Mean Square etc., dB Scale• Methods of Measurements, Measurement Standards, Classification of instruments
2	Measurement Errors and Instrument Characteristics: <ul style="list-style-type: none">• Error, Types of Errors, Significant Figures• Static and Dynamic Characteristics of Measuring Instruments
3	Electromechanical Instruments: <ul style="list-style-type: none">• PMMC, Galvanometer, DC Volt and Ammeter, Rectifier Volt and Ammeter• Series and Shunt Ohm Meter, VOM• Electro-dynamic Instrument, Electro dynamic Volt meter and Ammeter
4	Electronics Meters: <ul style="list-style-type: none">• Analog Electronics VOM, DC and AC Voltmeter circuits using active electronics components like transistor, FET, OPAMP• Electronics Ohm meter, Electronics Ammeter etc.• Digital Instruments, Display concepts, Analog to digital conversion principle, Digital voltmeter, types, construction, working, Digital Multi-meter, Digital frequency meter, Time measurement, frequency ratio measurement.
5	Instrument Transformer: <ul style="list-style-type: none">• Instrument Transformers, Types, Requirements, Difference between CT and PT• Construction, Burden, Error, Causes of error, reduction of error• Testing of Instrument Transformer• Effect of Secondary Open Circuit in CT, Permanent magnetization/ demagnetization of cores in CT
6	Measurement of Power and Energy: <ul style="list-style-type: none">• Power and Energy concept, Power in DC and AC Circuits• Electro-dynamic and ferro-dynamic watt meter, low power factor wattmeter, thermo couple watt meter• Power measurement in 3-phase systems

	<ul style="list-style-type: none"> • Energy measurement, motor meters, Induction type meters, 1-phase and 3-phase energy measurement, Errors, Compensation for light load, over load, voltage, temperature etc.
7	Bridge Circuits: <ul style="list-style-type: none"> • DC Bridge Circuits, Measurement of Medium Resistance, Measurement of Low Resistance, Measurement of High Resistance • AC Bridge Circuits, Bridge Balancing , Equivalent circuits of C and D Factor, Equivalent Circuit of L and Q Factor, Capacitance Measurement, Inductance Measurement • Frequency measurement, Digital LCR meters.
8	Instrument Calibration and Extension of Range : <ul style="list-style-type: none"> • Comparison methods, Digital Multi meter, Precision DC Voltage source • Potentiometer, calibration of various analog measurement instruments • Extension of range of instruments
9	Accessories for Measuring Instruments: <ul style="list-style-type: none"> • Probes, Test leads, shielded cables, connectors, use of probes, low capacitance probes, High voltage probes, RF demodulator probes, probes for ICs, Current probes

Reference Books:

1. Electronics Instrumentation & Measurements, David Bell
2. Elements of Electronic Instrumentation & Measurement, Joseph J Carr
3. Electronics Measurement & Instrumentation, K. Lal Kishore
4. Electrical & Electronic Measurements & Instrumentation, A.K. Sawhney