

GUJARAT TECHNOLOGICAL UNIVERSITY  
DIPLOMA IN ELECTRICAL ENGINEERING

Semester: 4

Subject Name    ELECTRICAL INSTRUMENTATION

Sr.No	Course content
1.	<b>FUNDAMENTALS OF MEASUREMENTS</b> 1.1 Fundamentals of measurements 1.2 Aims of measurement 1.3 Definition of basic terms related to measurement 1.4 Types & sources of error
2.	<b>POTENTIOMETERS &amp; BRIDGES</b> 2.1 D.C. potentiometer, principle, working and list of applications. 2.2 Wheatstone bridge and Kelvin's double bridge for resistance measurement. 2.3 Universal impedance bridge 2.4 Balanced and unbalanced bridges. 2.5 Self balancing bridges.
3.	<b>ELECTROMECHANICAL INSTRUMENTS</b> 3.1 Classification of instruments. 3.2 Essential torques in indicating instruments. 3.3 Construction, working, common errors and applications of <ul style="list-style-type: none"><li>• P M M C instrument.</li><li>• Moving iron instruments</li><li>• Dynamometer type watt meter</li><li>• Energy meter (single phase, three phase)</li><li>• P.F.meter</li><li>• Trivector meter</li><li>• Maximum demand meter</li><li>• Megger</li><li>• Earth tester</li><li>• Phase sequence indicator</li><li>• Solid state energy meter</li><li>• Clip-on meter</li></ul> 3.4 Extension of range of measuring instruments using shunt, multipliers and C.T and P.T. 3.5 Measurement of active and reactive power in single phase and three phase circuits. 3.6 Two watt meter method for three phase power measurement. 3.7 Measurement of insulation resistance using megger.
4.	<b>ELECTRONIC INSTRUMENTS</b> 4.1 Difference between analog and digital instruments. 4.2 Construction, working principle and applications of <ul style="list-style-type: none"><li>• Q-meter</li></ul>

	<ul style="list-style-type: none"> <li>• T.V.M</li> <li>• F.E.T.V.M</li> <li>• A.F, R.F signal generators.</li> </ul> <p>4.3 Block diagram and front panel controls of C.R.O.</p> <p>4.4 Measurement of voltage, current, phase difference, and frequency using C.R.O.</p> <p>4.5 Block diagram of digital multimeter and frequency meter.</p>
5.	<p><b>CALIBRATIONS &amp; TESTING</b></p> <p>5.1 Need for calibration.</p> <p>5.2 Calibration of ammeter, Watt meter and voltmeter as per I.S.</p> <p>5.3 Calibration of single phase energy meter and its adjustments as per I.S. code.</p>
6.	<p><b>TRANSDUCERS</b></p> <p>6.1 Definition of Transducer.</p> <p>6.2 Classification of Transducer.</p> <p>6.3 Types of errors in Transducer</p> <p>6.4 Selection of Transducer.</p> <p>6.5 Applications of transducer for the measurement of-</p> <ul style="list-style-type: none"> <li>• Length</li> <li>• Thickness</li> <li>• Displacement</li> <li>• Velocity, Force, Weight, Torque, Pressure.</li> <li>• Level</li> <li>• Temperature</li> <li>• Strain</li> <li>• P.H.measurement</li> <li>• Speed etc.</li> </ul> <p>6.6 Selection of Transducer for specific application.</p>
7.	<p><b>INSTRUMENTATION SYSTEM</b></p> <p>7.1 Definition</p> <p>7.2 Generalised instrumentation system.</p> <p>7.3 Block diagram of instrumentation system.</p> <p>7.4 Functions of each block.</p> <p>7.5 Block diagram of instrumentation system for measurement of Various non-electrical parameters.</p>
8.	<p><b>DATA HANDLING AND TELEMETERING</b></p> <p>8.1 Measuring methods and Balancing methods</p> <p>8.2 Definition of Telemetering.</p> <p>8.3 Types of Telemetering.</p> <p>8.4 Voltage, current frequency and position telemetering.</p> <p>8.5 Impulse telemetering.</p> <p>8.6 Radio frequency telemetering system.</p> <p>8.7 Indicators used in instrumentation.</p> <p>8.8 Types of recorder.</p>

**Reference Books:**

1. Electrical and electronic instruments. - A.K.sawhney.
2. Mech & industrial measurements. - R.K.Jain
3. A work book on instrumentation. - By - T T T I Bhopal
4. A course in electronics & electrical measurement & instrumentation By J.B.Gupta - Ketson
5. Principles of measurement & Instrumentation By A.S.Morris - PHI