

GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma in Instrumentation & Control Engineering

Semester: V

Subject Name: **Electronic & Pneumatic Instrumentation**

Sr. No.	Course Content
1.	<p>Electronic Instrumentation:</p> <p>1.1 Definition of instrumentation and instrumentation and control, Need for automatic instruments and types.</p> <p>1.2 Classification of electronic instruments as under</p> <ol style="list-style-type: none"> a. Laboratory / Testing instruments. b. Field instruments. <p>1.3 Operation and principle of various following instruments S.S.G., VOM, DVM, CRO, Balanced bridge type TVM.</p> <p>1.4 Circuit and derivation of Wheatstone Bridge, Kelvin's Double Bridge, Anderson Bridge and Maxwell Bridge.</p> <p>1.5 Types of Isolation and shielding techniques: working principle and applications.</p>
2.	<p>Pneumatic Instrumentation:</p> <p>2.1 Basic Unit of Pneumatic System : Flapper Nozzle & Pneumatic Relay</p> <p>2.2 Force balance principle and application.</p> <p>2.3 Motion balance principle and application.</p> <p>2.4 Moment balance principle and application.</p> <p>2.5 Pneumatic Proportional Controllers: construction and working.</p> <p>2.6 Pneumatic Proportional + Derivative Controllers:- construction and Working.</p> <p>2.7 Pneumatic Proportional + Integral Controllers: construction and Working.</p> <p>2.8 Pneumatic Proportional + Integral + Derivative Controllers: Construction and Working.</p> <p>2.9 Controller alignment and tuning.</p>
3.	<p>Field Instruments:</p> <p>3.1 Construction and working with schematic diagram of following</p> <p>3.1.1 Electronic controllers with details of each part, OPAMP based Instrumentation Amplifier.</p> <p>3.1.2 Electronic transmitters for pressure and differential pressure with Strain Gauge and Variable Reluctance type sensing elements.</p> <p>3.1.3 Explanation of following circuit functions in electronic controllers, On–Off, Proportional control action, Automatic reset action(Integral), P + I controller, Derivative action, P + D controller, + I + D controller, gain and feedback circuit.</p> <p>3.2 Square Root Extractor: Block diagram, Working principle and Applications</p> <p>3.3 Electronic Integrators: Block diagram, Working principle and applications.</p>

4.	Miscellaneous Instrumentation: 4.1 Metal detector : Block diagram, working principle and applications 4.2 Current transformer -construction and applications 4.3 Potential Transformer –construction and applications 4.4 SMART Transmitter :- Features and applications 4.5 Electronic Recorder (null balance type) :- Construction with block diagram and working Principle 4.6 Schematic Diagram and working of Pressure to Current (P to I) Converter and Current to Pressure (I to P) converter. 4.8 Schematic Diagram and working of Resistance to pressure (R to P) Converter. 4.9 Proximity switch: Types, Construction, Working principle and testing. 4.10 Study of following display devices with advantages , disadvantages and applications: (a) LCD (b) Alpha Numeric Display (c) Multicolor LED(d) TouchScreen
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Reference Books:

- 1 Electronic Instrumentation Techniques, W. D. Cooper.
2. Electrical & Electronic measurement, A. K. Sawhney & measuring Instrumentation.
3. Instrumentation Training Course, Vol-1, 2, D. B. Taraporewala.
4. Process Control Instrumentation Technology Curtis D Johnson