GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 1

Instrumentation and Control Engineering

(Applied Instrumentation)

Subject Name: PID CONTROLLER

Sr.No	Course content
1.	**Process Models** Introduction Static Models Dynamic Models Step Response Methods Methods of Moments Frequency Responses Parameter Estimation Disturbance Models Approximate Models and Unmodeled Dynamics
2.	**PID Control** Introduction The Feedback Principle PID Control Modifications of the PID Algorithm Integrator Windup Digital Implementation Operational Aspects Commercial Controllers When Can PID Control Be Used?
3.	**Controller Design** Introduction Specifications Ziegler-Nichols' and Related Methods Loop Shaping Analytical Tuning Methods Optimization Methods Pole Placement Dominant Pole Design Design for Disturbance Rejection
4.	**Tuning Methods** Introduction A Spectrum of Tools Step-Response Methods

	Frequency-Response Methods Complete Process Knowledge Assessment of Performance
5.	**Automatic Tuning and Adaptation** Introduction Process Knowledge Adaptive Techniques Model-Based Methods Rule-Based Methods Commercial Products Integrated Tuning and Diagnosis
6.	**Control Paradigms** Introduction Cascade Control Feedforward Control Model Following Nonlinear Elements Neural Network Control Fuzzy Control Interacting Loops System Structuring

Reference Books:

1. PID controllers: theory, design, and tuning *by* Karl J. Astrom and Tore Hagglund , Instrument Society of America (ISA)
2. Published Research Papers on PID controller tuning