

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN INSTRUMENTATION & CONTROL

Semester: 4

Subject Name **PROCESS TECHNOLOGY**

Sr.No	Course content
1.	PROCESS DOCUMENTATION 1.1 Standard ISA symbols for process instruments , vessels, pneumatic and hydraulic symbols. 1.2 Process flow diagrams, process piping and instrument installation diagrams. 1.3 Control loops for electronic and pneumatic systems (typical schemes for flow, temperature level, pressure control) 1.4 Instrument installation and hook – up diagrams.
2.	SIMPLE SCHEMES FOR INSTRUMENTATION AND CONTROL OF 2.1 HEAT EXCHANGER 2.1.1 Instrumentation list of Heat Exchanger variables and symbols. 2.1.2 Conventional Heat Exchanger control scheme. 2.1.3 Controlling the rate of condensate removal. 2.1.4 Condenser on pressure control. 2.1.5 Temp. – Pressure cascade loop on steam heater. 2.1.6 Condenser on temp. control scheme. 2.1.7 Temp.-flow cascade loop on steam heater. 2.1.8 Feed forward control of heat exchangers. 2.2 CHEMICAL REACTORS 2.2.1 Simple scheme for reactor control. 2.2.2 Reactor temp. control with recirculation. 2.2.3 Cascade temp. control of reactor with recirculation. 2.2.4 Simple scheme by modulating gas make-up. 2.2.5 Reactor pressure control by throttling flow of vent gas. 2.2.6 Continuous control of reactor pressure. 2.3 DISTILLATION COLUMN 2.3.1 Introduction and list of variable for distillation column operation. 2.3.2 Distillation column pressure control by throttling condenser water. 2.3.3 Distillation column temperature control by heat control to reboiler. 2.3.4 Distillation column temperature control by reflux flow control. 2.3.5 Distillation column feed flow control scheme., cascade control of feed to second column. 2.3.6 Distillation column reflux on flow control, Temp., cascaded reflux flow for composition control.

3.	PROCESS FLOW DIAGRAM AND BRIEF PROCESS STUDY OF FOLLOWING INDUSTRIES 3.1 Petroleum refinery.(products from crude petroleum, block diagram of refinery operations, Physical changes / unit operations) 3.2 Ammonia plant. 3.3 Urea plant . 3.4 Cement plant. (Dry process) 3.5 Textile industry.(block diagram & process for cotton Industries) 3.6 Nuclear Power plant.
4.	VARIOUS CONTROL SCHEMES IN FOLLOWING PLANTS 4.1 Textile - Automatic stop motion, Humidity, Moisture and stretch control. 4.2 Cement - Kiln temperature and speed control.
5.	FLOW DIAGRAM AND PROCESS STUDY OF THERMAL POWER PLANT (COAL BASED) 5.1 IMPORTANT CONTROL SCHEMES FOR (a) Combustion control - Air flow/fuel flow. (b) Drum level control - 1,2,3 element control. (c) Superheated steam temp. control scheme. 5.2 Importance of pH and Conductivity control of boiler feed water.

NOTE : Visits to industries/plants mentioned in the syllabus are recommended as a part of study.

Reference Books:

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| (1) Chemical Process Industries | R. N. Shreeve. |
| (2) Instrument Engineer 's Handbook Vol. II. | Liptak. |
| (3) Chemical Engineering | Dryden |
| (4) Applied instrumentation in the process industries | Andrews and Williams. |