

Devi Ahilya Vishwavidhyalaya, Indore, India Institute of Engineering & Technology				VII Year B.Tech. (Electronics and Instrumentation Engineering)			
Course Code & Name	Instructions Hours per Week			Credits			
7EIRC4 PROCESS INSTRUMENTATION AND CONTROL	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Course Learning Objectives:

1. The course aims to provide students with the knowledge about behaviour of industrial processes, builds the concepts related to operation and control of dynamic processes, and learn various strategies of processes control.
2. Learn theoretical and practical aspects for the design and operation of process control systems.

Prerequisites (if any): Control System, Sensor & Transducers

COURSE OF CONTENTS

UNIT-I: Introduction to Process Control

Introduction to process control Objectives of Control, Process Characteristics: Process Equation, degrees of freedom, process and control lag, dead time, load disturbance and its effect on processes, analog control, digital control, Self regulating processes, final control elements, valves and actuators, their various characteristics, piping and instrumentation diagram

UNIT-II: Types of Analog Controllers

Control modes Basic Control action, two position, multi-position, floating Control modes, Continuous controller modes: Proportional, integral, derivative, composite controller modes-I, P-D, P-I-D, comparisons of these control actions, design of various kinds of analog controllers, Parameters Adjustment, Controller tuning methods,

UNIT-III : Pneumatic and Hydraulic controllers

Controllers- other modes Modeling of simple systems-gas liquid and thermal systems, Concept of resistance and capacitance, Nozzle-flapper system, Pneumatic relays and amplifiers, Hydraulic systems, realization of various kinds of controllers for hydraulic and pneumatic applications.

UNIT-IV: Discrete State Process Control

Discrete state process control, Discrete state variables, Event sequence description, ladder diagram, relay sequencer, Programmable logic controller- Architecture, operation and programming

UNIT-V: Case studies

Cascade control, ratio control, feed-forward control, selective Control, Split range Control Boiler Control: Combustion Control, Oxygen/CO trimming, Feedwater Control, Furnace Control, Steam temp. Control, Distillation column control

Course Outcomes:

CO.No.	CO
CO1	Understand the fundamental principles, terminologies associated with the process control and instrumentation
CO2	Classification, design and applications of various kinds of Controllers
CO3	Modelling of fluid systems, Set strategies for the control of systems using pneumatic and hydraulic controllers
CO4	To understand, design, and implement systems that manage industrial processes through specific sequences of actions and events
CO5	Study and understand various additive control regimes

CO-PO-PSO Relationship

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO1	3	3	2	-	-	-	-	-	-	1	-	2	2	2
CO2	3	2	3	-	-	-	-	-	-	1	-	3	2	2
CO3	3	3	2	-	-	-	-	-	-	1	-	2	2	2
CO4	3	3	3	-	-	-	-	-	-	1	-	3	2	2
CO5	2	2	3	-	3	-	-	-	2	3	2	3	2	3

Recommended books:

1. D.P. Eckman “Automatic Process control” Wiley Publication.
2. Patranabies “Principles of Process control” Tata Mc Graw Hill Pub, (2006)
3. P. Harriott “Process control” McGraw-Hill: New York, 1964
4. Curtis Johnson “Process control Instrumentation Technology” Prentice Hall, New Delhi (2005)
5. B.G. Liptak “Hand Book of Process control” Taylor & Francis Ltd
6. Shinskey, “Process Control systems: Application, Design & Tuning” 4th Edition, McGraw Hill, Singapore (1996)