



C.U.SHAH UNIVERSITY

FACULTY OF: - Technology & Engineering

DEPARTMENT OF: -Instrumentation & Control Engineering

SEMESTER: - VI

CODE: - 4TE06INS1

NAME – INSTRUMENTATION SYSTEMS

Teaching & Evaluation Scheme

Subject Code	Subject Name	Teaching Hours/Week				Credits	Evaluation Scheme/Semester							
		Th	Tu	Pr	Total		Theory				Practical			Total Marks
							Sessional Exam		University Exam		Internal		University	
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE06INS1	Instrumentation Systems	4	0	0	4	4	30	1.5	70	3	---	---	---	100

Objectives

- To acquaint the students with fundamentals of Instrumentation systems and various procedures related to Instrumentation departments of industries

Pre-requisite

- A course in engineering drawing and knowledge regarding fundamentals of instrumentation engineering

Course Outlines

Sr. No.	Course Contents	No. of Hours
1.	Instrument Project Control: <ul style="list-style-type: none"> Document to be produced, Process Flow Sheets, Mechanical Flow Sheets, Instrument Index Sheets, Instrument Specification Sheets, Loop Wiring Diagram, Panel Drawings And Specifications , Plot Plans, Installation Details, Special Drawings, Purchase Requisitions, Process Information, Instruments Specifications & Standards, Piping Specifications, Electrical Specifications, Bid Documents, Project Procedures, Project Schedules, Equipment Information, Vendor Drawing, Work Coordination, Project Manager, Process Engineer, Equipment Engineer, Piping Design Supervisor, Purchasing & Expediting, Job Execution, Planning Hints, Scheduling, Specifying Instruments, Vendor Selection, Shipping, Receiving & Storing Instruments, Installation & Checkout, Project Check list, Design Consideration, Equipment Delivery, Conclusion 	12
2.	Engineering Design Criteria: <ul style="list-style-type: none"> Pneumatic V/S Electronics, Cost, Dependability, Safety, Maintenance, Process Control Requirements, 	10

	<ul style="list-style-type: none"> • Control Centers, Location, Layout, Electrical Classification, Utilities, Future & Spare Capacity, Specification For Various Measurement & Control Groups Flow Measurement, Level Measurement, Temperature Measurement, Pressure Measurement, • Control Valves, Control Panels, Analytical Instruments, Transmission Systems, Pneumatic, Electronic, Identification, • Process Connections, Location Of Taps, Sealing Instrument From The Process, Manifolds & Gauge Valves, Mounting Instruments, Selection Of Units, Charts, Ranges, Instrument Identification, Winterizing, Construction Materials, Packaged Equipment Systems, • Electrical Safety, National Electric Code, Purging & Pressurizing Enclosures, Intrinsic Safety. 	
3.	<p>Control Centers and Panels: Control Room Layout,</p> <ul style="list-style-type: none"> • Electric Power Systems, Instrument Power Requirements, Instrument Power Distribution, Control Room Lighting, Communication Systems, Electrical Classifications, • Control Panel Types, Flat face Panels, Breakfront Panels, Consoles, Comparison Of Panel Types, Panel Layout, Face Layout, Rear Layout, Auxiliary Racks & Cabinets, Panel Piping & Tubing, • Air Headers, Tubing Runs, Panel Wiring, Nameplates & Tags, Painting, Graphic Displays, • Panel Bid Specifications, Panel Inspections, Human engineering, Panel enclosure standard, Control center inspection 	07
4.	<p>Instrument Air System: Sizing criteria, pressure level, air supply source,</p> <ul style="list-style-type: none"> • Large Instrument air system • Oil removal, general considerations, dryers, desiccant type, refrigeration type, necessity for dryers, • Design guideline criteria, distribution systems, general layout, • Header & branch sizing, materials, take off & valving, control room air supply, case purging for electrical area classification 	06
5.	<p>Construction & Startup: Organizing, Documents Required, Planning The Schedule, Cost Control, Ordering & Receiving Equipment & Material, Purchase Orders, Material Status, Storage Of Equipment & Material,</p> <ul style="list-style-type: none"> • Installing Instruments Systems, Typical Installation Procedures, Co-Ordinating Work Among Crafts, • Check List Of Good Installation Practices, Calibration, Testing, Process Connections, Pneumatic Lines, Electrical, Loop Check, • Typical Flow Transmitter Check Out Procedure, Typical Temperature Transmitter Check Out Procedure, Typical Control Valve Check Out Procedure, Startup, Placing Instruments In Service, Tuning Control Loops, Evaluating Process Upsets & Disturbances, • Repairing Or Replacing Defective Equipment, Special Equipment, 	07
6.	<p>Engineering Graphical Symbols: Introduction, Flow Sheet Symbols, Flow Sheet Codes & Line Symbols, Instruments Symbols & Identification, Graphic Symbols For Distributed Control / Shared Display Instrumentation,</p>	04

	<ul style="list-style-type: none"> • Logic And Computer Systems, Graphic Symbols For Logic Diagram, Static Switching Control Devices, Graphical Symbols For Pipe Fittings, Valves & Piping 	
7.	<p>Typical Installation Details:</p> <ul style="list-style-type: none"> • Introduction, Flow, Level, Pressure, Temperature, • Control Valves, Miscellaneous, Instrument Supports. 	04

Learning Outcomes

Books Recommended

1. Applied Instrumentation in the Process Industries (Vol-II & Vol-III) by W. G. Andrew & H. B. Williams; Gulf Publishing
2. Encyclopedia of Instrumentation and Control by D. M. Considine - Krieger Publication Co.