<table>
<tr><td>Course Title</td><td colspan="3">DISTRIBUTED CONTROL SYSTEM (DCS-C200E & C300 & EXPERION -HONEYWELL</td><td></td></tr>
<tr><td>Purpose</td><td colspan="3">Gain Knowledge and hands–on practical's on Design & development, Operations, Engineering, Maintenance of Honeywell DCS – C200 E & 300 Controller & Experion</td><td></td></tr>
<tr><td>Eligibility</td><td colspan="3">Degree/Diploma in relevant branch of Engineering OR NTC/NAC with 2-3 years relevant trade Experience .</td><td></td></tr>
<tr><td>Duration</td><td colspan="3">02 Weeks (80 Hrs)</td><td></td></tr>
<tr><td>Location</td><td colspan="3">Advanced Training Institute Mumbai - Process Control Section</td><td></td></tr>
<tr><td>Learning outcomes</td><td colspan="3">1. Conceptual understanding of the C200E & C300 controllers to enable optimum utilization for Process Control
2. Conceptual understanding of Graphics Building guidelines to enable efficient Display Design to create an effective interface for Plant Operators .</td><td></td></tr>
<tr><td>Teaching methods</td><td colspan="3">1 Lectures in class room
2 Practice sessions or practicals
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4 Demonstrations</td><td></td></tr>
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<tr><td>3-C</td><td>ABILITY TO GRASP THE TOPIC</td><td>10</td></tr>
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<tr><td>AIDS</td><td colspan="3">1. LCD projection
2. White board
3. TRAINING KITS</td><td></td></tr>
<tr><td>Instruction material</td><td colspan="3">SOFTCOPY OF COURSE MATERIAL</td><td></td></tr>
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DAY	FORENOON SESSION (9.00 AM TO 1.00 PM)	AFTERNOON SESSION (1.30 M TO 5.30PM)
1	1.ADMISSION 2.DCS INTRODUCTION 3. DIFFERENCE BETWEEN DCS & PLC 4. APPLICATION OF DCS	Practicals – Conventional process loop control using PID controller
2.	1..Basic Overview ,Architecture & features of DCS 2.DCS Hardware 3. Communication -Experion PKS & C200 E/C300Configration -DCS I/O Capacity& Performance (C200& C300) - Experion PKS Control Builder Concept -Experion PKS CEE ,CPM & CM Concept - Cold & Warm restart - Logic Functional Block -Math Functional Block	1. Familiarization on Configuration Studio of Experion PKS - Starting Configuration Studio -Configuration Explorer -Control Strategy 2. Digital I/O Controls - Implementation AND, OR, Ex-OR & NAND - Implementation of Digital Logic for Process Control
3	Analog I/O interface & Performance Digital I/O interface & performance PID Block & Data Acquisition Block	Analog loop control using Experion PKS DCS
4	Experion PKS - Tag & Parameter - Parameter Connection using relative reference	----------Continoution of Practical on Analog loop using Experion PKS DCS-----
5	Experion PKS - History Tab & Server display Tab - REGCTL Block : Detail Display	Development of Real time multi-loops process control using C300 /C200E Controller
6	HMIWEB Display Builder - Display and Display objects - Use tools and navigation options - Create new operating display and display elements - Use the shape library	Concept of Tag/Points Generation Attaching points to the display Elements Create the alphanumeric display Creating Animation Display
7	HMIWEB Display Builder - Display and Display object properties : Animation Properties , Appearance Properties , Behaviours Properties , Callup Task Properties ,Data Properties	--Continuation of Forenoon Session ---
8	Drawing Concept - Developing P&I Diagram using SCADA drawing Tools - Developing Plant Diagram using SCADA drawing Tools . Related Practicals/ Hand on Practice	--Continuation of Forenoon Session ---
9.	Basic Trend Display object - About Trends and basic trends - Plot area & Axis Creating FacePlate Related Practicals/Hand-On-Practice	--Continuation of Forenoon Session ---
10	1. Alarm Management 2. Trends & Groups 3. Experion PKS Station	1. ASSESSMENT 2. FEEDBACK 3. VALIDATION

<table>
<tr><td>Course Title</td><td>PROCESS INSTRUMENTATION & CONTROL</td><td></td></tr>
<tr><td>Purpose</td><td>Gain Knowledge and Hands on practicals of different types Industrial process Instrument & control Methodology .</td><td></td></tr>
<tr><td>Eligibility</td><td>Degree/Diploma in relevant branch of Engineering OR NTC/NAC with 2-3 years relevant trade Experience .</td><td></td></tr>
<tr><td>Duration</td><td>02 Weeks (80 Hrs)</td><td></td></tr>
<tr><td>Location</td><td>Advanced Training Institute Mumbai - Process Control Section</td><td></td></tr>
<tr><td>Learning outcomes</td><td>3. Different types of field instrumentation, their principles of operation, their advantages and disadvantages and the application of the different types of sensors for flow, level, pressure and temperature measurements.
4. Identification and symbols used in I&C.
5. Basics of I&C, including different control functions, types of control loops, and continuous vs. discrete control.</td><td></td></tr>
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DAY	FORENOON SESSION (9.00 AM TO 1.00 PM)	AFTERNOON SESSION (1.30 PM TO 5.30PM)
1	1.ADMISSION 2. BASIC MEASUREMENT AND CONTROL CONCEPTS. 3.P&I DIAGRAM SYMBOLS 4. MEASURING INSTRUMENTS AND CONTROL VALVES AS A PART OF OVERALL CONTROL SYSTEM 5. TYPICAL APPLICATION	1. FAMILIRAZATION WITH PROCESS PLANT 2. INDENTIFICATION OF PROCESS INSTRUMENT 3.STUDY & WRITING OF EQUIPMENT SPECIFICATION .
2	1.Pressure-Concept , Term & Definition 2.Method of Pressure Measurement 3.Different types of Pressure Sensors & Gauge 4.Pressure Instrument Selection Guide 5.Pressure Gauge & Transmitter Installation	1.Pressure Measurement using different pressure gauges 2.Study of Electronic Pressure Transmitter 3. Study of Pneumatic Pressure Transmitter 3.Study of Pressure Control loop
3	1.PRINCIPLES OF TEMPERATURE MEASUREMENT 2. RTD THERMOCOUPLE THERMISTER 3. THERMOMETER – LIQUID –IN-GLASS , FILLED , BIMETALLIC 4. INSTALLATION CONSIDERATION 5. SELECTION GUIDE	1. Temperature measurement using Mercury Thermometer , Bi-metallic Thermometer & RTD 2. Temperature measurement using Thermocouple 3. Study of Temperature Control Loop
4&5	1.PRINCIPLE OF FLOW MEASUREMENT 2.DIFFERENCIAL PRESSURE FLOWMETER 3.OPEN CHANNEL FLOW METER 4. VARIABLE AREA FLOW METER 5. OSCILLATORY FLOWMETER 6. MAGNETIC FLOWMETER 7. POSITIVE DISPLACEMENT 8.ULTRASONIC FLOW MEASUREMENT 9.MASS FLOWMETER 10. INSTALLATION CONSIDERATION 11. SELECTION GUIDE	1.Flow measurement using Orifice ,Venturi & Pitot Tube. 2. Practicals on Displacement Type flowmeter 3.Flow Measurement using Vertex & Turbine Flow Meter 4. Study of Flow Loop Control
6&7	1. PRINCIPLE OF LEVEL MEAUREMENT 2. SIMPLE SIGHT GLASSES AND GAUGING RODS 3.BUOYANCY TYPE 4.HYDOSTATIC PRESSURE 5.ULTRASONIC MEASUREMENT 6. RADAR MEASUREMENT 7.ELECTRICAL MEASUREMENT 8. OPEN TANK AND CLOSED TANK LEVEL MEASUREMENT 9.INSTALLATION CONSIDERATION 10. SELECTION GUIDE	1. Study of level measurement using Capacitance Sensors 2. Study of Level Measurement using DP Transmitter . 3. Study of Level Loop
8	1.PRINCIPLE OF CONTROL VALVES 2.SLIDING STEM VALVES 3. ROTARY VALVES 4.CONTROL VALVE SELECTION AND SIZING 5.CONTROL VALVE CHARACTERISTICS 6.CONTROL VALVE NOISE AND CAVITATION 7.ACTUATORS AND POSITIONERS OPERATION 8. SELECTION GUIDE	1. Cut Section Model study of Control Valve 2. Study of I/P & P/I Converter 3. Study of Valve Positioner 4. Study of Control Valve Characteristics
9	1.PROCESS CONTROL- OPEN & CLOSED LOOP CONTROL 2. FEEDBACK CONTROL 3.CASECADE CONTROL 4.PID CONTROL	1. Demonstration -Process Loop Controls Using DCS & SCADA
10	1. THE NEW SMART INSTRUMENT AND FIELD BUS 2.PROCESS SAFETY AND HAZADS 3. INTRODUCTION TO DCS &SCADA	1. ASSESSMENT 2. FEEDBACK 3. VALIDATION

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<tr><td>Course Title</td><td>PID TUNNING</td></tr>
<tr><td>Purpose</td><td>Gain Knowledge & Hands on Practice to set up, maintain, and tune a PI or PID controller.</td></tr>
<tr><td>Eligibility</td><td>Degree/Diploma in relevant branch of Engineering OR NTC/NAC with 2-3 years relevant trade Experience .</td></tr>
<tr><td>Duration</td><td>01 Weeks (40 Hrs)</td></tr>
<tr><td>Location</td><td>Advanced Training Institute Mumbai - Process Control Section</td></tr>
<tr><td>Learning outcomes</td><td>1.Concept of PID Control
2. Able to identify the requirement of open loop and closed loop stability .
3. Parameterization of PID Controller
4.Tune feedback control system for Optimum Control .</td></tr>
<tr><td>Teaching methods</td><td>1 Lectures in class room
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1	ADMISSION Recognize the differences of each process loop. Learn the different process types, effect of noise, and the pros and cons of open loop tests and closed loop tests – all elements critical to tuning success.	Familiarization with PID Controller (Yokogawa & Honeywell PID Controller)
2	What are the P, I, D parameters? How do they work? The units of each term and different structures of PID formulas.	. Parameterization of PID Controller
3	Discussion on Parameterization of PID Controller	PID tuning for feedback loop for Optimum Control
4	Discussion of different control objectives, such as setpoint tracking or disturbance rejection, ramp and soak. How to adjust tuning strategy depending on your objectives.	Interfacing of PID Controller with RTD , Thermo- Couple , 4-20 Ma Signal
5.	Discussion of tuning techniques such as Ziegler-Nichols Tuning,	1. ASSESSMENT 2. FEEDBACK 3. VALIDATION

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<tr><td>Course Title</td><td>PROCESS PARAMETER MEASUREMENT & CALIBRATION</td><td></td></tr>
<tr><td>Purpose</td><td>Gain Knowledge and Hands on practicals on process parameters measurement & Calibration .</td><td></td></tr>
<tr><td>Eligibility</td><td>Degree/Diploma in relevant branch of Engineering OR NTC/NAC with 2-3 years relevant trade Experience .</td><td></td></tr>
<tr><td>Duration</td><td>01 Weeks (40 Hrs)</td><td></td></tr>
<tr><td>Location</td><td>Advanced Training Institute Mumbai - Process Control Section</td><td></td></tr>
<tr><td>Learning outcomes</td><td>1. Calibration Principles
2. Calibrating Pressure and Differential Press. Instruments
3. Calibrating Temperature Instruments
4. Calibrating Flow Instruments
5. Calibrating Level Instruments</td><td></td></tr>
<tr><td>Teaching methods</td><td>1 Lectures in class room
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DAY	FORENOON SESSION (9.00 AM TO 1.00 PM)	AFTERNOON SESSION (1.30 M TO 5.30PM)
1	1.ADMISSION - Define calibration - Explain how calibration affects quality, productivity, and safety -Recognize accuracy and precision -Identify zero shift, span error, combined zero shift and span error, and non-linearity with a pattern of instrument readings on an input/output graph or calibration data sheet -Identify the basic elements of a calibration set-up -Identify the input values for a five point Calibration check as a percent of the instrument's range -Fundamentals of pressure measurements - Pressure Instruments calibration	Calibration of Pressure and differential pressure Instruments - Pressure Gauge - Electronic Pressure Transmitter
2	-Fundamental of Temperature Measurement - Common test equipment used as measurement standards for calibration of temperature instruments -Identification of the proper thermocouple or RTD table for the sensor in the loop and use the tables in calibration -Calibrate an analog electronic temperature transmitter whose input is provided by a thermocouple or an RTD -State safety precautions for calibrating temperature instruments in the field	Calibration of Temperature Instruments - RTD - Thermocouple - Electronic Temperature Transmitter
3	-Fundamentals of flow measurement - Five point Check for differential pressure transmitter - Set up and procedure for calibration of different flow instruments	Calibration of Flow Instrument - Orifice & Venturi - Rotameter - Turbine & Vertex Flow meter - DP Transmitter
4	-Importance of properly calibrated level instruments - input and output measurement standards for calibrating hydrostatic level instruments -Define elevated or suppressed zero and determine the amount of zero suppression or elevation in a given hydrostatic pressure level gaging system	Calibration of Level Instruments -Calibration of DP transmitter for Level Measurement - Calibration of Capacitance Level transmitter for Level Measurement
5.	1. Calibration terminology 2. Traceability 3. Standard laboratory , accreditation & Calibration certificate	1. ASSESSMENT 2. FEEDBACK 3. VALIDATION