



CCST Exam Preparation Course Syllabus

Week Topic

- 1 Introduction to Process Control
 - Types of Processes
 - Continuous
 - Batch
 - Discrete
 - The Feedback Loop
 - Intro to P&ID Drawings
 - Study Questions
- 2 Controlling the Process
 - Process Characteristics and Controllability
 - Controller Responses
 - Control system architectures
 - Single Loop Controllers
 - Distributed Control Systems
 - Programmable Logic Controllers
 - Conclusion
 - Study Questions
- 3 CCST Exam Questions
- 4 Fundamentals of Electricity
 - Understand polyphase voltages and currents found in the industrial environment
 - Apply safety considerations when measuring electrical values or working around electrical equipment

 - Study Questions
- 5 Fundamentals of Electronics
 - Study Questions
- 6 CCST Exam Questions
- 7 Pressure Measuring Instruments
 - What is Pressure?
 - Units of Measurement
 - Pressure Measurement
 - Understanding the Effects of Gravity
 - Pressure Standards
 - Math Review
 - Unit Conversion Calculations
 - Study Questions

- 8 Plant Instruments that Measure Pressure Directly
 - Electronic Devices
 - Pressure Transmitters
 - Study Questions
- 9 CCST Exam Questions
- 10 Level and Density Measurements
 - Level Measurement Methods
 - Bubble Tube Method
 - Pressure and Differential Pressure Methods Using Differential Pressure Transmitters
 - Study Questions
- 11 Density Measurement Methods for Liquids and Liquid Slurries
 - Electronic Devices
 - Study Questions
- 12 CCST Exam Questions
- 13 Flow Measurement
 - Constriction or Differential Head Type
 - Reynolds Number
 - Study Questions
- 14 Open-Channel Flow Rate Measurements
 - Velocity Flowmeters
 - Study Questions
- 15 CCST Exam Questions
- 16 Temperature and Humidity Measurements
 - Temperature
 - Filled Systems
 - Study Questions
- 17 Electrical Systems
 - Humidity Measurements
 - Study Questions
- 18 CCST Exam Questions
- 19 Principles of Calibration
 - Importance of Calibration
 - Accuracy and Precision in Calibration
 - Recognizing Zero Shift and Span Error
 - Other Instrument Errors
 - Setup and Test Equipment for Calibration
 - Calibration Procedure
 - Study Questions
- 20 Calibrating Pressure and Temperature Instruments
 - Analog Electronic Pressure Transmitter Calibration
 - Smart Pressure Transmitter Calibration
 - Differential Pressure Transmitter Calibration
 - Pressure Gage Calibration

- Accurately Calibrate Pressure Transmitters
 - Zero-based
 - Elevation
 - Supression
 - Thermocouple Transmitter Calibration
 - RTD Transmitter Calibration
 - Study Questions
- 21 CCST Exam Questions
- 22 Calibrating Level and Flow Instruments
 - Differential Pressure Transmitter Calibration
 - Magnetic Flowmeter Calibration
 - Vortex Shedding Flowmeter Calibration
 - Mass Flowmeter Calibration
 - Hydrostatic Level Calibration
 - Displacement Level Calibration
 - Study Questions
- 23 Analytical Measurements
 - Electrical Conductivity
 - Hydrogen Ion Activity (pH)
 - Study Questions
- 24 CCST Exam Questions
- 25 Oxidation-Reduction Potential
 - Ion-Selective Measurement
 - Chromatography
 - Capacitance
 - Study Questions
- 26 The Feedback Control Loop
 - Overview
 - The Closed-Loop Control System
 - Controllers and Control Modes
 - Proportional
 - Integral
 - Derivative
 - Study Questions
- 27 CCST Exam Questions
- 28 Pneumatic Control Mechanisms
 - The Flapper-Nozzle Unit
 - Control Mechanism Requirements
 - The Automatic Controller
 - Manual Control Unit
 - The Closed-Loop Pneumatic Controlled System
 - Batch Controller
 - Study Questions
- 29 Electronic (Analog) Control Systems
 - Examples of Control Systems
 - Principle of Operation

- Closed-Loop Operation
- Study Questions

- 30 CCST Exam Questions

- 31 Actuators
 - Valve Actuator
 - Valve Positioner
 - Electrical Signals
 - Study Questions

- 32 Control Valves
 - Capacity of a Control Valve
 - Determining Pressure Drop Across the Valve
 - Valve Rangeability
 - Selection Factors
 - Viscosity Corrections
 - Study Questions

- 33 CCST Exam Questions

- 34 Control Loop Adjustments and Analysis
 - Proportional-Only Controller
 - Proportional-Plus-Integral Controller
 - Adjusting a Controller with the Proportional, Integral, and Derivative Mode
 - Study Questions

- 35 Control Loop Analysis
 - Step-Analysis Method of Finding Time Constant
 - Block Diagrams
 - Single-Time-Constant System
 - Two-Time-Constant System
 - Percent-Incomplete Method
 - Finding Control Modes by Step Analysis
 - Study Questions

- 36 CCST Exam Questions

- 37 Control Loop Analysis - Frequency Response Analysis
 - Frequency Response Analysis
 - Finding the Time Constant from the Bode Diagram
 - Testing a System
 - Control Objectives
 - PID Control
 - Adjusting the Proportional Band
 - Closed-Loop Response
 - Study Questions

- 38 Combination Control Systems
 - Duplex or Split-Range Control
 - Auto-Select or Cutback Control
 - Flow-Ratio Control
 - Cascade Controller
 - Study Questions

- 39 CCST Exam Questions
- 40 Digital Control Systems
 - Distributed Control Systems
 - Programmed Control Systems
 - Sequential Control systems
 - The Allen-Bradley PLCs
 - Study Questions
- 41 Selected Industrial Bus Structures
 - NetLinx
 - Foundation Fieldbus
 - ControlNet
 - EtherNet/IP
 - Profibus
 - Modbus Plus
 - Study Questions
- 42 CCST Exam Questions
- 43 Analytical Troubleshooting – Part 1
 - Advanced P&ID Drawings
 - Understand the purpose and use of the National Electrical Code (NEC)
 - Grounding, Noise and Power Considerations for Instruments, Equipment and Computers
 - Study Questions
- 44 Analytical Troubleshooting – Part 2
 - Analytical Troubleshooting Techniques
 - Logical Analysis
 - Common Problems
 - Study Questions
- 45 Preliminary CCST Exam Questions – Mock Practice Exam
 - Identify any need for review in specific knowledge area
- 46 Final CCST Practice Exam

The participant will be expected to spend approximately five hours per week on the lessons.