

# Hydroelectric Plant Operations

9 Modules / 103 Total Lessons – Recommended Courses

## Module 1 – Plant Basics (3)

501-01	Energy Conversion
501-02	Turbine Basics
501-05	Generator Overview

## Module 2 – Plant Sciences (6)

170-01	Introduction to Industrial Math
170-02	Measurements and Calculations
170-03	Fractions, Percentages, and Ratios
171-10	Physics – Force and Motion
171-11	Physics – Energy, Work and Power
201-01	Working Principles of Simple Machines

## Module 3 – Plant Drawings (5)

611-01	P&ID Basics
611-02	Reading a P&ID
611-03	Electrical Drawings
611-04	Logic Diagrams
611-05	Industrial Print Reading Overview



## Module 4 – Plant Electricity (26)

401-01	Electron Theory
401-02	Magnetism and Electromagnetism Explained
401-03	Ohm's and Kirchhoff's Laws in DC Circuits
401-04	Evaluating Series and Parallel DC Circuits
402-01	Introduction to Alternating Current (AC)
402-02	Ohm's and Kirchhoff's Laws in AC Circuits
402-03	Inductance in AC Circuits
402-04	Capacitance in AC Circuits
402-05	Impedance in AC Circuits
402-06	AC Power
402-07	Fundamentals of 3-Phase AC
405-01	Power Quality
405-02	Harmonics
405-03	High-voltage AC
409-01	AC Induction Motors
409-02	AC Generators
409-07	Generator Systems
415-01	Transformer Basic Operation and Theory
416-01	Battery Basics
416-02	Electrical Backup Systems
416-03	Uninterruptable Power Supplies
418-01	Electrical Faults and Current Ratings
418-02	Overcurrent Protection, Fuses & Breakers
418-03	Protection Relays
418-04	Transformer, Generator, and Motor Protection
418-05	Grounding and Bonding

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## Module 5 – Plant Instrumentation and Control (18)

603-01	Instrumentation and Control Overview
603-02	Principles of Temperature
603-03	Principles of Pressure
603-04	Principles of Level
603-05	Principles of Flow
603-06	Temperature Instruments
603-07	Pressure Measuring Devices
603-08	Level Measuring Devices
603-09	Flow Measuring Devices
603-15	Weight Measuring Devices
613-01	Introduction to Automated Control
613-02	Pneumatic Control System
613-03	Introduction to Switches
613-04	Electronic Control Systems
617-01	Introduction to Control Modes
617-02	Operation of Automatic-Manual Transfer Stations
617-03	Final Control Elements
621-01	Programmable Logic Controllers (PLC)

## Module 6 – Intro to Plant Equipment (24)

203-01	Introduction to Bearings
213-01	Lubrication Basics
215-01	Introduction to Valves and Their Components
215-14	Valve Positioners
215-15	Pressure Regulating Valves
219-01	Introduction to Centrifugal Pumps
223-01	Heat Exchanger Theory
223-03	Closed Heat Exchangers
225-01	Compressed Air Systems
231-01	Introduction to Positive Displacement Pumps
243-01	Introduction to Hydraulics
271-01	Vibration Introduction
271-02	Vibration Causes and Characteristics
271-04	Vibration Analysis Program
417-01	Switchgear
417-02	Low Voltage Breakers
417-03	Medium and High Voltage Switchgear
417-04	General Switchgear Maintenance
417-05	Switchgear Specific Maintenance Procedures
417-06	Circuit Breaker Time Travel
419-01	MOV (Motor Operated Valve) Application and Construction
419-02	MOV (Motor Operated Valve) Disassembly and Inspection, Part 1
419-03	MOV (Motor Operated Valve) Disassembly and Inspection, Part 2
419-04	Limit Switch Adjustment

## Module 7 – Intro to Hydroelectric Plant Operations (8)

583-01	The Hydroelectric Role in the Power System
583-02	Hydroelectric Power Stations
583-03	Water Management
583-04	Hydroelectric Generators
583-05	Generator Monitoring and Control
583-06	Hydroelectric Plant Auxiliaries
583-07	Electrical Equipment in a Hydroelectric Plant
583-08	Mechanical Governor

## Module 8 – Plant Systems (11)

507-01	Generator and Auxiliary Systems' Functions
507-02	Generator and Auxiliary Systems' Flow Paths and Major Components
507-03	Generator Construction and Process Control
507-04	Generator and Auxiliary Systems Start-up
507-05	Generator and Auxiliary Systems' Normal Operations
507-06	Generator and Auxiliary Systems' Shutdown
560-01	Main Transformers
560-02	Station Service System
560-03	Fuses and Circuit Breakers
560-04	Protective Relays & Instrument Transformers
560-05	Equipment Disconnects and Grounding

## Module 9 – Plant Controls (2)

565-01	Distributed Control System Fundamentals
565-02	Distributed Control System Components



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