# BASIC SKILLS

## WORKPLACE MATHEMATICS
- Whole Numbers
- Fractions
- Decimals
- Algebra

## MECHANICAL PRINT READING
- Orthographic Projection
- Format and Dimension
- Types and Symbols
- Thread Specifications

## WORKPLACE READING
- Basic Maintenance & Reliability
- Literal Comprehension - Main Idea
- Literal Comprehension - Relationships
- Inference
- Study Maintenance & Reliability

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# ELECTRICAL MAINTENANCE

## AC/DC ELECTRONICS
- Current
- Voltage
- Resistance
- Ohm’s Law
- Magnetism
- Electrical Measurements
- DC Circuits
- Inductance & Capacitance
- Alternating Current
- AC Measurements
- Capacitive Circuits
- Inductive Circuits
- Transformers
- Tuned Circuits

## BASIC ELECTRONIC COMPONENTS
- Types and Diagrams
- Controls and Application
- Operation and Troubleshooting

## DC MOTOR CONTROLLERS
- Controller Function and Operation
- Maintenance and Troubleshooting

## DC MOTORS
- Basics and Internal Parts of DC Motors
- Wiring Diagrams and Troubleshooting

## APPLIED DC FUNDAMENTALS
- Voltage, Resistance, and Current
- Electronic Components and Magnetism
- Electronic Schematics and Circuit Analysis

## ELECTRONIC CIRCUITS
- Basic Principles
- Characteristics and Operations
- Logic Fundamentals, Types & Application
### ELECTRICAL MAINTENANCE

#### INDUSTRIAL ELECTRICITY
- Basic Principles
- Alternating Current
- Conductors
- Wiring
- Installation, Distribution and Lighting
- Generators and Motors
- AC Motor Control and Current Measurement

#### MECHANICAL ELECTRICAL CONTROL SYSTEMS
- Introduction to Control Schematics
- Electrical Lockout
- Design And Troubleshooting
- Energy Management
- Electronic Controls
- Responsive Systems

#### MOTOR DRIVES
- Motor Drive Identification
- Open and Closed Loop Systems
- Variable Speed AC Drives
- Servo and Stepper Motors
- AC Motor Operation
- AC Drive Selection and Setup

#### MOTOR CONTROLS
- Basic Motor Controls & Relays
- Overload Protection Devices
- Time Delay Relays
- Schematic Symbols
- Schematics and Wiring Diagrams
- Starting Methods for Squirrel Cage Motors
- Wye-Delta, Synchronous & Wound Rotor Controls
- Installing & Troubleshooting Control Systems

#### PROGRAMMABLE LOGIC CONTROLLERS
- Fundamentals
- Programming
- Inputs and Outputs
- Troubleshooting
- Communications and Advanced Programming

### MECHANICAL MAINTENANCE

#### HVAC&R
- Condensers - Maintenance & Troubleshooting
- Cooling Towers - Maintenance & Troubleshooting
- Complete System Troubleshooting
- Chillers - Leak Check and Electrical
- Air Handlers - Mechanical Systems

#### PNEUMATICS
- The Power of Compressed Air
- The Pneumatic Circuit
- Processing Air
- Actuators
- Pneumatic Control Valves
- Working Safely with Pneumatic Systems
- Pneumatic System Maintenance
- Pneumatic System Troubleshooting
# MECHANICAL MAINTENANCE

## INDUSTRIAL BEARINGS
- Application and Technology
- Maintenance and Installation
- Troubleshooting

## CLUTCHES & BRAKES
- Types, Principles and Functions
- Troubleshooting

## HYDRAULICS
- Harnessing Hydraulic Power
- The Hydraulic Circuit
- Pumps and Actuators
- Control Valves
- Hydraulic Fluid
- System Safety and Maintenance
- Hydraulic System Troubleshooting

## INDUSTRIAL SEALS
- Types, Materials & Properties
- Gaskets & Packings - Inspection & Installation
- Mechanical Face Seals - Troubleshooting & Installation

## MACHINERY LUBRICATION
- Lubricating Oil - Types, Properties & Handling
- Lubricating Oil - Equipment & Procedures
- Lubricating Greases - Types, Application & Equipment

## INDUSTRIAL DRIVES
- Belt Drives
- Chain Drives
- Shaft Joint and Coupling Devices
- Complete Drive Packages
- Enclosed Drive Systems
- Gears and Gear Systems

## HYDRAULIC POWER SYSTEMS & TROUBLESHOOTING
- Identification and Operation
- Troubleshooting Techniques

## STEAM TRAPS
- Types, Principles, and Functions
- Sizing, Installation and Monitoring

## CENTRIFUGAL PUMPS
- Design and Function
- System Characteristics and Selection
- Operation and Maintenance
- Troubleshooting & Disassembly
- Reassembling and Installation

## PIPEFITTING
- Introduction to Pipefitting
- Piping Systems and Standards
- Pipe Fittings & Joints
- Measuring Pipe and Drawings
- Offsets
- Manual and Electric Threaded Pipe
- Flanged Pipe
- Plastic Pipe
- Accessories and Specialty Equipment
- Tubing
- Hoses

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MACHINE TECHNOLOGY

BASIC MACHINE TECHNOLOGY
- Safety Procedures & Guidelines
- Hand Tools & Their Uses
- The Use of Measuring Tools
- The Vertical Milling Machine
- The Vernier Caliper & Vernier Protractor
- The Pedestal Grinder
- Sharpening Drill Bits by Hand & Machine
- Drill Presses - Sensitive & Radial Arm
- Drill Press Operations
- Vertical Band Saws - Parts, Accessories & Operation

BASIC ENGINE LATHE
- Identification of Parts and Care
- Speed and Feed
- Grinding a Round-Nose Finishing Tool
- Three Methods of Facing Work to Length
- Straight Turning Work of Two Diameters
- Straight Turning Between Centers
- Drilling, Boring, and Reaming Work
- Turning a Radius
- Turning Tapers
- Filing and Polishing
- Knurling

INSTRUMENTATION & CONTROL

BASIC PROCESS CONTROL
- Feedback Control
- Process Control Modes
- Process Characteristics
- Process Variables
- Instrumentation Symbols
- Instrumentation Loop Diagrams
- Piping and Instrumentation Diagrams
- Mechanical Connections
- Electrical Connections

CONTINUOUS PROCESS CONTROL
- Principles of Continuous Control
- Applications of Heat Exchanger Control
- Applications of Distillation Control
- Applications of pH Control

CONTROL VALVES & ACTUATORS
- Basics & Function
- Types & Design
- Fundamentals & Selection
- Sizing & Installation
### INSTRUMENTATION & CONTROL

#### ELECTRONIC MAINTENANCE
- Solid-State Devices
- Integrated Circuits and Op Amps
- Sensor and Transducer Principles
- Transmitters
- Transducers
- Controllers, Indicators, and Recorders
- Tuning
- Sampling Systems & Gas Chromatograph Valves
- Gas Chromatograph Ovens and Controllers
- Spectroscopic Analyzers
- Electrochemical Analyzers
- Instrument Loop Troubleshooting

#### CALIBRATION TEST EQUIPMENT
- Primary Calibration Standards
- Pneumatic Test Equipment
- Electronic Test Equipment
- Instrumentation Errors
- Instrument Calibration

#### PROCESS MEASUREMENT
- Temp 1 - Thermometers and Thermocouples
- Temp 2 - Resistance and Radiation Devices
- Pressure 2 - Indicators and Transmitters
- Level 1 - Measurement and Gages
- Level 2 - Indicators and Transmitters
- Flow 1 - Measurement Overview
- Flow 2 - Flow Sensors

#### SMART DIGITAL INSTRUMENTATION
- Understanding HART Protocol
- Applications of HART Smart Field Device
- Configuring, Calibrating & Testing HART Smart Field Devices
- Foundation Fieldbus

#### GAGING & MEASUREMENT
- Type and Fundamentals
- Procedures and Operation

#### USING RSLOGIX
- Configuring Hardware and Software
- Programming and Editing
- Testing/Troubleshooting Functions

### SUSTAINABILITY

#### ENERGY MANAGEMENT
- Energy Smart
- Best Practices
- Instrumentation and Controls
- Theory of Steam Generation
- Fuels and the Combustion Process
- Boilers and Auxiliaries
- Emissions Control and Ash Handling
- Steam Distribution
- Steam Turbines and Condensers
- Electricity Generation and Distribution
- Pumping Systems
- Cooling Towers
- Raw Water Treatment
- Compressed Air
- Refrigeration
- HVAC and Indoor Air Quality

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# PREDICTIVE MAINTENANCE

## MACHINERY OIL ANALYSIS
- Fundamentals and Methods
- Strategies, Options and Testing
- Establishing an Effective Program

## VIBRATION ANALYSIS
- Predictive Maintenance and Machine Vibration
- Machine Vibration Basic Theory
- Preparing for Data Collection
- The Data Processing System
- Data Collection
- Data Analysis

## THERMOGRAPHY
- Basic Operations
- Operating Procedures and Implementation
- Practical Applications

## ADVANCED VIBRATION ANALYSIS
- AC Induction Motors Part 1
- AC Induction Motors Part 2

# GENERAL MAINTENANCE

## OPERATOR INSPECTION
- Pneumatic System Inspection
- Vacuum System Inspection
- Air Compression System Inspection
- Fastener & Equipment Structure Inspection
- Electrical Equipment & Control System Inspection
- Motor & Drive System Inspection
- Belt Drive, Chain Drive & Gear Box Inspection
- Clutch & Brake Inspection
- Lubrication System Inspection

## MAINTENANCE AND RELIABILITY PRINCIPLES
- People
- Processes
- Technologies

## INTRODUCTORY OPERATOR TRAINING
- Abnormal Operations

## MAINTENANCE PRINCIPLES
- Maintenance Principles

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