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### Reading Blueprints:

Introduction to Blueprints;  
Machine Parts;  
Machine Drawings;  
Sheet Metal Drawings;  
Building Drawings;  
Hydraulic and Pneumatic Drawings;  
Piping and Plumbing Drawings;  
Electrical Drawings;  
A/C and Refrigeration Drawings;  
Sketching

### Reading Schematics and Symbols:

Introduction to Schematics and Symbols;  
Symbols on Schematics;  
Electrical Symbols;  
Electrical Diagrams;  
Piping Symbols;  
Piping Diagrams;  
Hydraulic and Pneumatic Symbols;  
Hydraulic and Pneumatic Diagrams;  
A/C and Refrigeration Systems;

### Mathematics in the Plant:

Whole Numbers;  
Common Fractions;  
Decimal Fractions;  
Ratios and Proportions;  
Powers and Roots;  
Calculators;  
Geometry;  
Algebra; U  
sing Formulas;  
Trigonometry

### Making Measurements:

Units of Measurement;  
Metric Measurement;  
Linear Measurement;  
Comparison and Surface Measurement;  
Measuring Bulk Materials;  
Measuring Motion;  
Measuring Forces;  
Measuring Temperature;  
Measuring Fluids;  
Measuring Electricity

### Metals in the Plant:

Introduction to Metals;  
Properties of Metals;  
Manufacturing Processes;  
Iron and Steel;  
Standard Steels;  
Heat Treatment;  
Copper;  
Aluminum;  
Magnesium and Titanium;  
Lead, Nickel, Tin, and Zinc

### Nonmetals in the Plant:

Introduction to Nonmetals;  
Plastics; Rubber;  
Wood;  
Construction Materials;  
Insulating Materials;  
Paints and Coatings;  
Industrial Chemicals;  
Adhesives;  
Carbon

### Hand Tools:

Measuring Tools;  
Wrenches and Screwdrivers;  
Pipefitting Tools;  
Plumbing Tools;  
Electrician's Tools;  
Woodworking Tools;  
Masonry, Plastering, and Glazing Tools;  
Sheet Metalworking Tools;  
Metalworking Tools;  
Hoisting and Pulling Tools

### Portable Power Tools:

Electric Drills;  
Electric Hammers;  
Pneumatic Drills and Hammers;  
Screwdrivers, Nutrunners, and Wrenches;  
Linear-Motion Saws;  
Circular Saws;  
Routers and Planes;  
Electric Sanders;  
Grinders and Shears;  
Tool Sharpening

### Industrial Safety and Health:

Introduction to Safety and Health;  
Government Safety and Health Regulations;  
Personal Protective Equipment;

Chemical Safety;  
Tool Safety;  
Material Handling;  
Working Safely with Machinery;  
Working Safely with Electricity;  
Electrical Equipment Protection;  
Fire Safety; Protecting your Health;  
A Safe Work Environment

### Troubleshooting Skills:

Introduction to Troubleshooting;  
Working with Other People;  
Troubleshooting Techniques;  
Aids to Troubleshooting;  
Preparing for Troubleshooting;  
Using Schematics and Diagrams;  
Solving Mechanical Problems;  
Solving Electrical Problems;  
Breakdown Maintenance; Planned Maintenance

### Basic Electricity and Electronics:

Introduction to Electricity;  
Static Electricity;  
Current Electricity;  
Magnetism;  
Current, Resistance, and Potential Difference;  
Electrical Components;  
Conductors;  
DC Circuits;  
AC Circuits;  
Electronics

### Batteries and DC Circuits:

Electrochemical Action;  
Battery Characteristics;  
Kinds of Batteries;  
Maintaining Lead-Acid Batteries;  
Charging Lead-Acid Batteries;  
Solving Problems in DC Circuits;  
DC Series Circuits;  
Parallel Circuits;  
Series-Parallel Circuits;  
DC Circuits in Use

### Transformers and AC Circuits:

Principles of Alternating Current;  
Mathematics in AC Circuits;  
Inductance and Inductive Reactance;  
Capacitance and Capacitive Reactance;  
Impedance;  
Power and Energy in AC Circuits;  
Three-Phase Circuits;  
Principles of Transformers;  
Transformer Applications;  
Maintaining Transformers

### Electrical Measuring Instruments:

Principles of Meter Operation;  
Ammeters, Voltmeters, and Wattmeters;  
Resistance Measurement;  
Multimeters;  
Oscilloscopes

### Electrical Safety and Protection:

Electrical Hazards;  
Electrical Safety Equipment;  
Electrical Safety Procedures;  
The National Electric Code®;  
Grounding, Ground Faults, and Short Circuits;  
Fuses and Circuit Breakers;  
Motor Protection

### DC Equipment and Controls:

DC Power in Industry;  
DC Electromagnets;  
DC Generators;  
DC Motors;  
DC Armatures;  
DC Relays;  
DC Controllers;  
DC Power Supplies;  
Silicon Controlled Rectifiers;  
Maintenance of DC Equipment

### Single-Phase Motors:

Introduction to Single-Phase Motors;  
Split-Phase Motors;  
Capacitor Motors;  
Repulsion Motors;  
Universal Motors;  
Special Motors;  
Synchros;  
Servos;  
Motor Installation;  
Motor Maintenance

### Three-Phase Systems:

Principles of Three-Phase Motors;  
Induction Motors;  
Synchronous Motors;  
Multispeed Motors;  
Maintaining Three-Phase Motors;  
Motor Starters;  
Three-Phase Motor Controllers;  
Alternators;  
Auxiliary Generator Systems;  
Power Distribution Systems

### AC Control Equipment:

Motor Starters;  
Switches and Controls;  
Limit Switches;  
Special Control Switches;  
Timers and Counters;  
Control Relays;  
Equipment for Hazardous Locations;  
Special Motor Controls;  
Motor control Centers;  
Control Panel Wiring

### Electrical Troubleshooting:

Troubleshooting with Electrical Schematics;  
Troubleshooting with Building Drawings;  
Troubleshooting with Control Circuits;  
Troubleshooting Combination Starters;  
Troubleshooting Control Devices;  
Troubleshooting Special Controls;  
Troubleshooting DC Motors;  
Troubleshooting AC Motors;  
Troubleshooting Lighting Systems;  
Saving Time in Troubleshooting

### Electrical Safety in the Workplace:

Article 90: Introduction and Purpose;  
Articles 100 and 105: Terms and Definitions;  
Article 110: General Requirements for Work Practices;  
Article 120: Establishing an Electrically Safe Work Condition;  
Article 130: Work Involving Electrical Hazards;  
Articles 200-250: Safety-Related Maintenance Requirements;  
Articles 300-350: Safety Requirements for Special Equipment;  
Annexes and Supplemental Materials

### Basic Mechanics:

Forces and Motion;  
Work, Energy and Power;  
Fluid Mechanics;  
Simple Machines;  
Machine Elements;  
Measurement Tools and Instruments;  
The Safe Use of Hand Tools;  
The Safe Use of Portable Power Tools;  
Fasteners;  
Friction and Wear

### Lubricants and Lubrication:

Principles of Lubrication;  
Characteristics of Lubricants;  
Additives, Lubricating Action, and Bearing Lubrication;  
Oils and Their Applications;  
General-Purpose Greases;  
Special-Purpose Greases and Dry-Film Lubricants;  
Lubrication Systems and Methods;  
Automatic Lubrication Methods;  
Lubricant Storage and Handling;  
Lubrication Management

### Power Transmission Equipment:

Belt Drives;  
Chain Drives;  
Gears;  
Gear Drives;  
Adjustable-Speed Drives;  
Shaft Alignment;  
Shaft Coupling Devices;  
Clutches and Brakes

### Bearings:

Bearings and Shafts;  
Plain Journal Bearings I; Plain Journal Bearings II;  
Antifriction Bearings I;  
Antifriction Bearings II;  
Ball and Roller Bearings;  
Specialized Bearings;  
Bearing Seals;  
Lubrication;  
Bearing Maintenance

### Pumps:

Pump Development and Application;  
Basic Pump Hydraulics;  
End-Suction Centrifugal Pumps;  
Propeller and Turbine Pumps;  
Rotary Pumps;  
Reciprocating Pumps;  
Metering Pumps;  
Special-Purpose Pumps;  
Packings and Seals;  
Pump Maintenance

### Piping Systems:

Introduction to Piping Systems;  
Metal Piping;  
Nonmetallic Piping;  
Tubing;  
Hoses;  
Fittings;  
Common Valves;  
Special Valves;  
Strainers, Filters and Traps;  
Accessories

### Basic Hydraulics:

Principles of Hydraulics;  
Hydraulic Fluids;  
Strainers and Filters;  
Reservoirs and Accumulators;  
Hydraulic Pumps;  
Piping, Tubing, and Fittings;  
Directional Control Valves;  
Pressure Control Valves;  
Cylinders; Hydraulic Motors

### Hydraulic Troubleshooting:

Hydraulic Systems;  
Hydraulic Schematic Diagrams;  
Installing Hydraulic Components;  
Installing Pipe and Tubes;  
Selecting Hydraulic Fluids;  
Planning System Maintenance;  
Troubleshooting Systems;  
Troubleshooting Valves;  
Troubleshooting Cylinders;  
Troubleshooting Pumps and Motors

### Basic Pneumatics:

Pneumatic Principles;  
Reciprocating Compressors;  
Rotary Compressors;  
Primary Air Treatment;  
Secondary Air Treatment;  
Piping, Hoses, and Tubing;  
Directional Control Valves;  
Pressure-Control Valves;  
Pneumatic Cylinders;  
Pneumatic Motors and Rotary Actuators

### Pneumatic Troubleshooting:

Pneumatic Systems;  
Pneumatic Schematic Diagrams;  
Installation of System Components;  
System Maintenance; Determining System Failures;  
Troubleshooting Air Compressors;  
Troubleshooting Control Valves;  
Troubleshooting Cylinders;  
Troubleshooting Air Motors;  
Pneumatic/Hydraulic Systems

### Regulatory Compliance:

Hazard Communication.  
Lock-Out/Tag-Out.  
Bloodborne Pathogens.  
Forklift/Powered Industrial Truck Safety.  
Emergency Planning.  
Personal Protective Equipment.

### General Safety:

Safety Orientation.  
Back Safety.  
Driving Safety.  
Electrical Safety.  
Fall Protection.  
Industrial Ergonomics.  
First Aid.  
Hand and Power Tool Safety.  
Ladder Safety.  
Machine Guard Safety.  
Materials Handling Safety.  
Walking and Working Surfaces.  
Workplace Violence.