

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