Industrial Maintenance Electrical & Instrumentation Technician

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LEVEL 1


Alternating Current (20 Hours) ISBN 978-0-13-604705-6 (Module ID 40204-08) Covers transformers, single-phase and three-phase power distribution, capacitors, the theory and operation of induction motors, and the instruments and techniques used in testing AC circuits and components.

E&I Test Equipment (10 Hours) ISBN 978-0-13-604706-3 (Module ID 40205-08) Focuses on proper selection, inspection, and use of common electrical and instrumentation test equipment, including voltage testers, clamp-on ammeters, ohmmeters, multimeters, phase/motor rotation testers, data recording equipment, field communicators, pressure testers, and dead weight testers. Also covers safety precautions and meter category ratings.

Flow, Pressure, Level, and Temperature (15 Hours) ISBN 978-0-13-604707-0 (Module ID 40206-08) Presents devices used to measure flow, pressure, level, and temperature, along with their principles of operation.

LEVEL 2

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Continued on following page
Process Mathematics (15 Hours)
(Module ID 40303-09) Covers the methods used to eliminate or reduce electrical shock hazards to personnel working on electrical equipment.

Hand Bending (10 Hours)
(Module ID 40303-09) Discusses transformer types, construction, connections, protection, and grounding along with capacitors and rectifiers.

Tubing (15 Hours)
ISBN 978-0-13-604710-0
(Module ID 40209-08) Introduces a variety of tubing, tubing materials, tools, and work practices. Covers proper storage and handling, cutting, deburring, reaming, bending, and flaring of tubing.

Conductor Terminations and Splices (10 Hours)
(Module ID 40213-08) Describes methods of terminating and splicing conductors of all types and sizes, including preparing and tapping conductors.

Clean, Purge, and Test Tubing and Piping Systems (7.5 Hours)
(Module ID 40210-08) Presents safe methods for cleaning, purging, blowing down, pressure testing, and leak testing tubing, piping, and hoses used in industrial maintenance.

Conductor Selection and Calculation (15 Hours)
(Module ID 40303-09) Explains distribution equipment, including grounding, switchboard and ground fault maintenance, transformers, and electrical drawing identification.

Distribution Equipment (17.5 Hours)
(Module ID 40307-08) Covers the types of conductors used in wiring systems, including insulation, current-carrying capacity, and temperature ratings.

Tubing (15 Hours)
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(Module ID 40209-08) Introduces a variety of tubing, tubing materials, tools, and work practices. Covers proper storage and handling, cutting, deburring, reaming, bending, and flaring of tubing.

Transformer Applications (7.5 Hours)
(Module ID 40304-09) Describes methods of terminating and splicing conductors of all types and sizes, including preparing and tapping conductors.

Motors and Controls (15 Hours)
(Module ID 40304-09) Describes selecting, sizing, and installing motor controllers. Also covers control circuit pilot devices and basic relay logic.

Conductor Selection and Calculation (15 Hours)
(Module ID 40303-09) Explains distribution equipment, including grounding, switchboard and ground fault maintenance, transformers, and electrical drawing identification.

Motor Controls (15 Hours)
(Module ID 40304-09) Describes selecting, sizing, and installing motor controllers. Also covers control circuit pilot devices and basic relay logic.

Distribution Equipment (17.5 Hours)
(Module ID 40307-08) Covers the types of conductors used in wiring systems, including insulation, current-carrying capacity, and temperature ratings.

Clean, Purge, and Test Tubing and Piping Systems (7.5 Hours)
(Module ID 40210-08) Presents safe methods for cleaning, purging, blowing down, pressure testing, and leak testing tubing, piping, and hoses used in industrial maintenance.

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MODULES

Industrial Maintenance Electrical & Instrumentation Technician

LEVEL 4

Curriculum Notes

• 165 Hours
• Revised: 2009, Third Edition
• Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

PAPERBACK

ISBN

Individual Modules: $24.99 see module list

MODULAS

The modules listed below are included in the Trainee Guide. The following ISBNs are for ordering individual modules only.

Standby and Emergency Systems (12.5 Hours)
(Module ID 40401-09) Explains the installation, utilization, and maintenance requirements for standby and emergency electrical systems.

Basic Process Control Elements, Transducers, and Transmitters (15 Hours)
(Module ID 40402-09) Discusses sensing and transmitting devices used in an instrumentation loop, along with the process variables measured by the detectors or sensors. Gives examples of technical manuals and specification sheets. Explains how control devices are selected, and how to draw basic control loop diagrams that include a measuring element, a transducer, and a transmitter.

Instrumentation Calibration and Configuration (10 Hours)
(Module ID 40403-09) Introduces methods of instrumentation calibration, including the three- and five-point methods. Covers components that require calibration in pneumatic, analog, and smart loops, as well as methods used to calibrate these components.

Pneumatic Control Valves, Actuators, and Positioners (40 Hours)
(Module ID 40404-09) Covers the construction, operation, and uses of control valves, actuators, and positioners that are driven, and in some cases controlled by, compressed air. Explains the installation and maintenance of these devices, and includes alignment and troubleshooting procedures.

Performing Loop Checks (7.5 Hours)
(Module ID 40405-09) Covers loop check steps, including verifying mechanical installation, validating that the loop has correct tag numbers, performing loop checks, and proving the loop.

Troubleshooting and Commissioning a Loop (10 Hours)
(Module ID 40406-09) Teaches troubleshooting techniques used to locate problems in control loops, and how to isolate a loop in order to troubleshoot it. Covers commissioning of a loop once it is repaired, loop checked, and calibrated.

Process Control Loops and Tuning (20 Hours)
(Module ID 40407-09) Discusses control loops, devices, and terms. Introduces formulas and their applications to PID control. Offers a theory-based approach to PID control and its application in industrial process control. Addresses open, closed, and visual loop tuning.

Data Networks (15 Hours)
(Module ID 40408-09) Introduces terms associated with data network devices and computers used in industrial facilities. Explains how data network devices and computers are interconnected for communication purposes. Describes how open connectivity is used in industrial data networks, and explores the hardware devices used in a data highway system.

Programmable Logic Controllers (17.5 Hours)
(Module ID 40409-09) Introduces the application of PLCs in industrial process control, as well as the binary numbering system used in computer-based control. Covers components of PLCs, including power supplies, I/O modules, processor modules, types of communication bus, and memory.

Distributed Control Systems (17.5 Hours)
ISBN 978-0-13-609137-0
(Module ID 40410-09) Describes how DCS was developed by combining the technologies of single loop control, direct digital control, and supervisory control. Covers DCS hardware requirements, how control loops are implemented into a DCS, types of data transmission used in DCS, communication protocols, and human interfaces.