

Electrical Occupations

General Assessment Information

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Test Type: The Electrical Occupations industry-based credential is included in NOCTI's Job Ready assessment battery. Job Ready assessments measure technical skills at the occupational level and include items which gauge factual and theoretical knowledge. Job Ready assessments typically offer both a written and performance component and can be used at the secondary and post-secondary levels. Job Ready assessments can be delivered in an online or paper/pencil format.

Revision Team: The assessment content is based on input from secondary, post-secondary, and business/industry representatives from the states of Connecticut, Kentucky, Michigan, Pennsylvania, and Tennessee.



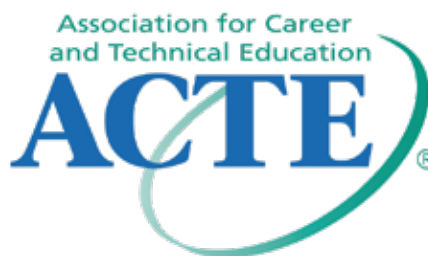
46.0399- Electrical and Power
Transmission Installers, Other



Career Cluster 2- Architecture
and Construction



47-2111.00- Electricians



The Association for Career and Technical Education (ACTE), the leading professional organization for career and technical educators, commends all students who participate in career and technical education programs and choose to validate their educational attainment through rigorous technical assessments. In taking this assessment you demonstrate to your school, your parents and guardians, your future employers and yourself that you understand the concepts and knowledge needed to succeed in the workplace. Good Luck!

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General Assessment Information (continued)



The Pennsylvania Builder's Association utilizes this assessment to assist in determining competencies for granting skill certificates to students graduating from Pennsylvania secondary trade programs that have been endorsed by the Pennsylvania Builder's Association (PBA)

PBA's services include support to workforce training and education by linking industry employers with educators to grow the workforce of tomorrow. PBA serves Pennsylvania communities and consumers through its steadfast efforts to protect homeownership rights and advocate for affordable housing options. PBA is affiliated with the National Association of Home Builders.



In the lower division
baccalaureate/associate degree
category, 3 semester hours in
Electrical Occupations

Written Assessment

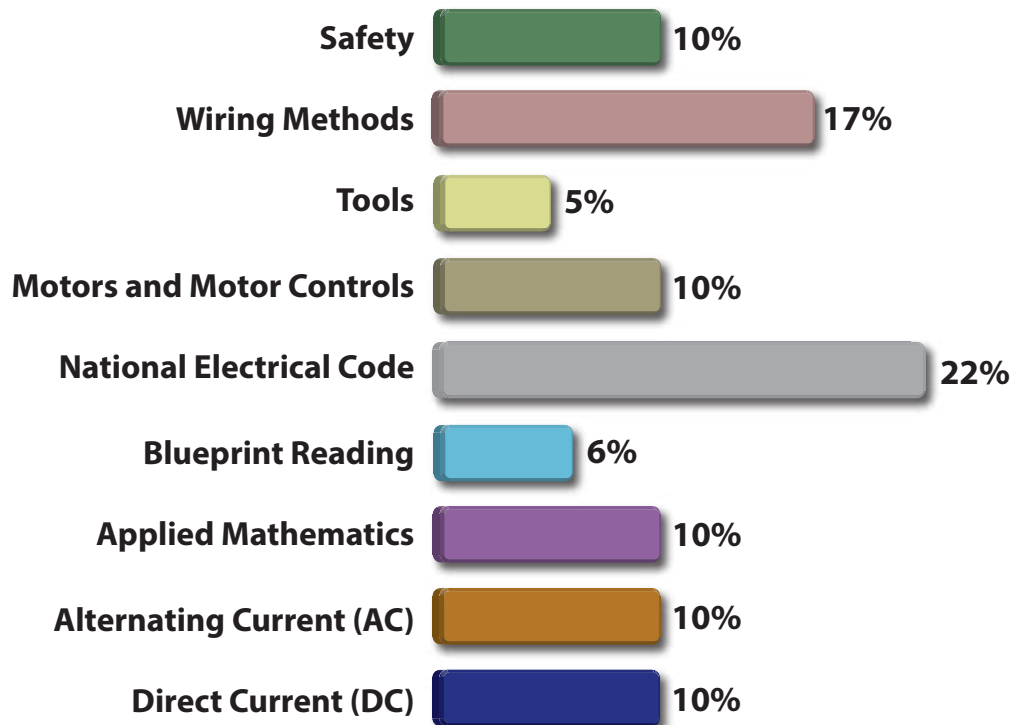
NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

Administration Time: 3 hours

Number of Questions: 171

Number of Sessions: This assessment may be administered in one, two, or three sessions.

Areas Covered



Specific Standards and Competencies Included in this Assessment

Safety

- Apply shop safety rules and ergonomics
- Explain fire prevention guidelines and methods
- Describe lock-out/tag-out procedures
- Describe procedures for responding to electrical hazards and shock emergencies
- Explain OSHA job site requirements
- Demonstrate the proper use of ladders, scaffolding, and fall protection

Wiring Methods

- Describe and demonstrate the proper installation and use of cable
- Describe and demonstrate the proper use of conduit and other raceways
- Install devices according to manufacturer's specifications and applicable codes
- Identify and select appropriate rough-in materials
- Select and install proper service entrance materials
- Display understanding of low-voltage wiring systems (doorbells, landscape, lighting systems)
- Identify and install communications cable applications
- Demonstrate proper grounding methods and concepts

Tools

- Identify and use hand and power tools
- Identify and use measuring devices and instruments

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Specific Standards and Competencies (continued)

Motors and Motor Controls

- Identify types of single-phase and three-phase AC motors
- Identify types of motor control circuits and components
- Describe the operation of a motor control circuit given a ladder diagram
- Identify overcurrent protection devices and their purposes
- Identify capacitors, relays, switches, and contacts

National Electrical Code

- Locate and reference the National Electrical Code (NEC)
- Identify minimum wire sizes according to NEC ampacity charts
- Identify NEC requirements for appliances and special circuits
- Cite physical layout requirements for receptacles in accordance with NEC
- Identify areas requiring GFCI protection
- Indicate clearances for services according to NEC
- Identify installation methods and types of grounding in accordance with NEC
- Explain NEC color coding pertaining to identification of conductors
- Identify areas requiring ARC fault protection
- Identify box sizing requirements

Blueprint Reading

- Interpret and use specifications, prints, drawings, diagrams, and scales
- Identify electrical and electronic symbols and drawing conventions
- Identify and draw a working circuit according to specifications



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Specific Standards and Competencies (continued)

Applied Mathematics

- Demonstrate knowledge of basic mathematical operations
- Perform calculations involving fractions, decimals, and percents
- Demonstrate knowledge of basic algebra and geometry
- Estimate the amount of materials required
- Calculate requirements from a given drawing using Ohm's/Watt's Law

Alternating Current (AC)

- Explain transformers and their functions
- Identify the characteristics of AC circuits
- Describe and calculate capacitance, reactance, impedance, current, voltage, and resistance
- Compare and contrast characteristics of AC and DC

Direct Current (DC)

- Identify the characteristics of DC circuits
- Identify resistor values based on color codes
- Describe and calculate resistance, current, voltage, and power
- Apply Ohm's Law



Sample Questions

On scaffolding, the toe-boards must be a minimum of _____ high.

- A. 1-1/2 inches
- B. 3-1/2 inches
- C. 5-1/2 inches
- D. 6-1/2 inches

A service drop to a building refers to a service that is

- A. underground
- B. overhead
- C. terminated
- D. disconnected

The insulation value of a motor's windings is tested with a/an

- A. megohmmeter
- B. voltmeter
- C. ammeter
- D. wattmeter

The start switch used to energize a magnetic contactor in a motor control is

- A. normally open
- B. normally closed
- C. a high voltage switch
- D. a low voltage switch

For small appliance circuits, the smallest size wire allowed is

- A. #10
- B. #12
- C. #14
- D. #16

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Sample Questions (continued)

Liquid tight flexible metal conduit may be used in

- A. extreme heat
- B. place of MC
- C. place of Romex®
- D. wet locations

The mechanical bonding wire of a service panel must be connected to the

- A. breaker
- B. neutral bus
- C. ground bar
- D. ground fault circuit interrupter

The term "overcurrent" refers to a motor control current in

- A. excess of normal or full-load operation
- B. a ceiling or attic
- C. volts or Ohms in Ohm's Law
- D. a ground fault

The branch circuit's _____ must be greater than the load.

- A. length
- B. conduit size
- C. ampere rating
- D. wire nuts

GFCI is required in residential bathrooms, kitchens, and

- A. hallways
- B. bedrooms
- C. attics
- D. garages

Performance Assessment

NOCTI performance assessments allow individuals to demonstrate their acquired skills by completing actual jobs using the tools, materials, machines, and equipment related to the technical area.

Administration Time: 3 hours and 25 minutes

Number of Jobs: 4

Areas Covered:

36% Install Cable from Meter Base to Service Entrance Panel

Participants will select proper tools, mount and install meter base, wire and install panel, install and attach SEU cable, bond the panel, and check the phases.

10% Install GFCI Circuit Breaker in Existing 100 AMP Panel

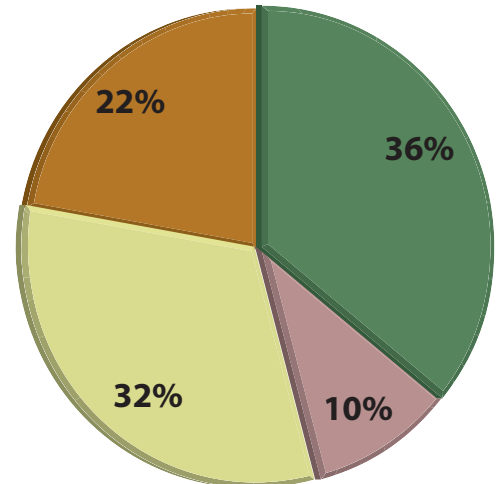
Participants will insert a GFCI circuit breaker.

32% Wire Lighting Control

Participants will select the correct tools, complete drawing, wire for three-way and four-way switches, identify the white wire and test the lighting control.

22% Install Door Chimes

Participants will complete drawing, select the correct tools, install and test door chimes, and verify the voltage.



Sample Job

Install GFCI Circuit Breaker in Existing 100 AMP Panel

Maximum Time: 15 minutes

Participant Activity: The participant will insert a 20 AMP single-pole GFCI circuit breaker in existing 100 AMP panel.

