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## Industrial Electricity

## General Assessment Information

### Blueprint Contents

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**Test Type:** The Industrial Electricity 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, New Jersey, North Carolina, Ohio, and Pennsylvania.



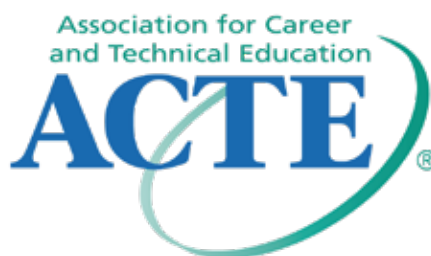
47.0105- Industry Electronics  
Technology/Technicians



Career Cluster 15-  
Science, Technology, Engineering,  
and Mathematics



49-2094.00- Electrical  
and Electronic Repairers



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)



**NATIONAL COLLEGE CREDIT RECOMMENDATION SERVICE**  
University of the State of New York - Regents Research Fund

In the lower division  
baccalaureate/associate degree  
category, 3 semester hours in  
Industrial Electricity

## Written Assessment

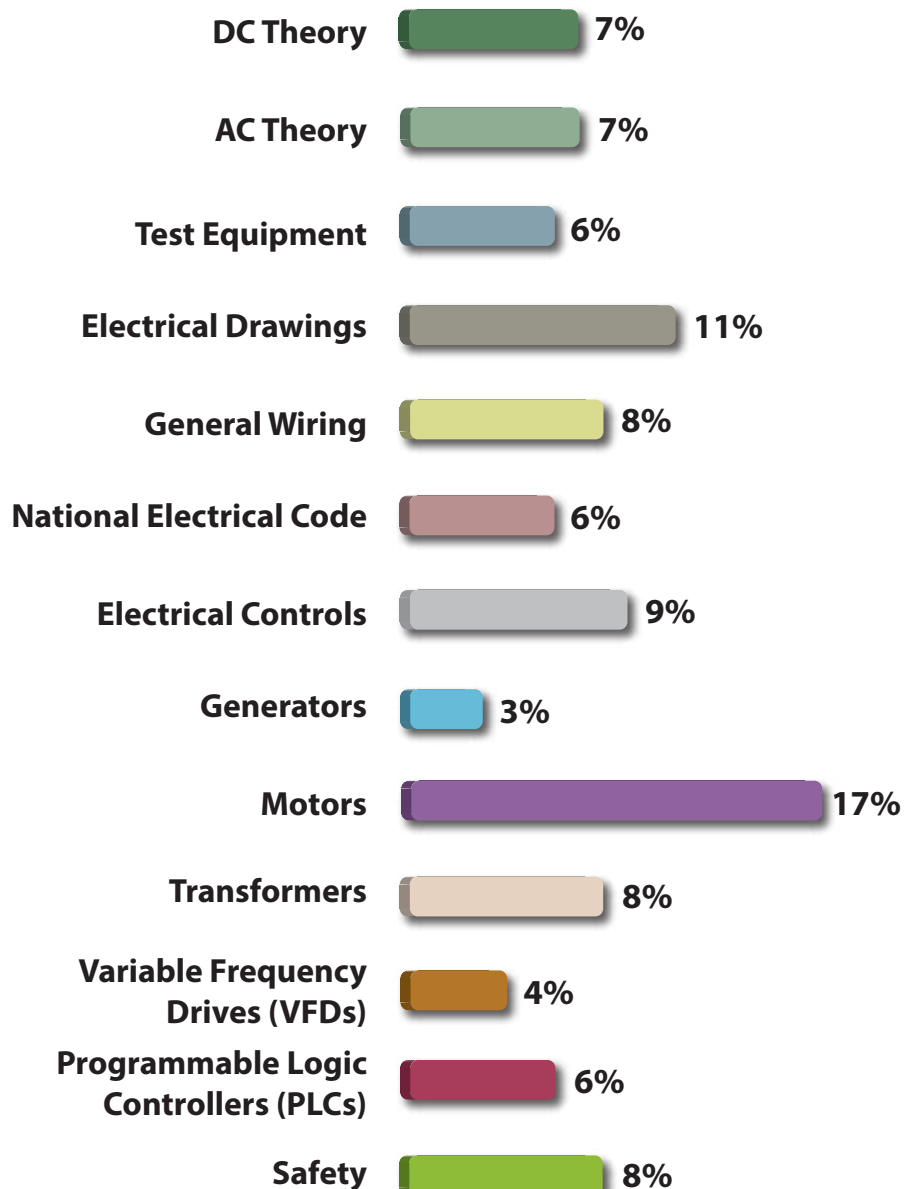
NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

**Administration Time:** 3 hours

**Number of Questions:** 191

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

### Areas Covered



## Specific Standards and Competencies Included in this Assessment

### DC Theory

- Demonstrate knowledge of principles of DC theory
- Apply Ohm's Law and Kirchoff's Law
- Solve series and parallel circuits
- Calculate power formulas

### AC Theory

- Calculate inductive reactance
- Calculate capacitive reactance
- Demonstrate knowledge of principles of AC theory
- Calculate waveforms and frequency

### Test Equipment

- Test circuits for opens and continuity
- Test circuits for voltage, current, and resistance
- Demonstrate proper care and use of test equipment

### Electrical Drawings

- Identify electrical symbols
- Interpret electrical wiring drawings
- Troubleshoot from electrical drawings

### General Wiring

- Select, measure, and cut conduit
- Ream, thread, and bend conduit
- Install boxes, fixtures, and hardware
- Select proper enclosures
- Identify and use electrical fittings



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## Specific Standards and Competencies (continued)

### National Electrical Code

- Define the purpose, intent, and jurisdiction of the NEC
- Identify proper conductor type and size
- Size pull boxes
- Demonstrate proper grounding and bonding procedures

### Electrical Controls

- Identify and connect switches, sensors, and relays
- Exhibit understanding of motor starters
- Understand principles of circuit protection

### Generators

- Determine the output of a generator
- Identify the internal components of a generator

### Motors

- Identify motor circuits
- Identify and define types of motors
- Identify and explain motor components
- Connect leads for operation
- Test for operation
- Troubleshoot and diagnose problems

### Transformers

- Identify types of transformers
- Identify leads and connections
- Calculate voltage
- Calculate amperage
- Calculate KVA capacity

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## Specific Standards and Competencies (continued)

### Variable Frequency Drives (VFDs)

- Demonstrate proper set up and installation
- Exhibit knowledge of basic programming
- Troubleshoot VFDs

### Programmable Logic Controllers (PLCs)

- Demonstrate proper set up and installation
- Exhibit knowledge of basic programming
- Troubleshoot PLCs

### Safety

- Exhibit basic knowledge of OSHA standards
- Identify appropriate personal protective equipment (PPE)
- Demonstrate knowledge of correct scaffolding and ladder procedures
- Demonstrate proper selection and use of hand and power tools



## Sample Questions

**Materials with a low resistance are called**

- A. insulators
- B. potential
- C. emf
- D. conductors

**Conductors at the junctions of switchpoints or outlets must have a minimum length of**

- A. 3 inches
- B. 6 inches
- C. 9 inches
- D. 12 inches

**Shaded-pole motors have \_\_\_\_\_ starting torque.**

- A. very high
- B. very low
- C. medium
- D. maximum

**The primary winding of a transformer is rated at 480V and 600 turns. If the secondary is rated at 120Vs, the secondary has \_\_\_\_\_ turns.**

- A. 150
- B. 400
- C. 1600
- D. 2400

**A \_\_\_\_\_ is a device used to safely remove cartridge fuses from electrical enclosures.**

- A. insulated side cutter
- B. pulling pliers
- C. insulated cartridge pliers
- D. fuse puller

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### Sample Questions (continued)

**One form of the equation for electrical power in a DC circuit is**

- A.  $P = I2E$
- B.  $E = P \div I$
- C.  $E = P \times I$
- D.  $R = P \div E$

**A generator**

- A. changes electrical energy to mechanical energy
- B. changes mechanical energy to electrical energy
- C. is always self-excited
- D. is always separately excited

**The direction of rotation of a shaded-pole motor is**

- A. clockwise
- B. counterclockwise
- C. from main pole to shaded pole
- D. from shaded pole to main pole

**Select the correct wiring configuration on a 120 VAC output card for a programmable logic controller (PLC).**

- A. L2 (N) to the card and L1 (H) to the field devices
- B. L1 (H) to the card and L2 (N) to the field devices
- C. L2 (N) to the card and ground to the field devices
- D. L1 (H) to the card and ground to the field devices

**A GFCI on a 120V circuit operates by sensing an imbalance of**

- A. voltage between hot and ground
- B. voltage between hot and neutral
- C. current between hot and ground
- D. current between hot and neutral

## 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 20 minutes

**Number of Jobs:** 4

### Areas Covered:

#### **14% Tools and Materials Identification**

Participants will identify tools and materials correctly, and write neatly and legibly on the identification form.

#### **27% Conduit Bending**

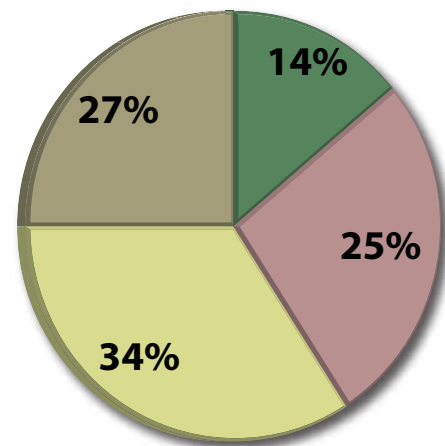
Participants will safely use the tools, ream and thread the conduit, and accurately measure lengths for a correct appearance of the conduit.

#### **34% Wiring a Motor Starter**

Participants will safely use the correct tools and conductors to label and number wires correctly, meet workmanship criteria, operate the motor and clean up the work area.

#### **25% Replacing Ballast in a Fluorescent Fixture**

Participants will safely use the correct tools to install a ballast, meet the criteria for professional work, and operate the fluorescent fixture.<sup>1</sup>



## Sample Job

### Replacing Ballast in a Fluorescent

**Maximum Time:** 20 minutes

**Participant Activity:** The participants will go to a designated station, remove and replace the ballast in the fluorescent fixture that is provided, test for operation, and notify the evaluator so that the work can be inspected.

