TEACHER ASSESSMENT BLUEPRINT

ELECTRICAL CONSTRUCTION TECHNOLOGY

Test Code: 5171
Version: 01

Specific Competencies and Skills Tested in this Assessment:

OSHA Regulations and Electrical Safety Practices
- Identify proper use of personal protective equipment (PPEs)
- Identify procedures for fire and environmental safety
- Define procedures for ladder safety
- Identify correct protocol for working on live circuits
- Explain the purpose of OSHA and how it relates to electrical construction

Meters, Measurements, Testing
- Identify characteristics and uses of meters and measuring devices
- Identify materials as insulators, conductors, and semi-conductors
- Explain connection and use of electrical test equipment
- Use formulas to determine current and voltage output
- Interpret and convert meter readings

Tools, Materials, and Components
- Identify and correctly use hand and power tools
- Select proper conductor cable size and type
- Identify types and characteristics of conduit
- Cut, ream, deburr, and bend conduit
- Identify boxes and fittings
- Identify the function and purpose of various specialty devices, including Ground Fault Circuit Interrupter (GFCI), Arc-Fault, and Transient Voltage Surge Suppressor (TVSS)

National Electric Code (NEC)
- Explain and apply Article 90 (Introduction) of the NEC
- Identify and explain NEC general applications
- Explain procedures involved in NEC wiring and protection regulations
- Cite NEC regulations relating to wiring methods and materials
- Identify and select equipment for general use according to NEC regulations
- Properly apply NEC tables and charts
Blueprints, Specifications, and Estimations
Identify and interpret electrical symbols
Identify and interpret wiring and schematic diagrams
Interpret and use specifications
Perform basic math calculations and conversions
Demonstrate planning and layout of a circuit

AC Theory and Magnetic Theory
Identify characteristics of AC circuits
Explain capacitance, impedance, current, voltage, and resistance
Explain the function and characteristics of rectifiers, inverters, and filters
Calculate power consumption, dissipation, and loss
Determine principles of magnetic theory

Motor Control Circuits, Logic Circuits, and Programmable Logic Controllers (PLCs)
Identify characteristics of various types of controls
Identify and interpret terms, abbreviations, acronyms, and symbols
Apply knowledge of signal and control systems
Install, test, and troubleshoot logic circuits
Understand programmable logic circuits (PLCs)
Create a motor control circuit diagram
Develop a logic control circuit

DC: Basic Electric and Electron Theories
Identify characteristics and components of DC circuits
Design a basic DC circuit
Explain the relationship of electricity, electrons, and atoms

Circuit Theorems and Conversions
Identify and apply various circuit theorems, including Ohm’s Law, Kirchoff’s Law, and Watt’s Law
Identify and apply various mathematical conversions, including scientific and engineering notations

Wiring, Circuits, and Installation
Select wiring appropriate for specific installations
Explain the correct applications of switched circuits
Install proper boxes, devices, and trim
Install rough-in wiring
Perform finish work
Wire switched outlets
Pull, splice, terminate, and connect wire
Test and troubleshoot completed installation
Identify basic service entrance requirements
Install fittings, connectors, and components


_Electrical Construction Technology (continued)_

**Transformers**
Identify primary and secondary windings
Calculate voltage and current for primary/secondary windings
Explain and calculate transformer efficiency
Determine KVA capacity and load

**Motors**
Describe characteristics of various types of motors
Distinguish between capacitor run and capacitor start
Wire a three-phase motor
Identify and connect motor connections
Install, test, and troubleshoot motors
Reverse motor rotation properly
Calculate motor efficiency
Select short-circuit and overload protection for specific purposes
Identify and interpret motor nameplate information
Electrical Construction Technology (continued)

Written Assessment:

Administration Time: 3 hours
Number of Questions: 193

Areas Covered:

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<tr>
<th>Percentage</th>
<th>Description</th>
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<tr>
<td>6%</td>
<td>OSHA Regulations and Electrical Safety Practices</td>
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<td>13%</td>
<td>Motors</td>
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Sample Questions:

Perform a/an _______ test of high voltage rated gloves before every use

A. air leakage
B. oil resistant
C. waterproof
D. heat resistant

A 240 volt circuit breaker requires ______ space(s) in a load center supplied by a 3-wire, 120-240 volt system.

A. 1
B. 2
C. 3
D. 4

The type and size of overcurrent protection may be found in the

A. panel board schedule
B. floor plans
C. lighting fixture schedule
D. cross-sectional views

The total resistance of three resistors in parallel with values of 5, 7.5, and 15 ohms is

A. 2.5 ohms
B. 6.5 ohms
C. 17.5 ohms
D. 27.5 ohms

A motor rated at 240 volts and 6.5 amps draws 1,170 watts at full load. Its power factor is

A. 0.50
B. 0.75
C. 0.80
D. 3.00
Performance Assessment:

Administration Time: 3 hours  
Number of Jobs: 2

Areas Covered:

- **75%**  
  **Switch Controls, Conduit Bending, and GFCI Receptacles**
  Draw product wiring diagram, select appropriate material, installation of boxes, wiring installation methods, installation of device, functionality, accuracy of measurement, proper bending and cutting techniques, installation of conductors, installation of GFCI, and safety/workmanship.

- **25%**  
  **Doorbell Circuit**
  Identify and select components, installation of components, functionality, and safety/workmanship.

Sample Job: Doorbell Circuit  
Maximum Job Time: 40 minutes

Participant Activity: The participant will select the appropriate materials for the job and follow a project plan to successfully install a functioning doorbell circuit according to electrical codes and specifications.