

Teacher Assessment Blueprint

Electronics Technology



Test Code: 5907 / Version: 01

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General Assessment Information

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Test Type: The Electronics Technology assessment is included in NOCTI's Teacher assessment battery. Teacher assessments measure an individual's technical knowledge and skills in a proctored proficiency examination format. These assessments are used in a large number of states as part of the teacher licensing and/or certification process, assessing competency in all aspects of a particular industry. NOCTI Teacher tests typically offer both a written and performance component that must be administered at a NOCTI-approved Area Test Center. Teacher assessments can be delivered in an online or paper/pencil format.

Revision Team: The assessment content is based on input from subject matter experts representing the following states: California, Connecticut, Kentucky, North Carolina, and Pennsylvania.



15.0303- Electrical, Electronic
and Communications
Engineering
Technology/Technician



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



17-3023.01- Electronics
Engineering Technicians



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
Electronics or General Technology.

Written Assessment

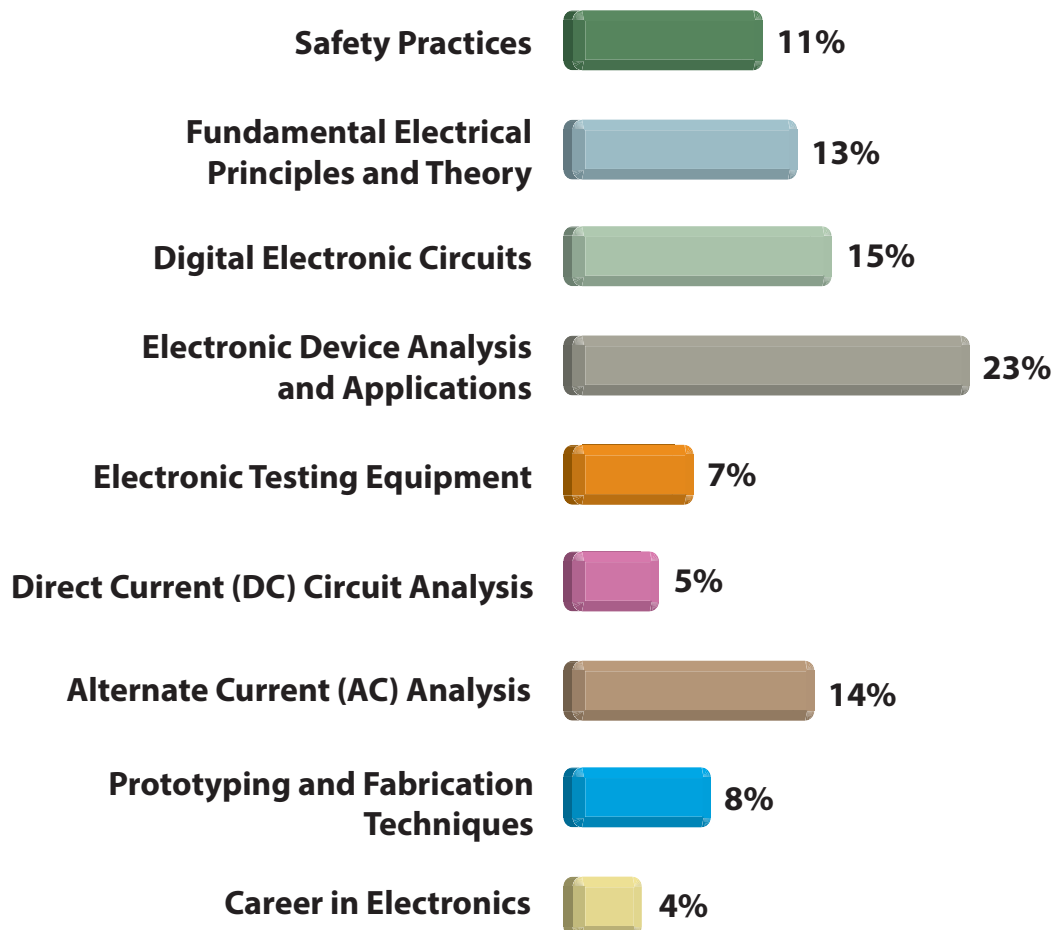
NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

Administration Time: 3 hours

Number of Questions: 151

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 Practices

- Demonstrate safe working procedures
- Explain the purpose of OSHA and how it promotes safety on the job
- Identify electrical hazards and how to avoid or minimize them in the workplace
- Explain safety issues concerning lockout/tagout procedures
- Safely discharge electronic equipment
- Explain the chemical and environmental hazards of electronics equipment

Fundamental Electrical Principles and Theory

- Explain basic electrical theory, including Ohm's law and Watt's law
- Describe magnetism and electromagnetism
- Identify schematic symbols
- Identify sources of electricity, including renewable sources
- Interpret color codes
- Describe conductors, resistors, and insulators
- Apply proper scientific and engineering notations

Digital Electronic Circuits

- Demonstrate knowledge of fundamental logic gates and functions
- Demonstrate knowledge of Boolean logic
- Demonstrate knowledge of sequential logic (flip flops)
- Demonstrate knowledge of digital circuitry
- Demonstrate knowledge of different number systems
- Convert between different number systems



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Specific Standards and Competencies (continued)

Electronic Device Analysis and Applications

- Identify diodes, rectifier, and power supply circuits
- Identify bipolar transistors and bipolar transistor circuits
- Demonstrate knowledge of Field Effect Transistors (FETs) and FET circuits
- Demonstrate knowledge of thyristors and control circuits
- Identify optoelectronic devices and light functions
- Identify Op-Amps, principles, and applications (including oscillators)
- Demonstrate knowledge of Electromagnetic Interference (EMI)
- Describe circuit protection methods
- Interpret a manufacturer's data sheet

Electronic Testing Equipment

- Identify, select, and demonstrate proper hand tool use
- Display knowledge and proper use of multimeters
- Display knowledge and proper use of oscilloscopes
- Display knowledge and proper use of function generators, frequency counters, testers, etc.

Direct Current (DC) Circuit Analysis

- Analyze and troubleshoot DC series circuits
- Analyze and troubleshoot DC parallel circuits
- Analyze and troubleshoot DC combination/complex circuits



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Specific Standards and Competencies (continued)

Alternate Current (AC) Analysis

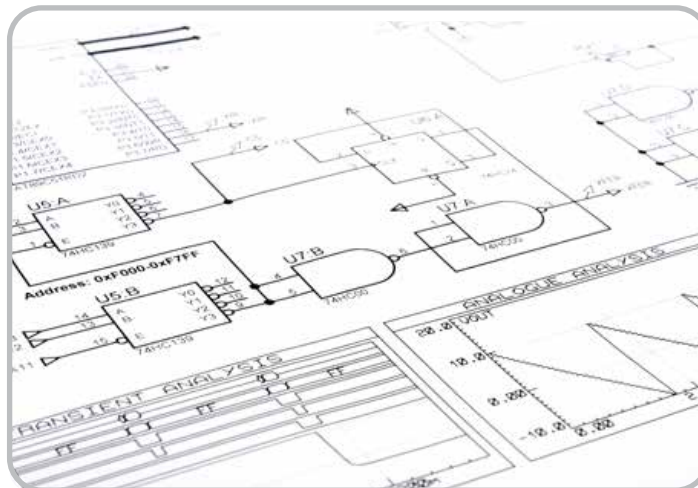
- Analyze AC circuits and waveforms
- Troubleshoot an AC circuit
- Demonstrate knowledge of inductance, capacitance, and resonance
- Explain current and voltage phase relationships
- Describe the operation of transformers, including troubleshooting

Prototyping and Fabrication Techniques

- Layout components on a printed circuit board according to a schematic
- Demonstrate knowledge of proper soldering and de-soldering techniques
- Repair or replace a component or foil on a printed circuit board
- Prototype electrical circuits using schematics and breadboards

Careers in Electronics

- Identify available careers in electronics technology (i.e., Nanotechnology, Industrial Automation, Biomedical Electronics, Robotics, etc.)
- Describe entry level requirements for various electronics technology careers



Sample Questions

To ensure that a capacitor has been fully discharged, the technician should

- A. notice the spark at the tip of the shorting probe
- B. check for residual voltage with a voltmeter
- C. re-energize the equipment to see if it works
- D. use a voltage sensor at the top of the capacitor

A battery produces electricity by

- A. thermo energy
- B. proton potential
- C. electron potential
- D. chemical reaction

An 8 bit DAC has a resolution of

- A. 8
- B. 80
- C. 255
- D. 1024

What does an FET do?

- A. makes the silicon on PCBs
- B. amplifies weak signals
- C. maintains a stable voltage
- D. works in parallel with a capacitor

The phase relationship between voltage and current in a purely resistive circuit is

- A. 0 degrees
- B. 90 degrees
- C. 180 degrees
- D. 270 degrees

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 15 minutes

Number of Jobs: 4

Areas Covered:

27% De-Soldering and Soldering

Safety glasses, selection of components, de-soldering, soldering (re-soldering), component identification, quality of soldering, work area clean up, and time to complete Job 1.

23% Power Supply Construction and Circuit Analysis

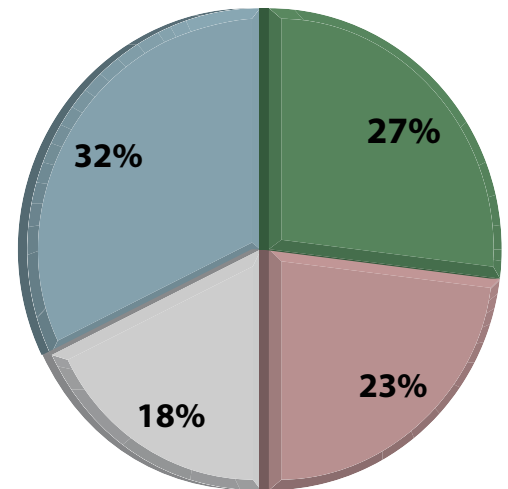
Safety glasses, selection of components, use of tools and equipment, quality of construction, circuit measurements, capacitors installed to X and Y, measure voltages for X and Y with DMM, and time to complete Job 2.

18% Op Amp Construction and Analysis

Safety glasses, selection of components, use of tools and equipment, measure output voltage with DMM, display input versus output on oscilloscope, gain measurement, and time to complete Job 3.

32% Design and Build a Combinational Logic Circuit

Develop Boolean expression from truth table, simplification of Boolean expression, draw the gate logic diagram, build/test the designed circuit, time to complete Task 1 of Job 4, time to complete Task 2 of Job 4, time to complete Task 3 of Job 4, and time to complete Task 4 of Job 4.



Sample Job

Power Supply Construction/Circuit Analysis

Maximum Time: 45 minutes

Participant Activity: The participant will refer to the diagram provided and build the circuit, choose proper components from the selection given, measure and record the full RMS Secondary Voltage, measure the DC voltage and record the correct polarity from X to the ground and from Y to the ground.

