

**Pre-Engineering/Engineering
Technology**

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Test Type: The Pre-Engineering/Engineering 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: Kentucky, New York, Pennsylvania, and Virginia.



15.9999- Engineering
Technologies/Technicians,
Other



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



17-3027.00- Mechanical
Engineering Technicians

Written Assessment

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

Administration Time: 3 hours

Number of Questions: 197

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

Areas Covered

Overview of Engineering  9%

Design Process/Problem Solving  11%

Manufacturing  12%

Assembly and Fabrication  5%

Materials  6%

Communication and Teamwork  11%

Safety  8%

Engineering Systems  38%

Specific Standards and Competencies Included in this Assessment

Overview of Engineering

- Describe major engineering fields
- Identify functions that an engineer performs
- Describe education required to be an engineer
- Identify ethics related to engineering situations
- Describe relationships between the engineer and other technical personnel
- Identify the progression of the engineering field

Design Process/Problem Solving

- Identify principles of the problem solving process
- Outline the steps in the design process
- Translate word problems into mathematical statements
- Analyze solutions, identifying strengths and weaknesses
- Develop details of a solution
- Develop, test, and redesign prototypes

Manufacturing

- Explain components of set up, machining, casting, molding, welding, and finishing
- Identify and use common hand tools
- Identify and properly use fasteners
- Estimate and measure the size of objects using SI and US units
- Explain the role of quality control in manufacturing
- Measure with precision tools and instruments



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Specific Standards and Competencies (continued)

Assembly and Fabrication

- Explain the role of quality control in assembly and fabrication
- Identify situations of supplying and outsourcing
- Identify the order and methodology of the assembly process

Materials

- Identify common materials
- Compare and contrast physical properties of materials
- Select correct materials for specific functions
- Test materials for specific characteristics

Communication and Teamwork

- Read and understand design documentation and technical manuals
- Write technical reports
- Make an oral presentation
- Interpret critical aspects and/or types of engineering drawings and plans
- Express data in tables, graphs, and charts
- Contribute to a team project

Safety

- Exhibit knowledge of appropriate personal safety procedures
- Describe the role of OSHA in the technical workplace
- Describe and use safety equipment
- Describe the function of safety devices

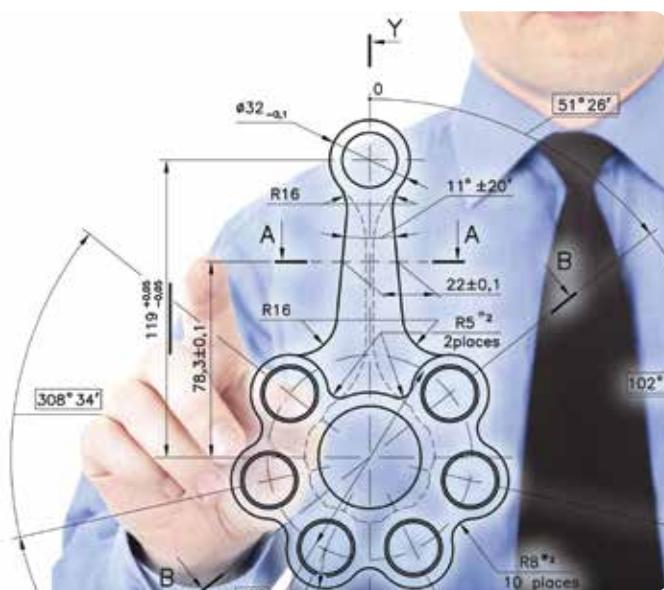


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Specific Standards and Competencies (continued)

Engineering Systems

- Solve problems using vectoring, predict resultant forces
- Demonstrate the effect of resistance
- Apply Ohm's Law, Watt's Law, and Kirchoff's Law
- Identify series, parallel, and combination circuits
- Apply knowledge of AC and DC systems
- Identify what causes resistance in a fluid system
- Apply knowledge of hydraulic and pneumatic systems
- Identify the three ways heat is transferred
- Explain the difference between Celsius and Fahrenheit scales
- Describe heat conductors and insulators
- Solve thermal problems using appropriate units
- Identify the six simple machines and their applications
- Solve problems using appropriate units in engineering systems
- Identify the uses and types of inductors and capacitors
- Use appropriate electrical units to solve problems
- Draw a circuit diagram and lay out the circuit
- Identify the difference between analog and digital signals
- Identify direction of heat flow given differences in temperature
- Understand the use of insulation to minimize heat flow
- Identify electrical components and their functions



Sample Questions

Which of the following is a method of prototype testing?

- A. destructive
- B. visualization
- C. brainstorming
- D. manufacturing

What is the approximate piston area for a 5-inch diameter cylinder?

- A. 3.93 square inches
- B. 15.7 square inches
- C. 19.6 square inches
- D. 78.5 square inches

A protractor can measure

- A. volume
- B. angles
- C. polygons
- D. area

Which of the following is a ferrous metal?

- A. aluminum
- B. copper
- C. magnesium
- D. mild steel

Winds blowing west at a speed of 10 to 15 mph are called

- A. scalars
- B. vectors
- C. directions
- D. magnitudes

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 30 minutes

Number of Jobs: 2

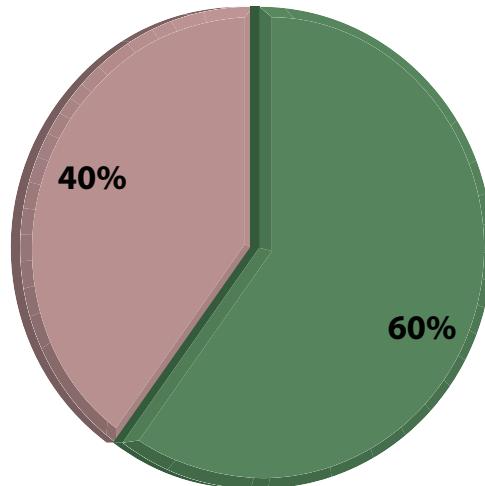
Areas Covered:

60% Technical Writing

Identify problem and/or need, evaluate alternatives, design a solution, test the solution, analyze results, draw conclusions, and format.

40% Oral Presentation

Presentation time, headings followed the technical report, number of slides, slide with chart, question/answer period, and overall presentation.



Sample Job

Oral Presentation

Maximum Time: 1 hour

Participant Activity: The participant will prepare and present an oral presentation on the previously prepared technical report.

