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# **Pre-Engineering/Engineering Technology**

## General Assessment Information

### Blueprint Contents

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**Test Type:** The Pre-Engineering/Engineering Technology 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 Florida, Idaho, Kentucky, Michigan, and Pennsylvania.



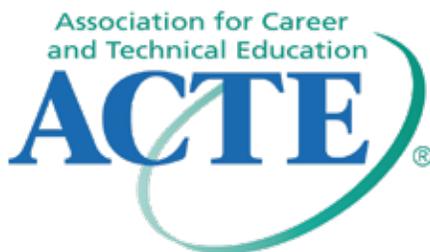
15.9999- Engineering  
Technologies/Technicians, Other



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



17-3027.00  
Mechanical Engineering Technicians



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!



In the lower division  
baccalaureate/associate degree category,  
3 semester hours in Introduction to  
Engineering, Engineering Technology or  
Introduction to Manufacturing  
Engineering Technology

## Written Assessment

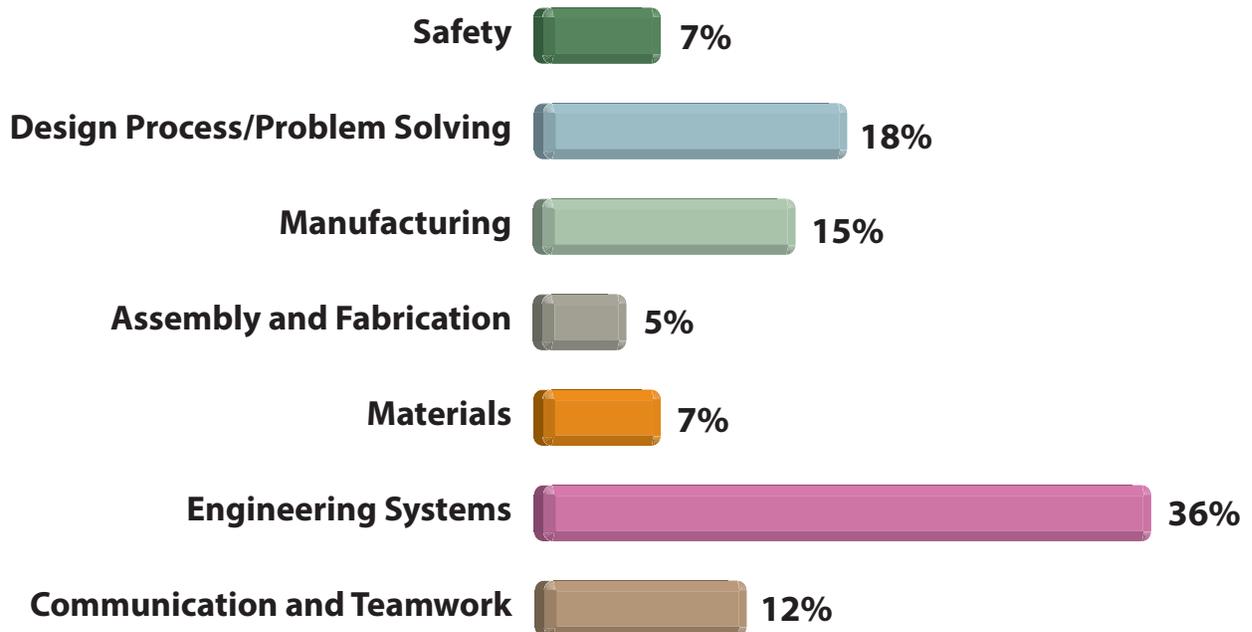
NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

**Administration Time:** 3 hours

**Number of Questions:** 175

**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**

- Exhibit knowledge of appropriate personal safety procedures
- Describe the role of OSHA in the technical workplace
- Describe the use of standard safety equipment
- Select the appropriate safety equipment

### **Design Process/Problem Solving**

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

### **Manufacturing**

- Identify common manufacturing operations (e.g., casting, molding, welding, finishing)
- Select appropriate hand tools for specific applications
- Select appropriate fasteners for specific applications
- Estimate and measure the size of objects using SI and US customary units
- Select appropriate measuring tools for specific applications
- Explain the role of quality control in manufacturing (e.g., tolerancing, datums, dimensioning)
- Distinguish between automated manufacturing control systems (e.g., PLCs, robotics, AGVs)

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## Specific Standards and Competencies (continued)

### Assembly and Fabrication

- Explain the role of quality control in assembly and fabrication
- Differentiate between insourcing 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



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## Specific Standards and Competencies (continued)

### Engineering Systems

- Solve problems using vectoring (e.g., predict resultant forces)
- Identify common forces that act on materials (e.g., torsion, shear, compression)
- Demonstrate the effect of electrical components within an electrical system
- Apply Ohm's Law, Watt's Law, and Kirchoff's Law
- Identify series, parallel, and combination circuits
- Apply knowledge of AC and DC systems
- Demonstrate the effect of resistance in a fluid system
- Apply knowledge of hydraulic, pneumatic, and mechanical systems
- Identify heat transfer methods
- Convert engineering measurements between different unit systems
- Compare/contrast conductors and insulators
- Solve thermal problems using appropriate units
- Determine appropriate uses of digital and analog systems

### Communication and Teamwork

- Read and understand design documentation and technical manuals
- Write technical reports
- Deliver an oral presentation
- Express data in tables, graphs, and charts



## Sample Questions

**Immediately report the malfunction of any piece of equipment to**

- A. other employees
- B. a safety engineer
- C. the supervisor
- D. OSHA

**One creative method of increasing the number of engineering design alternatives is**

- A. computer-aided design
- B. computer-aided manufacturing
- C. brainstorming
- D. optimizing

**Consensus is**

- A. agreeing on a proposed solution
- B. disagreeing on a proposed solution
- C. participating in the census
- D. reviewing the proposed solution

**The technician should use a \_\_\_\_\_ to cut a keyway in a shaft.**

- A. milling machine
- B. lathe
- C. surface grinder
- D. jig grinder

**The acronym, OEM, refers to**

- A. Only Electrical Manufacturers
- B. Original Equipment Manufacturer
- C. Operations Efficiency Monitoring
- D. Open Equipment Manufacturing

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### Sample Questions (continued)

**Forging is commonly performed on what type of materials?**

- A. hard woods
- B. heavy castings
- C. thermoplastics
- D. metals

**An electrical component referred to as a rheostat is a type of**

- A. variable capacitor
- B. heater
- C. variable resistor
- D. switch

**The flow through a control valve will increase with an increased**

- A. orifice or throat size
- B. fluid viscosity
- C. downstream pressure
- D. resistance

**The formula for force output of a hydraulic cylinder is**

- A. area divided by force
- B. 14.7 multiplied by area
- C. pressure multiplied by area
- D. pressure divided by area

**What is the first step in preparing a presentation?**

- A. Define the audience.
- B. Determine the objective.
- C. Plan a presentation strategy.
- D. Decide on the general form of the presentation.

## 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

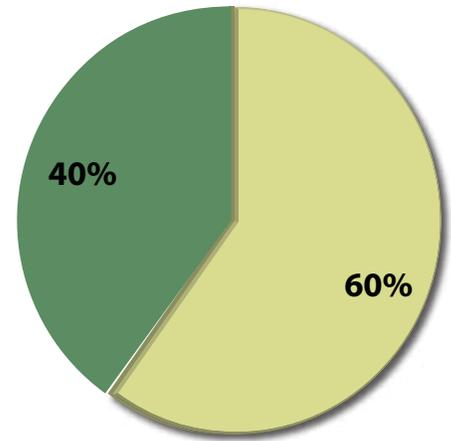
### Areas Covered:

#### 60% Technical Writing

Participant will identify a problem or need, evaluate alternatives, design a solution, test the solution, analyze the results, draw conclusions, and format the report correctly.

#### 40% Oral Presentation

Participant will give a presentation within the allotted time. Presentation will include: correct number of slides following the technical report, a slide with a chart or table, a question and answer period, and good overall presentation style.



## Sample Job

### Oral Presentation

**Maximum Time:** 1 hour

**Participant Activity:** Using presentation software, the participant will prepare and present a 5-minute oral presentation on the technical report previously prepared in Job 1 Technical Writing, including a specific number of slides, and one with a chart or table. The participant will host a question and answer period, and will display good presentation techniques throughout.

