Test Type: The Industrial Maintenance Mechanics assessment 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 Arizona, Kentucky, and Michigan.
Written Assessment

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

**Administration Time:** 3 hours  
**Number of Questions:** 169  
**Number of Sessions:** This assessment may be administered in one, two, or three sessions.

## Areas Covered

- **Machinery and Equipment**: 16%  
- **Tools and Safety**: 14%  
- **Electronics and Electrical Principles**: 13%  
- **Hydraulics and Pneumatics**: 14%  
- **Motors and Motor Controls**: 14%  
- **Mechanism Drives**: 10%  
- **Industrial Robotics Systems**: 8%  
- **Blueprints and Schematics**: 11%
Specific Competencies and Skills Tested in this Assessment

Machinery and Equipment
• Disassemble, repair, and reassemble machinery/equipment
• Maintain operating condition and perform preventive maintenance of the machinery/equipment
• Identify and troubleshoot component defects and malfunctions
• Test operation of newly repaired machinery/equipment
• Analyze test results, machine error messages, and information from operators in order to diagnose machinery/equipment problems
• Maintain record of repairs and maintenance performed

Tools and Safety
• Select and differentiate appropriate use of various hand tools
• Demonstrate appropriate care of hand tools
• Identify and safely use large machine tools, including lathes, mills, hoists, rigging equipment, and presses
• Identify safe use of ladders and scaffolding
• Demonstrate understanding of lock-out/tag-out procedures
• Exhibit understanding of shop safety

Electronics and Electrical Principles
• Apply basic electrical principles
• Demonstrate knowledge of basic CNC operations
• Demonstrate knowledge of basic programmable logic controllers (PLCs)
• Exhibit basic knowledge of electrical symbols

Hydraulics and Pneumatics
• Interpret basic hydraulic and pneumatic symbols
• Apply knowledge of hydraulic and pneumatic components
• Interpret hydraulic and pneumatic principles

(Continued on the following page)
Specific Competencies and Skills (continued)

Motors and Motor Controls
- Apply basic electrical principles of motors
- Interpret appropriate applications for types of motors (linear, servo, AC induction, DC motors, and transformers)
- Select appropriate applications for frequency drives
- Identify motor components

Mechanism Drives
- Apply principles of mechanisms
- Identify appropriate applications of various gears and drives
- Demonstrate knowledge of appropriate set-up procedures
- Apply principles of mechanics

Industrial Robotics Systems
- Interpret appropriate industrial robotic functions and applications
- Interpret basic robotic programming, including CADD
- Identify various industrial robotic design features

Blueprints and Schematics
- Interpret various lines
- Exhibit knowledge of legends
- Interpret blueprint and schematic components
- Interpret title block information
- Demonstrate knowledge of views, angles, and tolerances
Sample Questions

A flow meter measures
A. force per unit of area  
B. volume per unit of time  
C. the product of force and area  
D. the product of volume and time

The electrical component used for memory logic is the
A. control transformer  
B. closed pushbutton  
C. control relay  
D. circuit breaker

A body weighing 100 pounds is lifted 10 feet. What is its change in potential energy?
A. 10 pounds  
B. 1,000 pounds  
C. 10 foot pounds  
D. 1,000 foot pounds

The graphite connectors that ride against the motor commutator are called
A. brushes  
B. slip rings  
C. armatures  
D. fields

The zero point of a robot is considered the
A. first program step  
B. last program step  
C. origin of a coordinate system  
D. point of axis movement

(Continued on the following page)
Sample Questions (continued)

The operating area around a robot should be free of debris, water, and
A. light
B. oil
C. heat
D. electricity

The actuator size, speed, and _____ determine the pump size needed in a hydraulic circuit.
A. time
B. distance
C. load
D. maximum pressure

To reverse rotation on a single-phase capacitor-start motor, one would reverse the leads
A. on the capacitor
B. on the start-winding
C. at the power supply
D. on the field winding

What is the difference between encoders and tachometers?
A. Tachometers refer to positions and encoders refer to velocity.
B. Encoders refer to positions and tachometers refer to velocity.
C. Tachometers deal with feedback and encoders do not.
D. Tachometers deal with linear motion and encoders do not.

One of the basic rules when drawing ladder diagrams is
A. load devices are always placed at the left end of the line
B. only one input device should be shown on each line
C. only one output device should be shown on each line
D. input devices are never placed in series
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  
**Number of Jobs:** 4

**Areas Covered:**

20% **Connect and Operate a Circuit**  
Assemble pneumatic circuit, test functionality of automatic mode, adjust flow control, switch to manual mode, safety, and time to complete Job 1.

31% **Assemble a Multiple Shaft Gear Drive System**  
Mount and level motor, install and align flexible coupling, install and adjust gears, install prony brakes, start and run motor, record motor current, torque down prony brakes, record motor current rise, safety, and time to complete Job 2.

29% **Read and Interpret an Industrial Blueprint**  
Material use, surface finish, surface tolerance, identify “Line B”, include angle on taper, safety, and time to complete Job 3.

20% **Troubleshoot an Electrical Control System**  
Determine the malfunction, remove faulty fuse, replace fuse, start and run motor, safety, and time to complete Job 4.
Sample Job

Read and Interpret an Industrial Blueprint

**Maximum Time:** 30 minutes

**Participant Activity:** The participant will read the blueprint provided and properly record specifications.

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![Diagram of industrial blueprint](image-url)