

## ***Job-Specific Testing***

We offer access to over *150 different technical tests* that have been nationally validated to reflect entry level and experienced worker skills. These tests are carefully constructed by skilled technicians, career and technical educators, and test development specialists from across the nation. They are continually reviewed and updated to reflect new technologies, job titles, and National Standards.

Among other things, these tests can be used to:

1. Identify the skill level of job incumbents and pinpoint skill gaps.
2. Serve as one determinant in selecting candidates for a specific job or skill position (hiring or promotion).
3. Support job-certification programs for experienced workers.



**Tennessee Manufacturing Extension Program**

## ***Types of Assessments Offered***

### **Job Ready Assessments – Written Test Only**

Tool designed to support high quality educational and training programs based on industry standards.

### **Industrial Assessments – Written Test Only**

Designed for a specific industrial occupation. These assessments are available for use based on proper validation for your application.

### **Experienced Worker Assessments – Written & Practical (“Hands-on”) Job Tests**

Used for assessing professional and journey worker skills. These assessments are used for technical instructor certification and for experienced workers moving ahead in their field. Includes written and practical job test.

### **Customized Assessments**

Developed when the off-the-shelf assessments do not quite match specific needs.

## ***Certification of Test Validity***

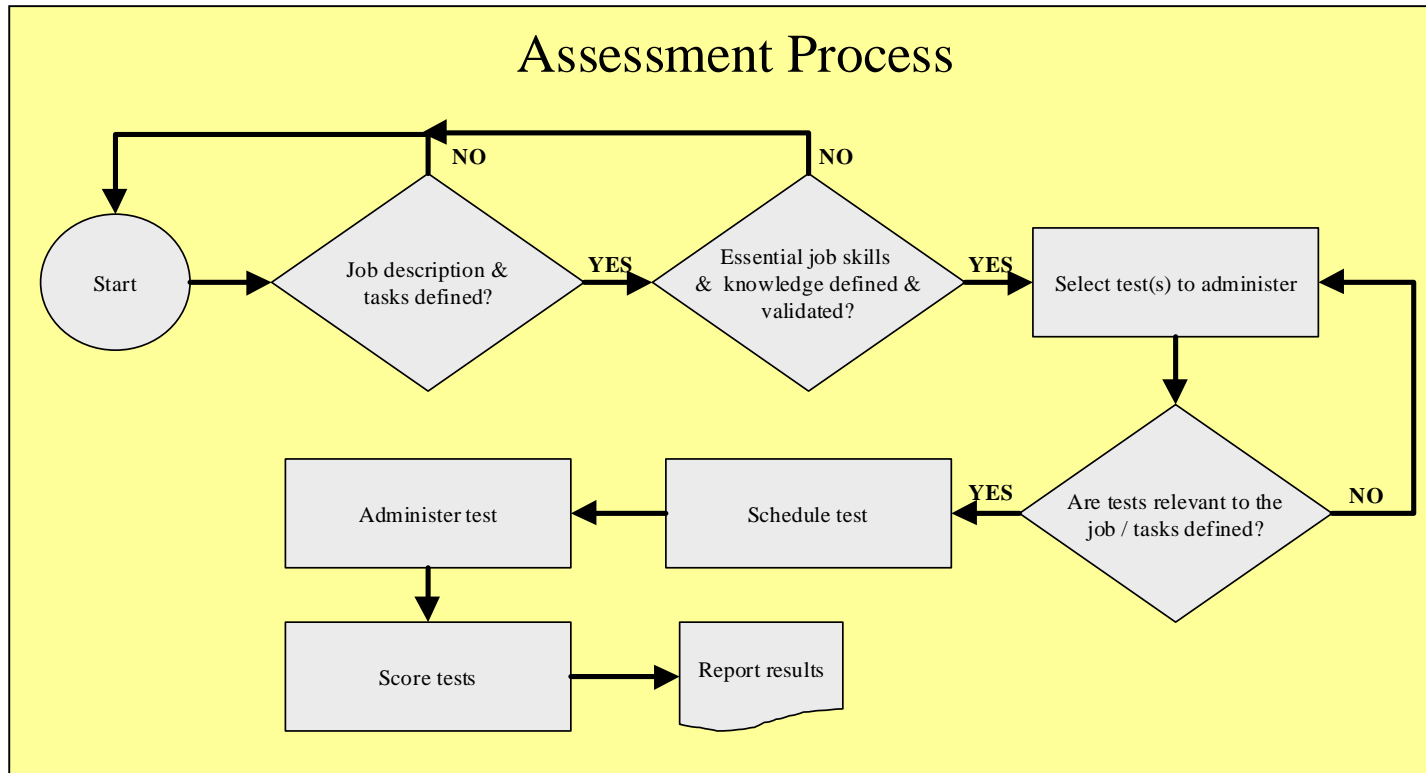
Before any test is administered:

1. Job title and job description (tasks) must be defined.
2. Content experts, practitioners, or incumbent workers must have identified the knowledge and skills essential to the job defined.
3. Content experts must have reviewed the test criteria and determined that the contents are relevant to the job and/or tasks defined.



## ***Written Test Scoring***

Participant records answers on scannable scoring card. Test results are reported within 48 – 72 hours. Scores reflect how each individual rates according to the norm for the specific test(s) administered.



*Written Assessment Administration*

Written assessments can be given to large numbers of participants in several occupational areas at one time. Detailed instructions are provided for efficient administration. Scannable answer sheets are provided for each participant. The only supplies needed for the written assessments are a good supply of soft-lead pencils with erasers, pencil sharpener, scrap paper, a clock or stopwatch, and a chalkboard for recording time and other information.

*Performance Assessment Administration*

Performance assessments are administered to small groups under close supervision. Detailed instructions are provided for efficient administration. Third party evaluators are recommended to ensure the validity of test results. Complete lists of necessary materials and supplies are provided.

**SAMPLE Industrial Assessments – INDUSTRIAL MAINTENANCE**

Designed for a specific industrial occupation. These assessments are available for use based on proper validation for your situation.

<p><b>Master Machine Repair Assessment</b> 0649</p> <p>4% Couplings 3% Centrifugal Pumps 16% Hydraulics 7% Fluid Power 8% Pneumatics 6% Control 12% Motor Controls 9% Symbols 6% Transformer and Lighting 6% Alternating Current 9% Direct Current 10% Programmable Controller 4% National Electric Code</p>	<p><b>Machine Repair Assessment</b> 0640</p> <p>70% Industrial Maintenance 3% Basic Terms of Maintenance 11% Ball Bearings 12% Machine Tool Practices 4% Lubrication Techniques</p>	<p><b>Maintenance Mechanic Assessment</b> 0658</p> <p>12% Install Equipment 8% Fabricate Material 14% Perform Preventative Maintenance 8% Repair Piping and Ductwork 16% Repair Equipment 8% Changeover Production Line 8% Weld Materials 6% Perform Miscellaneous Jobs 6% Calculations 12% Safety</p>	<p><b>Maintenance Mechanic Assessment</b> 0662</p> <p>13% Maintain Miscellaneous Pumps 13% Maintain Electrical Systems 11% Fabricate 16% Perform Miscellaneous Duties 8% Maintain/Install Piping Systems 13% Maintain Hydraulic/Pneumatic/ Vacuum Systems 8% Maintain Instrumentation Systems 13% Maintain Drive/Conveyor Systems 5% Maintain Heating/Cooling Systems</p>
<p><b>SAMPLE QUESTIONS</b></p> <p>1. The seal in a centrifugal pump may be necessary to prevent A. fluid from leaking out around the shaft. B. fluid from leaking out around the flange. C. air from leaking into the pump. D. both A and C.</p> <p>2. Which of the following pump types does not have a variable displacement feature? A. gear type B. vane type C. piston type D. none of the above.</p> <p>3. Whenever you are replacing a solenoid, you should A. be certain that the spool in the valve is shifting freely. B. wait until the fluid in the system has cooled to the normal operating temperature before testing. C. watch the indicator lights to be certain that the solenoid is shifting in the valve properly. D. check the resistance of the coil with a meter to be certain that the problem is not in the system's wiring.</p> <p>4. The valve type that should be used to control a single-acting cylinder is A. a two-way. B. a three-way. C. a four-way. D. any of the above.</p>	<p><b>SAMPLE QUESTIONS</b></p> <p>1. The use of what type of wrench is the greatest cause of mutilated nuts and bolt heads? A. socket B. adjustable C. box-end D. open-end</p> <p>2. Wise action on your part when troubleshooting non-functioning machine tools would be to A. take voltmeter readings. B. examine all electrical connections. C. push the reset button and await results. D. carefully examine parts as you dismantle.</p> <p>3. Scraping is the operation that causes a metal chip to be A. peeled off. B. pushed off. C. chipped off. D. rubbed off.</p> <p>4. Most pressure gauges used in hydraulic work are calibrated to measure liquid pressure and disregard atmospheric pressure. This relative reading is known as A. hydraulic pressure. B. gauge pressure. C. system pressure. D. none of the above.</p>	<p><b>SAMPLE QUESTIONS</b></p> <p>1. The most accurate method of centering or aligning a work piece in a four-jaw independent lathe chuck is with a A. dial indicator. B. combination square. C. vernier caliper. D. micrometer.</p> <p>2. In the fabrication of a ladder, you would need to know the A. height and length. B. type of materials. C. layout of ladder and steps. D. all of the above.</p> <p>3. The three main causes of pump failure are contamination, lack of lubrication and A. hot bearings. B. cavitation damage. C. misalignment. D. leaking seals.</p> <p>4. When a broken tap is removed from a job with a chisel or punch A. grind the tool to a sharp point. B. use a small hammer. C. wear goggles. D. use a lead hammer.</p>	<p><b>SAMPLE QUESTIONS</b></p> <p>1. What is the procedure for parallel alignment of coupling? A. Straight edge across the two coupler flanges at two points 90° apart. B. Straight edge across the two coupler flanges at four points 90° apart. C. Straight edge across the two coupler flanges rotate and check at four points. D. Straight edge "on center" of flanges.</p> <p>2. When a regulator is attached to a fully charged cylinder of oxygen, the tank cylinder valve should be opened very slowly to prevent A. damage to the safety pressure release valve. B. a loss of oxygen in case of a leak at the connections. C. damage to the regulator from the sudden high pressure. D. dirt from entering the regulator suddenly.</p> <p>3. An electrical fire should be extinguished with a A. blanket. B. soda acid fire extinguisher. C. CO2 fire extinguisher. D. fire hose.</p> <p>4. A globe valve may be used as a flow- control valve because A. it will flow in one direction only. B. it may be operated partially open. C. its stem does not rise when it is opened. D. either side may be used as the pressure side</p>

**SAMPLE Industrial Assessments INDUSTRIAL MAINTENANCE (cont'd)**

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<p><b>Maintenance Mechanic Assessment</b> 0657</p>	<p><b>Industrial Mechanical Maintenance Assessment</b> 0664</p>	<p><b>Maintenance Technician Assessment</b> 0637</p>
<p>2% Basic Terms of Maintenance 5% Bearings, Maintaining Bearings and Lubrication Techniques 5% Brakes, Clutches and Maintaining Brakes &amp; Clutches 17% Industrial Maintenance Pumps 6% Pumps and Maintaining Pumps 6% Couplings and Motors 4% Mechanical Drive Components 3% Pipefitting and Steam 9% Pneumatics 24% Hydraulics 3% Maintaining V-belts 9% Measurements, machine Tool and Machine Tool Practices 7% Industrial Maintenance Safety</p>	<p>7% Safety 20% Inspection and Diagnosis 10% Welding and Burning 20% Power Transmission 10% Hydraulics 11% Fluid Mechanics 5% Steam and Plumbing 12% Pumps and Compressors 5% Lubrication</p>	<p>6% New Equipment Installation 19% Processing Equipment Maintenance 8% Refrigeration Systems Maintenance 8% Equipment and Parts Fabrication 10% Physical Plant Systems Maintenance 20% Packaging Equipment Maintenance 8% Building and Facilities Maintenance 10% Preventative Maintenance 11% Basic Electricity/Electronics</p>
<p>SAMPLE QUESTIONS</p> <ol style="list-style-type: none"> <li>Thrusts loads are _____ to a shaft.                     <ol style="list-style-type: none"> <li>at a right angle</li> <li>at 30°</li> <li>parallel</li> <li>usually damaging.</li> </ol> </li> <li>Copper tubing can be best cleaned by using                     <ol style="list-style-type: none"> <li>a file.</li> <li>sandpaper.</li> <li>acid.</li> <li>steel wool.</li> </ol> </li> <li>The "formula" for a 45° offset is                     <ol style="list-style-type: none"> <li>1.013.</li> <li>1.406.</li> <li>1.414.</li> <li>3.140.</li> </ol> </li> <li>How many positions does a spring- centered valve have?                     <ol style="list-style-type: none"> <li>one</li> <li>two</li> <li>three</li> <li>four</li> </ol> </li> <li>If you want to check the run out of a shaft, the best tool to use would be                     <ol style="list-style-type: none"> <li>Jo blocks.</li> <li>a micrometer.</li> <li>a vernier caliper.</li> <li>an indicator.</li> </ol> </li> </ol>	<p>SAMPLE QUESTIONS</p> <ol style="list-style-type: none"> <li>Rack and pinion are employed when it is necessary to change                     <ol style="list-style-type: none"> <li>variable speed to constant speed.</li> <li>circular motion to linear motion.</li> <li>circular motion to cam motion.</li> <li>cam motion to circular motion.</li> </ol> </li> <li>The size of a coated electrode is determined by the                     <ol style="list-style-type: none"> <li>overall diameter.</li> <li>ampere setting.</li> <li>core diameter.</li> <li>A.W.S. classification of electrodes.</li> </ol> </li> <li>If possible, lubricate a bearing while it is                     <ol style="list-style-type: none"> <li>at rest; then tighten down on the grease plug to maintain internal pressure.</li> <li>at rest; then remove the grease plug to relieve internal pressure.</li> <li>in operation; then tighten down on the grease plug to maintain internal pressure.</li> <li>in operation; then remove the grease plug to relieve internal pressure.</li> </ol> </li> <li>The function of a pressure relief valve is to                     <ol style="list-style-type: none"> <li>unload the pump.</li> <li>divert the flow to the tank.</li> <li>all of the above.</li> <li>none of the above.</li> </ol> </li> <li>Tension on reverse air dust collector bags is controlled by what?                     <ol style="list-style-type: none"> <li>adjustable tube sheets</li> <li>pneumatic cylinders</li> <li>mechanical tensioners</li> <li>hydraulic cylinders</li> </ol> </li> </ol>	<p>SAMPLE QUESTIONS</p> <ol style="list-style-type: none"> <li>All reversing starters are equipped with some form of interlocking protection in order to                     <ol style="list-style-type: none"> <li>keep the cover locked securely.</li> <li>prevent the heaters from burning out.</li> <li>prevent both coils from energizing at the same time.</li> <li>prevent potential accident hazard.</li> </ol> </li> <li>Superheat is added to a refrigerant                     <ol style="list-style-type: none"> <li>during its change of state.</li> <li>at the point of latent heat of fusion.</li> <li>after all liquid has changed to a vapor.</li> <li>after condensation.</li> </ol> </li> <li>When clamping work on a milling table, the best setup results if the                     <ol style="list-style-type: none"> <li>bolt is closer to the work than the step block.</li> <li>bolt is closer to the step block than to the work.</li> <li>bolt is the same distance from the work and step block.</li> <li>clamps are in an angular plane resulting in greater clamping pressure.</li> </ol> </li> <li>Which of the parts listed below must be sufficiently heated before the pilot flame will continue to burn on a gas hot water heater?                     <ol style="list-style-type: none"> <li>thermostat</li> <li>pilot tube</li> <li>thermocouple</li> <li>burner pipe</li> </ol> </li> <li>The purpose of grounding electrical circuits is to                     <ol style="list-style-type: none"> <li>protect equipment from damage.</li> <li>protect the building from lightening.</li> <li>carry the unbalanced load.</li> <li>lower circuit potential to ground.</li> </ol> </li> </ol>

**SAMPLE Industrial Assessments INDUSTRIAL MAINTENANCE (cont'd)**

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<p><b>Maintenance Technician Assessment</b> 0481</p> <p>16% Oxy-Acetylene Welding 4% General Knowledge/Safety (Welding) 14% Pipefitting/Installation 10% General Knowledge/Safety (Pipefitting) 4% Hydraulics - Actuators 3% Hydraulics - Pumps/Accumulators 7% Hydraulic Valves 12% Hydraulic Systems/Theory 8% Instrumentation - Sensors/Transducers 6% Instrumentation - Process Controller 3% Instrumentation Theory 7% Air Conditioning Theory and Controls 6% Air Conditioning Servicing</p>	<p><b>Maintenance Technician Assessment</b> 0480</p> <p>13% Maintain Miscellaneous Pumps 13% Maintain Electrical Systems 11% Fabricate 16% Perform Miscellaneous Duties 8% Maintain/Install Piping Systems 13% Maintain Hydraulic/Pneumatic/Vacuum Systems 8% Maintain Instrumentation Systems 13% Maintain Drive/Conveyor Systems 5% Maintain Heating/Cooling Systems</p>	<p><b>MECHANICAL AND FLUID POWER MAINTENANCE</b> 0648</p> <p>52% Industrial Mechanics 23% Pneumatics 30% Hydraulics 11% Machine Tool Practices 4% Measurements and Machine Tools 19% Mechanical Drive Components 11% Welding</p>
<p>SAMPLE QUESTIONS</p> <p>1. To insure proper installation of plastic pipe after glue is applied, A. insert pipe into fitting and hold. B. insert pipe into fitting and turn ¼ turn. C. allow glue to set first and then insert pipe into fitting. D. insert pipe into fitting and then reglue the outside of pipe and fitting.</p> <p>2. Safetywise, the worst thing to do when repacking a high pressure valve is A. not removing old packing. B. repacking under pressure. C. repacking with wrong material. D. over tightening the packing.</p> <p>3. A double-acting hydraulic cylinder A. exerts force in two directions at once. B. can exert force in either direction. C. exerts force only in one direction. D. has a spring return.</p> <p>4. In troubleshooting a hydraulic circuit with a noisy pump, which of the following is not a likely cause of the trouble? A. air entering pump inlet B. misalignment of pump and drive unit C. pressure relief valve set too low D. dirty inlet strainer</p> <p>5. The temperature range of a transmitter is 0-200 degrees. The output signal range is 3-15 psig. What would be the expected output signal for an input temperature of 150 degrees? A. 6 psig B. 9 psig C. 11.25 psig D. 12 psig</p>	<p>SAMPLE QUESTIONS</p> <p>1. What is the procedure for parallel alignment of coupling? A. Straight edge across the two coupler flanges at two points 90° apart. B. Straight edge across the two coupler flanges at four points 90° apart. C. Straight edge across the two coupler flanges rotate and check at four points. D. Straight edge "on center" of flanges.</p> <p>2. The magnet that turns inside the motor is the A. rotor. B. stator. C. coil. D. bell.</p> <p>3. When a regulator is attached to a fully charged cylinder of oxygen, the tank cylinder valve should be opened very slowly to prevent A. damage to the safety pressure release valve. B. a loss of oxygen in case of a leak at the connections. C. damage to the regulator from the sudden high pressure. D. dirt from entering the regulator suddenly.</p> <p>4. An electrical fire should be extinguished with a A. blanket. B. soda acid fire extinguisher. C. CO2 fire extinguisher. D. fire hose.</p> <p>5. A globe valve may be used as a flow- control valve because A. it will flow in one direction only. B. it may be operated partially open. C. its stem does not rise when it is opened. D. either side may be used as the pressure side.</p>	<p>SAMPLE QUESTIONS</p> <p>1. When using a nut, blot, flat washer and lock washer in assembly work, where should the lock washer be positioned? A. next to the head of the bolt B. between the flat washer and the part C. between the nut and the flat washer D. the position of the lock washer is irrelevant.</p> <p>2. Roller chain couplings are usually lubricated with A. a light grease. B. a heavy oil. C. a heavy grease. D. a light oil.</p> <p>3. The purpose of a counterbalance valve is which of the following? A. to maintain control of a vertical cylinder to prevent it from descending due to gravity B. to balance the pressure in two parts of a system C. to balance the flow rates D. none of the above</p> <p>4. A hydraulic directional control valve A. conditions fluid. B. cools fluid. C. starts, stops, or changes direction of fluid. D. drains fluid.</p> <p>5. The maximum allowable gap between the face of the wheel and the tool rest on a pedestal grinder is A. 1/8". B. 1/16". C. 1/32". D. 1/4".</p>

**SAMPLE Industrial Assessments INDUSTRIAL ELECTRICAL/ELECTRONICS**

*Designed for a specific industrial occupation. These assessments are available for use based on proper validation for your situation.*

<p><b>Industrial Electrical/Electronics Maintenance Assessment 0634</b></p> <p>3% General Trade Information 23% Electrical 15% Reading Diagrams and Calculations 3% Motors and Generators 4% Wiring - Controls 3% Lighting 5% Symbols and Digital 3% Microprocessors/Systems 20% Programmable Logic Controls 13% Basic Electronics - Level I 6% Basic Electronics - Level II</p>	<p><b>Industrial Electrical/Electronics Assessment 0633</b></p> <p>10% Basic Electrical 6% D.C. Circuits/Calculations 6% A.C. Circuits/Calculations 6% D.C. Machines 6% A.C. Machines/Polyphase Circuits 6% National Electric Code 14% Motor Control/Symbol 6% Digital 6% Microprocessors/Systems 6% Electronic Components 6% Instruments 6% Analysis 6% Troubleshooting 4% Transformers and Lighting 6% Programmable Controller</p>	<p><b>Industrial Instrumentation and Electrician Technician 0650</b></p> <p>20% Maintain Motor Controls 15% Maintain Motors 15% Maintain Instruments 5% Maintain Systems 5% Repair DCS Equipment 15% Repair Miscellaneous Equipment 14% Perform Miscellaneous Duties 5% Safety 6% Blueprints/Schematics</p>
<p>SAMPLE QUESTIONS</p> <p>1. The proper way to check for a good ground in a power tool is between A. the front and rear areas of the case. B. either the hot or the neutral prong of the plug and the ground wire prong. C. the hot and neutral prong of the plug. D. the case and the ground wire prong.</p> <p>2. All starters are basically rated in A. ohms. B. volts. C. frequency. D. horsepower.</p> <p>3. In order to reverse the direction of a split-phase motor, it is necessary to A. interchange the line leads. B. reverse the connections to both the starting and running windings. C. reverse the wires to the capacitor. D. reverse the connections to the starting winding.</p> <p>4. What type of switch circuit is indicated by an OR gate? A. parallel B. series parallel C. parallel series D. series</p> <p>5. Which of the following is usually a symptom of a logic fault in a PC managed system? A. Lights on the controller indicate that it is not completing a scan. B. A partial, rather than a complete, system has failed. C. Proper power flow indicated on a programming device. D. Only choices A and B are correct.</p>	<p>SAMPLE QUESTIONS</p> <p>1. A Rheostat, a type of variable resistor, is normally used to control electrical A. pressure. B. power. C. current. D. frequency.</p> <p>2. When working with capacitors, the first thing to do to them is to see that they are A. wiped clean. B. discharged. C. disconnected. D. charged.</p> <p>3. The speed of a wound-rotor motor may be increased by A. reducing the resistance in the secondary circuit. B. reducing the resistance in the primary circuit. C. inserting resistance in the primary circuit. D. inserting resistance in the secondary circuit.</p> <p>4. Ambient temperature is the A. air temperature where a piece of equipment is located. B. temperature of the windings in the motor. C. temperature of the air inside the controller. D. temperature of the wires feeding the motor.</p> <p>5. The number of bits necessary to represent the binary equivalent of the decimal number 62 is A. 2. B. 6. C. 7. D. 8.</p>	<p>SAMPLE QUESTIONS</p> <p>1. The only safe, reliable way to lock out a motor is by A. tagging every operator station in the "off" position. B. locking out the local ON-OFF switch. C. deactivating the control circuit. D. interrupting the circuit at the motor disconnect.</p> <p>2. Instead of using a permanent magnet to generate the stationary magnetic field, most motors use A. an electro-magnetic capacitor. B. a transformer. C. field coils. D. a battery.</p> <p>3. Pneumatic signals can be converted to electronic signals using a A. ct. B. amp meter. C. p/i converter. D. square root extractor.</p> <p>4. Select a device you would use to determine hydraulic pressure A. pressure gauge. B. hydraulic flowmeter. C. multimeter. D. flowmeter.</p> <p>5. The purpose of conforming to the National Electric Code in wiring is to A. provide better lighting. B. insure a smaller light bill. C. make your electric motors run better. D. insure safety in your electrical system.</p>

**SAMPLE Experienced Worker Assessments**

Experienced Worker assessments are used for assessing professional and journey worker skills. Includes both written and performance testing.

<p><b>Experienced Worker:</b>  <b>Industrial Electrician Assessment</b>                  0214</p> <p><u>Written Assessment</u>                  17% Basic Theory                  15% D.C. Circuits/Calculations                  12% A.C. Circuits/Calculations                  14% D.C. Machines                  13% A.C. Machines/Polyphase Circuits                  15% N.E.C. Code                  9% Motor Control/Symbols                  5% Motor Controls                  (190 test items)</p> <p><u>Performance Assessment</u>                  19% MAGNETIC MOTOR CONTROL CIRCUITS                  Install a control system which may include job/run, pilot lights, limit switches, relays, timers, sequence control, etc. Install and wire according to N.E.C. standards.</p> <p>26.5% BENDING RIGID CONDUIT                  Cut, bend, thread and install rigid metal conduit.</p> <p>26.5% BENDING ELECTRICAL METALLIC TUBING (E.M.T.)                  Cut and bend E.M.T. to various shapes and specific dimensions.</p> <p>14% TROUBLESHOOTING CONTROLS                  Troubleshoot problems in a motor control circuit.</p> <p>14% DIGITAL CIRCUIT                  Connect circuit components following a given diagram. The circuit will be energized and tested.</p> <p>(Administration time: 4 hours; Number of jobs: 5)</p>	<p>SAMPLE QUESTIONS</p> <ol style="list-style-type: none"> <li>1. Concerning transformers in general, which statement is true?                         <ol style="list-style-type: none"> <li>a.The secondary is the low voltage winding.</li> <li>b.The primary is the high voltage winding.</li> <li>c.The primary is connected to the load.</li> <li>d.The secondary is connected to the load.</li> </ol> </li>   <li>2. When using a 3 wire control circuit to control a magnetic motor starter, the part that will open the control circuit when an overload occurs is/are the                         <ol style="list-style-type: none"> <li>a.motor starter auxiliary contact.</li> <li>b.motor starter power contacts.</li> <li>c.overload relay heater element.</li> <li>d.overload relay switch.</li> </ol> </li>   <li>3. A _____ location is a location in which ignitable concentrations of flammable gases can exist under normal operating conditions.                         <ol style="list-style-type: none"> <li>a.Class I, Division I</li> <li>b.Class I, Division II</li> <li>c.Class II, Division I</li> <li>d.Class II, Division II</li> </ol> </li>   <li>4. Which of the following aids in releasing the armature of a relay when voltage is disconnected?                         <ol style="list-style-type: none"> <li>a.magnet assembly</li> <li>b.air gap</li> <li>c.shading coil</li> <li>d.bell crank</li> </ol> </li>   <li>5. A single receptacle is to be attached to a 20 amp branch circuit. The receptacle can be sized                         <ol style="list-style-type: none"> <li>a.20 amps only.</li> <li>b.15 amps only.</li> <li>c.either 15 or 20 amp.</li> <li>d.depends on the voltage used.</li> </ol> </li> </ol>
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**Experienced Worker****Industrial Electrician Assessment**

0214

## SAMPLE JOB

Job 1: Motor Control Circuit

Estimated Time: 1 hour and 20 minutes

*Participant Activity:* The participant is to wire a motor reversing circuit according to a wiring diagram that the participant has drawn. Power is to be supplied by a disconnect switch. The motor is to be connected to contactors with clockwise rotation. The motor should operate in the direction designated by the push button actuated. The motor will be able to be jogged in the forward direction only. The participant must use a control transformer as the coil voltage is 120 volts.

*LIST OF MATERIALS AND EQUIPMENT REQUIRED*

Prepared work station having all components mounted and conduits installed, including:

A fused disconnect switch with three phase connected to the line side

A three-phase reversing magnetic starter

A reversing station with three buttons for "forward" and "reverse" and "stop"

A small three-phase motor

A control transformer

A single pole switch or job/run switch

3 thermal overload "heater" elements for motor used

3 Coils No. 14 TW or THW wire, solid preferably 3 different colors (black, red, white)

Wire nuts of proper sizes and quantity

Wire markers or labels numbered 1-25

Fish tape

Electrical tape

*NOTE:* The National Electrical Code Handbook and a calculator may be used for both the written and performance tests. Each candidate is to supply his/her own hand tools.

**SAMPLE Experienced Worker Assessments (cont'd)**

Experienced Worker assessments are used for assessing professional and journey worker skills. Includes both written and performance testing.

<p><b>Experienced Worker Industrial Technology Assessment 0076</b></p> <p><u>Written Assessment</u> 20% Basic Industrial Electronics 20% Basic Industrial Electricity 20% Basic Industrial Mechanics 20% Basic Industrial Pneumatics 20% Basic Industrial Hydraulics (200 test items)</p> <p><u>Performance Assessment</u> 10% BASIC ELECTRICAL CONTROL CIRCUITRY Use of hand tools and basic electrical control devices to design and construct circuitry given a written description of the function to be performed.</p> <p>15% BASIC FLUID POWER SYSTEMS Use of hand tools and basic pneumatic and/or hydraulic control devices and actuators to design and construct systems given a written description of the function to be performed.</p> <p>10% BASIC ELECTRONIC CONSTRUCTION, IDENTIFICATION AND DIAGNOSIS Use of breadboard and common hand tools and test equipment to construct an electronic circuit, identify unmarked components and diagnose faults given a circuit diagram.</p> <p>15% BASIC MECHANICAL ASSEMBLY, ALIGNMENT AND CALIBRATION Use of common hand tools to construct, align and tension mechanical assemblies given a written description of the device to be assembled.</p> <p>50% ADVANCED SKILLS, CANDIDATE'S CHOICE, ANY TWO AREAS Use of common hand tools and equipment to perform advanced jobs in two areas of the candidate's choice from the skill areas representative of the trade.</p> <p>(Administration time: 3 hours, 30 minutes; Number of jobs: 4)</p>	<p>SAMPLE QUESTIONS</p> <ol style="list-style-type: none"> <li>1. An ammeter must be connected             <ol style="list-style-type: none"> <li>A. across the battery.</li> <li>B. in series with the circuit being measured.</li> <li>C. only after the resistance is checked.</li> <li>D. to the individual point being checked but only after the circuit power source is removed.</li> </ol> </li>   <li>2. The primary winding of a trans-former has 15,000 turns and the secondary winding has 300,000 turns. There are 1,000 volts on the primary winding and 500 amps on the secondary winding. What type of transformer is this?             <ol style="list-style-type: none"> <li>A. step-up</li> <li>B. step-down</li> <li>C. isolation</li> <li>D. boost-or-buck</li> </ol> </li>   <li>3. According to OSHA, what type of hoist may be used to lift personnel for work on elevated equipment?             <ol style="list-style-type: none"> <li>A. fork lift</li> <li>B. front-end loader</li> <li>C. overhead crane</li> <li>D. motorized scaffold</li> </ol> </li>   <li>4. When air is allowed to expand, generally its pressure and temperature             <ol style="list-style-type: none"> <li>A. increase.</li> <li>B. decrease.</li> <li>C. equalize.</li> <li>D. remain constant.</li> </ol> </li>   <li>5. When the pressure at the pump inlet is reduced to the vapor pressure of the liquid being pumped, the liquid             <ol style="list-style-type: none"> <li>A. boils.</li> <li>B. condenses.</li> <li>C. attempts to turn into a solid.</li> <li>D. sublimates.</li> </ol> </li> </ol>
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Experienced Worker  
**Industrial Technology Assessment**  
0076

SAMPLE JOB

Job 1: Wire a Three-Wire Motor Control Circuit  
Estimated Time: 30 minutes

Participant Activity:

The participant is to, using the ladder-diagram format, sketch neatly on the page provided, the circuit that would be constructed to perform the operation stated below:

A three-phase motor is wired to a magnetic starter in such a fashion that it may be started and stopped by pressing "Start" and stopped by pressing "Stop". Proper connection of overload relays must be included. Motor must NOT JOG when "Start" is pressed while holding "Stop". The participant will use standard symbols to represent components, use only the components listed, check with the examiner for voltage ratings on components, connect the components to reflect sketch. The participant is to call the examiner to check circuit before applying power and finally must demonstrate proper operation of the circuit.

LIST OF MATERIALS, TOOLS AND EQUIPMENT REQUIRED

Prepared work station having all components mounted and conduits installed including a fused disconnect switch with three-phase supply connected to the line side.

NOTE: A calculator may be used for both the written and performance examinations. The candidate should bring the following: Various reference manuals (National Electric Code, American Electrician's Handbook, Audele's Millwright's and Mechanic's Guide, Womack Fluid Power Designer Handbook, TTL and CMOS Data Books or suitable equivalent, standard maintenance technician's hand tools, including open-end and boxed-end wrenches, allen wrenches, screwdrivers, pliers (lineman's, needle-nose, slip-joint and water-pump), soft-faced hammer, punch awl, drift punch, micrometer, feeler gauge, straight-edge, wire strippers, oscilloscope and probes, digital multimeter, logic probe, wireless breadboard (protoboard), pre-stripped breadboarding wires.