



## ***CUSTOMIZED TEACHER ASSESSMENT BLUEPRINT***

### **HEAVY EQUIPMENT MAINTENANCE AND REPAIR**

**Test Code: 5912**

**Version: 01**

#### ***Specific Competencies and Skills Tested in this Assessment:***

##### **Maintain and Repair Engine**

Change oil and filters  
Maintain fuel system  
Apply knowledge of 4-stroke engines  
Maintain cooling system  
Maintain intake and exhaust systems

##### **Maintain and Repair Power Train**

Demonstrate knowledge of hydrostatic power train  
Service and repair final drives  
Service power shift transmissions  
Service and inspect drive lines  
Service and maintain mechanical transmissions

##### **Maintain and Repair Electrical System**

Maintain/repair electronic controls  
Service and test starting system  
Service and test charging system  
Service and test battery  
Maintain basic electrical system (lighting accessories)

##### **Maintain and Repair Brake System**

Inspect air brake systems  
Apply knowledge of wet brake systems  
Apply knowledge of hydraulic brake systems  
Identify brake components

##### **Welding**

Identify various types and components of metals  
Apply knowledge of shielded metal arc welding  
Demonstrate safe use of welding and fabrication tools

## ***Heavy Equipment Maintenance and Repair – Teacher continued***

### **Preventive Maintenance**

- Inspect and maintain tire performance
- Monitor gauges and warning lights
- Inspect hydraulic system
- Adhere to maintenance schedules and manage record keeping
- Measure and maintain oil and fluid levels
- Perform oil sampling

### **Maintain and Repair Hydraulic System**

- Identify basic hydraulic system components
- Describe operation of various hydraulic pumps
- Service and troubleshoot hydraulic system, valves, and pressure controls
- Apply knowledge of hydraulic schematic symbols
- Apply knowledge of hydraulic circuits
- Service and rebuild hydraulic cylinders

### **General Shop Practices**

- Identify personal protection equipment (PPEs)
- Select proper fasteners
- Select and use sealants properly
- Perform drilling and tapping operations
- Describe proper use of hand tools
- Demonstrate safe use of jacks and lifting equipment

### **Air Conditioning**

- Identify air conditioning components
- Maintain air conditioning system
- Recover and recharge air conditioning systems
- Troubleshoot air conditioning malfunctions

### **Heavy Equipment Undercarriage**

- Inspect undercarriage and components
- Demonstrate appropriate use of ground engaging equipment
- Perform track tension adjustments
- Demonstrate appropriate blocking/cribbing techniques

## ***Heavy Equipment Maintenance and Repair – Teacher continued***

### **Written Assessment:**

Administration Time: 3 hours

Number of Questions: 169

#### ***Areas Covered:***

16%	Maintain and Repair Engine
10%	Maintain and Repair Power Train
12%	Maintain and Repair Electrical System
11%	Maintain and Repair Brake System
5%	Welding
11%	Preventive Maintenance
11%	Maintain and Repair Hydraulic System
10%	General Shop Practices
7%	Air Conditioning
7%	Heavy Equipment Undercarriage

#### ***Sample Questions:***

Insufficient valve clearance can cause

- A. coolant leakage
- B. a burnt valve
- C. worn valve guides
- D. oil leakage

Spur gears have teeth that are

- A. curved
- B. straight
- C. herringboned
- D. beveled

The electrolyte in a battery is a solution of water and

- A. sulfuric acid
- B. baking soda
- C. viscous oil
- D. hydrogen sulfide

One sign of a defective hydraulic brake system is

- A. low gas mileage
- B. uneven tire wear
- C. non-operational stoplights
- D. low brake fluid level

The resistance of a liquid to flow is

- A. viscosity
- B. velocity
- C. reciprocity
- D. density

## ***Heavy Equipment Maintenance and Repair –Teacher continued***

### **Performance Assessment:**

Administration Time: 2 hours and 25 minutes  
Number of Jobs: 7

#### ***Areas Covered:***

- |     |   |
|-----|---|
| 10% | <b><u>Test Cooling System</u></b><br><i>Cap pressure test, system pressure loss, leaks in system, and time to complete job 1.</i>   |
| 19% | <b><u>Electrical Testing</u></b><br><i>Battery discharge test, starter draw test, alternator maximum output test, and time to complete job 2.</i>   |
| 12% | <b><u>Adjust Valve Clearance</u></b><br><i>Accuracy of specifications, accuracy of positioning engine for valve adjustment, accuracy of initial measurement for valve clearance, accuracy of final measurement for valve clearance, and time to complete job 3.</i> |
| 14% | <b><u>Set Carrier Ring and Piston Backlash</u></b><br><i>Set carrier ring and pinion backlash, measure and record backlash, and time to complete job 4.</i>   |
| 8%  | <b><u>Identify Brake Components</u></b><br><i>Identify brake components, and time to complete job 5.</i>  |
| 10% | <b><u>Measure and Adjust Track</u></b><br><i>Lock-out/tag-out, record specification, measure and record track measurement, circle correction action needed, adjust track and record adjusted measurement, remove lock-out/tag-out, and time to complete job 6.</i>  |
| 27% | <b><u>Cut and Weld Steel</u></b><br><i>Oxyacetylene cutting, welder set-up, accuracy of cut, accuracy of weld, penetration, appearance of weld, quality of cut edges, and time to complete job 7.</i>   |

***Sample Job:*** Cut and Weld Steel

***Maximum Job Time:*** 20 minutes

***Participant Activity:*** The participant will use the proper tools and equipment to cut steel using the pattern provided. Attach the cut piece as shown in the drawing using a butt weld. Inform the evaluator when completed to inspect the work.