

FY16 FFA AG MECHANICS CDE

Written Exam:

25 multiple choice questions – 5 from each systems area

Team Activity:

Area Information

Teams will need to be familiar with reading plans/blueprints, calculating bill of materials, and completing an invoice for a roof system.

State Information

Teams will need to be familiar with reading plans/blueprints, calculating bill of materials, and completing an invoice for the construction of a roof system. Teams may be required to construct a roof truss using plans provided at the CDE.

Students need to be familiar with the use of the following tools:

- framing square
- rafter angle square
- measuring tape
- cordless drill/driver
- miter saw
- hammer
- wrenches
- screwdrivers

Note:

All necessary tools will be provided that will be used during the Team Activity.

Approved Safety Glasses are required for Team Activity. (Meets or exceeds ANSI Z87.1-2003 safety standards.)

Skill Activities:

A. Machinery/Equipment Systems

Area Information

The Machinery/Equipment Systems Activity will require students to be able to complete a problem solving/skill activity related to a Poulan Pro Riding Mower (Model # PB20H42LT). Students should be able to read, and interpret engine parts lists, operator's manuals, and specification sheets.

State Information

The Machinery/Equipment Systems Activity will require students to be able to complete a problem solving/skill activity related to an Exmark Zero Turn Riding Mower. Students should be able to read, and interpret engine parts lists, operator's manuals, and specification sheets.

B. Electrical Systems - Necessary tools will be provided. You may bring Colored pencils for use on drawing diagrams.

Area Information

Boxes will be mounted to 2" x 4" boards. Source conductor will be connected to the first box of a branch circuit with one cable being left out. The contestant will choose between two and three wire cable and install the wire into the problem. The contestant will make hooks and secure the wires to the correct locations, but will not cut wire. Connections to boxes and connection of devices inside the box must be made according to NEC recommendations and accepted wiring practices (AAVIM)

State Information

Students need to be familiar with the methods and materials necessary to wire a branch circuit(s). The contestant will be required to:

- correctly wire devices and Service Entrance Panels
- select appropriate overcurrent protection
- identify/select conductors/cables
- correctly bond all devices and boxes

Connections to boxes and connection of devices inside the box must be made according to NEC recommendations and accepted wiring practices (AAVIM)

C. Energy Systems

Area Information - Necessary tools will be provided.

Single Cylinder Briggs and Stratton OHV Vertical Shaft Engines (Model # 120000) and/or Engine parts will be supplied for the contestant to evaluate/repair/troubleshoot. Students should be familiar with Sections 10, 11, and 12 of the Briggs and Stratton Single Cylinder OHV Manual for Air-Cooled Engines. (Part # 276781-8/09)

State Information

Single Cylinder Briggs and Stratton OHV Horizontal Shaft Engines (Model # 120000) and/or Engine parts will be supplied for the contestant to evaluate/repair/troubleshoot. Necessary tools will be provided. Students should be familiar with Sections 10, 11, and 12 of the Briggs and Stratton Single Cylinder OHV Manual for Air-Cooled Engines. (Part # 276781-8/09)

D. ENR Systems

Area Information

Students will need to be familiar with the set-up and leveling of surveying instruments.

Students should be able to take rod readings, measure distance with tape and/or instruments.

Record field notes for differential, profile and topographic leveling.

Lay out grade stakes for cut/fills, layout and map contour lines, and determine percent of slope or grade.

State Information

Students will need to be familiar with the set-up and leveling of surveying instrument.

Students should be able to take rod readings, measure distance with tape and/or instruments.

Record field notes for differential, profile and topographic leveling.

Lay out grade stakes for cut/fills, layout and map contour lines, and determine percent of slope or grade

E. Structural Systems

Regional/Area/State Information

Welding Skill will be SMAW (Stick) Welding

Welding will be required to be completed in the flat position.

Welding may be required as any one of the following types of welding joints: Butt, Tee, Lap, or Pipe

Welds will be required on 3/16" x 4" x 5" flat metal, metal pipe, or a combination.

Welding Equipment List for Contestants-

1. Teams will be penalized under "Safety" on score sheet for not having the following items:

Welding Helmet – Shade 10

Body cover- leathers, Shop Jackets, non-flammable Coveralls

Welding Gloves

Pliers/Tongs

Safety glasses –approved with shields

Wire brush

Soapstone

Chipping Hammer

2. Please do not share tools and equipment between team members (bring one of each for each student).

3. All other materials and tools will be provided.

Event Related Competencies from 2012- 2016 National Ag Mechanics CDE

A. Machinery/Equipment Systems Competencies

Problem Solving

1. Identify safe machinery operation practices for field and highway conditions.
2. Identify the recommended service and maintenance operations from the operator's manual.
3. Select lubricants for machinery and equipment.
4. Identify functions of machinery components.
5. Identify parts and functions of hydraulic systems.
7. Prepare machinery for storage.
9. Explain principles of machinery management.
13. Identify safe adjustment [level] on power equipment.
19. Identify repair procedures and techniques.
20. Select repair material needed for specific jobs.

Skills

1. Check and adjust driveline components.
3. Install, adjust and service belt and chain drives.
4. Select and use test equipment including meters, tachometers and timing devices to determine proper machine operation.
6. Install, operate, maintain, adjust and evaluate machine systems.
7. Inflate tires to proper air pressure.
8. Adjust equipment for field and crop conditions.
19. Select tools and materials for specific repair jobs.
21. Select and use appropriate safety equipment.
22. Identify safe machinery operation practices for field and highway conditions.
23. Identify the recommended service and maintenance operations from the operator's manual.
24. Describe how to repair a specific component or system.
25. Select fuels, lubricants, hydraulic fluids and coolants for proper operation.
27. Operation and interpretation of circuit diagrams and flowcharts for: electrical, hydraulic, fuel, oil, cooling, intake and exhaust systems.
28. Identify the function and operating principles of clutches, transmissions, control devices and brakes.
29. Explain and describe principles of power transmission.
30. Identify the parts and functions of electrical, hydraulic, lubrication, cooling, governor and fuel systems.
34. Conduct a pre-operation inspection of a tractor or implement.
36. Perform recommended periodic service jobs (as found in operator's manuals).
37. Test and service cooling systems.
40. Adjust steering linkage.
42. Conduct on-board tractor monitor checks as identified in operator's manual.
45. Service and maintain fuel, air intake and exhaust, cooling and lubrication systems.

B. Electrical Systems Competencies

Problem Solving

2. Use appropriate standards for agricultural applications, including the National Electrical Code (NEC), Electrical Testing Laboratory (ETL), Factory Mutual, Underwriters Laboratory (UL), Canadian Standard Association (CSA) and/or OSHA standards.
3. Plan safe electrical circuits.
4. Select conductor type and size for specific applications.
8. Plan and evaluate proper grounding systems and ground-fault protection.

Skills

5. Read schematics and sketch wiring circuits.
6. Attach conductors to terminals.
8. Make proper splices and connections.
12. Wire 120/240V service outlets.
13. Install electrical circuits, switching devices and appliances.
14. Install ground-fault circuit interrupters.

C. Energy Systems Competencies

Problem Solving

1. Interpret horsepower, torque and other power measurement criteria.
3. Interpret metric units in measurements.
4. Compare costs of alternative machine uses.
6. Describe operating principles of two-stroke and four-stroke spark or compression ignition engines.
18. Select energy efficient equipment and materials.

Skills

3. Starting, stopping and operating machinery engines.
4. Perform recommended periodic service jobs (as found in operator's manuals).
5. Use measuring tools and test instruments such as: micrometer and telescoping gauges, dial indicator, compression tester, torque wrench, VOA (volt-ohm-amp)meter, DMM (digital multi-meter), timing devices, tachometer and dynamometer for determining test procedures.
10. Select and use engine overhaul equipment, including valve, cylinder, piston, seal and bearing tools.
11. Service and maintain fuel, air intake and exhaust, cooling and lubrication systems.

D. Environmental and Natural Resources Systems Competencies

Problem Solving

4. Read legal land descriptions.
5. Determine land areas.
6. Determine the difference in elevation of two or more points.
7. Determine cuts, fills, cut/fill ratios and volumes.
8. Describe the characteristics of a profile-leveling plot.

Skills

2. Set up and level the surveying instrument.
3. Take rod readings.
4. Measure distance with tape and/or instruments.
7. Record field notes for differential, profile and topographic leveling.
9. Lay out grade stakes for cut/fills.
13. Lay out and map contour lines.
29. Determine percent of slope or grade.

E. Structural Systems Competencies

Problem Solving

- 32. Select arc welding machines and accessories.
- 33. Read drawings and welding symbols.
- 34. Control distortion in arc welding.
- 35. Select appropriate electrodes and wires.
- 37. Prepare materials and equipment for arc welding.
- 38. Test weld quality and strength.
- 43. Select welding rods and fluxes.
- 44. Start-up and shut down of welding equipment.
- 57. Select types of pipe and tubing.

Skills

- 26. Layout and prepare metal for arc welding.
- 28. Weld basic joints in all positions.
- 29. Join pipe for welding.
- 34. Layout and prepare metal for welding or cutting.
- 37. Join steel pipe, tubing or shapes by welding.
- 39. Adjust machines for various types of thickness of metal.