

**FFA**  
**2018 STATE FINALS**  
**AGRICULTURAL MECHANICS WRITTEN EXAM**

**Instructions:**

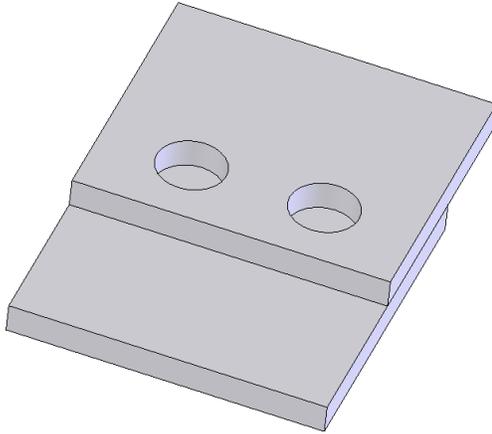
1. Remain in your seat at all times until excused by the exam instructor.
2. **DO NOT** mark on this examination sheet. Mark the SCANTRON only.
3. Use #2 pencil only.
4. Place your contestant name where instructed, on the SCANTRON only.
5. When marking your answers, completely fill in the correct answer box.
6. There is only one best answer for each question.
7. The exam monitor will not answer questions during the exam.
8. This is a **CLOSED BOOK/NOTES EXAM!! NO NOTES OF ANY FORM ARE ALLOWED.**
9. Calculators are provided if you don't have one.
10. When you have finished the exam, turn your paper over and remain in your seat. The exam monitor will collect all the papers and answer sheets at the end of the time period. You will then be excused.

GOOD LUCK!!

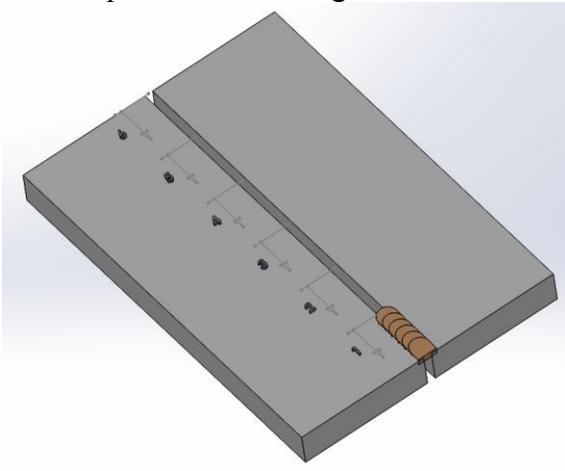
1. In arc welding, a machine designated with a 20% duty cycle can \_\_\_\_\_.
  - a. operate under load for 20 minutes at a time
  - b. operate under load for 20 hours per day
  - c. operate under load for 12 minutes per hour
  - d. operate under load for 12 hours per day
  - e. not operate
  
2. A measure of the rate of flow of electrical current is known as:
  - a. Volt
  - b. Amp
  - c. Watts
  - d. Duty cycle
  - e. b and d above
  
3. A piece of electrical equipment requires 10,000 Watts of power. If the voltage is 220v, how much current will be required?
  - a. 10 amps
  - b. 220 volts
  - c. 45.5 volts
  - d. 45.5 amps
  - e. 10,000 ohms
  
4. In electrical applications in the U.S., 60 hertz means the current \_\_\_\_\_.
  - a. is constant and reliable
  - b. is direct.
  - c. alternates
  - d. reverses direction 60 times per second
  - e. reverses direction 60 times per minute
  
5. A 7024 welding electrode can be used for \_\_\_\_\_ welding.
  - a. vertical and horizontal
  - b. flat and horizontal fillet
  - c. out-of-position
  - d. overhead
  - e. all position
  
6. In arc welding, the arc temperature is about \_\_\_\_\_.
  - a. 4000 degrees F
  - b. 6000 degrees F
  - c. 9000 degrees F
  - d. Just enough to melt steel.
  - e. Just enough to melt aluminum.

7. Which of the following welding lenses is the darkest?
- #10
  - #12
  - #14
  - #5
  - #00
8. In welding, GTAW stands for:
- Gas Tig Arc Welding
  - Gas Tungsten Arc Welding
  - Gas Tungsten Carbide Welding
  - Grounded Torch Arc Welding
  - b and c above
9. When using the GMAW process on thinner materials, the following shielding gas is usually preferred:
- CO<sub>2</sub>
  - Argon/CO<sub>2</sub> mix
  - Helium
  - Oxygen/CO<sub>2</sub> mix
  - a and d above
10. When using the GTAW process, the following shielding gas is usually preferred:
- CO<sub>2</sub>
  - Argon
  - Helium
  - Oxygen
  - Either b or c above
11. NEMA stands for:
- National Electrical Manufacturers Association
  - National Electrical Motors Association
  - National Engineers and Manufacturers Association
  - National Engineers and Machinists Association
  - None of the above.
12. A welding electrode including "E60" in its designation means:
- It can handle 60,000 lbs of force.
  - It can handle 60,000 psi of tensile stress.
  - It can withstand 60 psi of shielding gas.
  - The electrode can be tilted 60 degrees during welding.
  - Both a and d above

13. Which fabric below is the most flammable, and therefore should not be worn as protective clothing during arc welding?
- a. Wool
  - b. Cotton
  - c. Leather
  - d. Synthetic
  - e. None of the above
14. In the figure below, filling the two holes with weld metal is known as \_\_\_\_\_.



- a. Fillet welding
  - b. Filler welding
  - c. Plug welding
  - d. Slot welding
15. The process of welding in the order shown below is referred to as:



- a. Skip welding.
- b. Fillet welding.
- c. Back-step welding
- d. Forward welding.
- e. None of the above.

16. In SMAW, when the color of the electrode flux changes, this indicates:
- Amperage is too high.
  - The voltage is too low.
  - The arc length is too short.
  - The material is too hot.
  - All of the above.
17. To minimize distortion in arc welding you should:
- Weld beads alternately on each side.
  - Use intermittent welds, if a full length weld is not required for strength.
  - Peen to relieve internal stress.
  - All of the above
  - None of the above, as distortion cannot be minimized.
18. The process of applying a hard, wear-resistant layer to the surface of a softer metal is known as:
- Hardsurfacing
  - Peening
  - Scarfig
  - Gouging
  - Heat treating
19. In MIG welding, what term is used to describe when the wire is fused to the contact tip?
- Birdbath
  - Burnback
  - Arc Blow
  - Short arc
  - Spray transfer
20. Trapped non-metallic solids in weld metal are known as:
- Porosity
  - Craters
  - Slag inclusions
  - Fusion
  - Undercut
21. A step-down transformer.....
- reduces the current in transmission wires for consumer use.
  - reduces the voltage in transmission wires for consumer use.
  - increases the voltage in transmission wires for consumer use.
  - increases the current in transmission wires for consumer use.
  - Both a and b.

22. SEP stands for:
- Sub Electrical Panel
  - Service Electrical Panel
  - Service Entrance Panel
  - Sub Exit Panel
23. A circuit breaker is a safety device that provides.....
- overcurrent protection for a circuit.
  - overvoltage protection for a circuit.
  - a good way to power up/down electrical equipment.
  - protection from ground fault electrical shock.
  - a and d above.
24. Which device below is used to pull wires through a conduit?
- Snake
  - Plumber's helper
  - Fish tape
  - GFCI
  - None of the above
25. What type of lines in a wiring plan represent switches in the circuit?
- Blue lines
  - Red lines
  - Yellow lines
  - Dotted lines
  - Solid lines
26. A wiring plan includes the designation "SA1". What does the "SA" represent?
- Small Amperage
  - Service Appliance
  - Small Appliance
  - Service Amperage
  - None of the above
27. A wiring plan includes the designation "GP1". What does this designation represent?
- Ground Protected Circuit #1.
  - General Purpose Circuit #1.
  - Garage Power Circuit #1.
  - General Pantry Circuit #1.
  - Grounded Power #1.

28. At 60° C, how much current can a #8 AWG wire handle ?

- a. 50 amps
- b. 40 amps
- c. 30 amps
- d. 70 amps
- e. None of the above

29. The following receptacle is rated at:



- a. 15 volts
- b. 15 amps
- c. 20 amps
- d. 20 volts
- e. None of the above

30. The following receptacle is rated at:



- a. 120 v, 50 amps
- b. 250 v, 50 amps
- c. 120 v, 30 amps
- d. 250 v, 30 amps
- e. None of the above.

31. Which tool below should be used for locating the center on the end of a 2" diameter piece of round stock?



a.

\*



b.



c.



d.

32. If you are going to tap a  $\frac{1}{2}$ "-NC-13 thread, the diameter of the hole will be:

- a.  $\frac{1}{2}$ "
- b. one drill bit size smaller than  $\frac{1}{2}$ "
- c. smaller than  $\frac{1}{2}$ "
- d. larger than  $\frac{1}{2}$ "
- e.  $\frac{3}{8}$ "

33. The correct spindle speed for drilling metal with a twist drill bit depends on:

- a. the type of metal you are drilling
- b. the twist drill material type
- c. both a and b above
- d. none of the above

34. Which twist drill material type below is the hardest, and can be run at a faster speed?
- a. Carbon
  - b. Mild
  - c. HS
  - d. Aluminum
  - e. None of the above.

35. Which of the following is not a standard file shape?
- a. Triangular
  - b. Half-Round
  - c. Hex
  - d. Round
  - e. Flat

36. The designation for the following cold chisel is.....



- a. Cape
  - b. Diamond-Point
  - c. Bevel end
  - d. Round-Nose
  - e. Gouging
37. Which tool is used to hold a threading die?
- a. Die wrench
  - b. Die stock
  - c. Tap wrench
  - d. Tap stock
  - e. None of the above
38. When drilling holes larger than 3/8" diameter in steel, a pilot drill with the following diameter should be used.
- a. Half of the final hole size.
  - b. One quarter of the final hole size.
  - c. One eighth of the final hole size.
  - d. Three quarters of the final hole size.
  - e. Diameter equal to the dead center of the final drill size

39. “Draw Filing” refers to placing the file at a \_\_\_\_\_ angle to the metal and pushing or pulling the file in a direction parallel to the material’s edge.
- 45°
  - 90°
  - 30°
  - 180°
  - 60°
40. When cutting metal with a hacksaw, optimal conditions exist when \_\_\_\_\_ teeth are in contact with the material and cutting
- 1
  - 2
  - 3
  - 4 or more
  - 5 or more
41. Which of the following gases normally is not combined with pure oxygen for “oxyfuels” cutting or welding?
- Acetylene
  - Propane
  - Natural gas
  - Helium
  - MAAP gas
42. Which of the following cutting tips is the smallest?
- 00
  - 0
  - 1
  - 2
  - 3
43. In oxyfuels cutting/welding, a loud snap or popping noise that generally blows out the flame is known as \_\_\_\_\_.
- flashback
  - backfire
  - blow out
  - leaning out
44. A squealing or hissing noise from the torch is a symptom of \_\_\_\_\_.
- flashback
  - too much acetylene
  - too much oxygen
  - inadequate acetylene
  - inadequate oxygen

45. Acetylene gas becomes unstable above pressures of:
- 10 psi
  - 15 psi
  - 20 psi
  - 25 psi
  - 30 psi
46. Which fuel gas yields the hottest neutral flame?
- MAAP
  - Propane
  - Natural gas
  - Acetylene
  - Nitrogen
47. Joining steel parts by melting them together is referred to as:
- Fission welding
  - Fusion welding
  - TIG welding
  - Braze welding
  - Soldering
48. When cutting steel, the width of material lost during the process is known as the \_\_\_\_\_.
- Kerf
  - Smurf
  - Slag
  - Waste
  - Burn out
49. When brazing, a powdered chemical compound, called \_\_\_\_\_, is used to prevent the formation of oxides to allow the bronze to stick to the base metal.
- slag
  - flax
  - flux
  - tinner's fluid
  - flask
50. For oxyacetylene cutting of steel, the acetylene pressure regulator is sometimes set at a higher pressure than the oxygen pressure regulator.
- True
  - False

## References

1. Agricultural Mechanics: Fundamentals and Application, 6<sup>th</sup> edition. Delmar publishers.
2. Modern Agricultural Mechanics, 2nd Edition. Burke, Wakeman. Interstate Publishers
3. Electrical Wiring, 7<sup>th</sup> edition. AAVIM publishers.