

Wyoming FFA
2014 Agricultural Technology and Mechanical Systems
Career Development Event

You will have **60 minutes** to complete this examination. Answer the multiple choice questions by selecting the one best answer for each question. **Mark your answers on the answer sheet provided.**

Do not write on this exam

SECTION 1: Machinery & Equipment Systems Questions 1-10

1. The spray pattern of a field sprayer is best adjusted by:
 - a. Increasing pressure
 - b. Decreasing pressure
 - c. Using nozzle tips with different orifices
 - d. Changing boom length

2. Determine the FHP (Fluid Horsepower) of a hydraulic pump when it is pumping 30 gal/min at 1000 psi. Formula $FHP = p \times Q / 1714$
 - a. 114
 - b. 25.71
 - c. 35
 - d. 17.50

3. A 1000 RPM power take off shaft comes from the factory with how many splines?
 - a. 14
 - b. 21
 - c. 7
 - d. 6

4. What is a MAJOR difference in using hydraulic fluid as compared to air pressure to transfer force?
 - a. Air pressure needs to circulate through a circuit.
 - b. Hydraulic fluid can be compressed, but air can not.
 - c. Hydraulic fluid cannot be compressed, but air can be.
 - d. Hydraulic fluid depends on the use of pneumatics.

5. As spray nozzle tips wear, the chemical application rate that the nozzles are capable of applying _____?
 - a. Increases
 - b. Decreases
 - c. Stays the same
 - d. The nozzles should not wear down because they are ceramic

6. The acronym, PLN, stands for:
- Pump Line Nozzle
 - Pressure Lubricated Nozzle
 - Pressurized Lightweight Nozzle
 - None of the above
7. All of the following materials are used to manufacture spray nozzles except?
- Brass
 - Copper
 - Ceramic
 - Hardened Stainless Steel
8. During a 30-second sprayer calibration procedure, 26 ounces of liquid are collected from a spray tip. What is the tip's approximate delivery rate in gallons per minute?
Note: 1 gal = 128 ounces 1 minute = 60 seconds
- 0.2 gallon per minute
 - 0.3 gallon per minute
 - 0.4 gallon per minute
 - 0.8 gallon per minute
9. The theoretical field capacity of a machine such as a windrower or forage harvester is a function of which two factors?
- Machine weight and horsepower
 - PTO speed and angle
 - Travel speed and working width
 - Machine rating and velocity
10. The load capacity of a hydraulic cylinder is equal to
- Pressure X area of piston
 - Pressure X radius of cylinder
 - Weight of object to be lifted
 - Length of ram

Section 2: Electrical Systems Questions 11-20

11. The continuous load supplied by a circuit should not exceed 80% of the branch circuit rating. After how many hours of continuous operation is a load considered to be a continuous load?
- One-half hour
 - One hour
 - Two hours
 - Three hours
12. Which of the following terms represents a measure of the rate of flow of electricity in a conductor?
- Ampere
 - Polarity
 - Volt
 - Watt

13. Which of the following conductors are primarily used in conduit and cable trays for services, feeders, and branch circuits in commercial or industrial applications as specified in the National Electrical Code?
- Type NM Romex
 - Type THHN
 - Type UF
 - Type AC
14. Under normal operating conditions, the on/off electric motor magnetic switch contacts are closed by a:
- Capacitors
 - Electro-magnet
 - Inductance purge
 - Repulsion pulse
15. The stationary electromagnet in the electric motor is called a:
- Stator
 - Rotor
 - Armature
 - None of the above
16. When selecting conductor size, the smaller the AWG number, the:
- Smaller the current-carrying capacity
 - Larger the current-carrying capacity
 - Smaller the cross-sectional area
 - Thinner the insulation
17. Which of the following classifications of wire can be buried directly in the soil?
- T
 - THHN
 - TW
 - UF
18. When installing a service mast above a roof line for single phase or 3 phase power must be a minimum of _____ in dia. and made of galvanized steel conduit.
- 2"
 - 3"
 - 4"
 - 4 1/2"
19. A ground-fault circuit interrupter (GFCI), works by breaking the circuit when current in the hot conductor and the _____ are not equal.
- Safety ground
 - Circuit breaker
 - Neutral
 - None of the above

20. What is the purpose of a thermal circuit breaker?
- Is a ground fault protection device installed in a consumer unit (CU) or distribution board (DB) primarily to protect against electric shocks
 - Trips when a power surge occurs in the electrical wiring
 - If an overload occurs, the filament in the breaker melts, stopping the flow of electricity
 - A protective device that breaks a circuits path when the temperature gets too high

Section 3: Energy Systems Questions 21 - 30

21. In the four-cycle engine, which of the following strokes allows for the fuel and air mixture to be pulled into the cylinder?
- Compression
 - Power
 - Intake
 - Exhaust
22. Which of these regulate the speed of the engine and was invented by James Watt?
- Starter
 - Carburetor
 - Cam shaft
 - Governor
23. Which of the following power source uses light energy?
- Air pressure
 - Hydraulics
 - Solar
 - Steam
24. A farmer complains of low engine power in the field. What is a possible cause?
- Plugged fuel filter
 - Plugged air filter
 - Plugged A/C condenser
 - Both a and b
25. Valve stems are held in alignment by a:
- Valve spring
 - Valve sleeve
 - Valve guide
 - Cylinder block
26. The parts or sections of a small engine valve in a Briggs & Stratton Vanguard V-Twin OHV engine are:
- Stem, margin, face
 - Stem, margin, seat
 - Stem, head, seat
 - Stem, face, toe

27. A 10 horsepower single cylinder engine is operating at 5000 feet above sea level. What approximate horsepower are produced by the engine if the engine's power is decreased 2.5 percent for each 1000 feet of elevation above sea level?
- 6.65 horsepower
 - 7.52 horsepower
 - 8.75 horsepower
 - 9.62 horsepower
28. When measuring valve clearance in a small gas engine, the cylinder should be set at _____ for proper adjustment.
- $\frac{1}{4}$ " before top dead center on the compression stroke
 - $\frac{1}{4}$ " after top dead center on the compression stroke
 - $\frac{1}{4}$ " before top dead center on the exhaust stroke
 - $\frac{1}{4}$ " after top dead center on the exhaust stroke
29. The _____ is an engine part that converts the up and down or linear motion of the piston to circular motion.
- Camshaft
 - Connecting rod
 - Crankshaft
 - Flywheel
30. In Wyoming, diesel fuel used for the farm is non-taxable. There is an additive added to farm fuel so it is visually seen as farm fuel. What is the additive?
- Blue dye
 - Green dye
 - Red dye
 - Orange dye

Section 4: Structural Systems Questions 31 - 40

31. A weld placed in a joint created by a 90 degree angle is a/an:
- Butt weld
 - Fillet weld
 - Spot weld
 - Tack weld
32. Which of the following terms is used to describe the continuous running time for which a welder was designed?
- Duty rating
 - Running specification
 - Duty cycle
 - Ambient cycle
33. As a result of its' ability to dissipate heat rapidly, most welding tips used in the Oxy/Fuel process are made of which of the following metal types?
- Steel
 - Aluminum
 - Copper
 - Brass

34. Which of the following is a “low hydrogen” electrode?
- E6010
 - E6013
 - E7014
 - E7018
35. What is the name of the automatic plumbing valve that allows fluid to flow in only one direction, but prevents the fluid from draining back when the line is not pressurized?
- Stop-and-waste valves
 - Gate valves
 - Compression hose faucets
 - Check valves
36. What duty cycle rating is required for a welding machine that will operate at its maximum rating for six minutes continually during a ten-minute period?
- 20%
 - 40%
 - 60%
 - 80%
37. The AWS classification of SMAW electrode, E6011, what does the “60” stand for?
- All positions
 - Tensile strength
 - Flat/horizontal position
 - Vertical position
38. Free acetylene should not be stored above what PSI?
- 5
 - 15
 - 75
 - 50
39. If the flame consists of a slight excess of acetylene it is known as:
- Neutral flame
 - Oxidizing flame
 - Carburizing flame
 - None of the above
40. Which of the following is not a function of the coating elements found in SMAW electrodes?
- Provide mechanical and metallurgical properties of the weld deposit
 - Shield the molten metal from oxygen and nitrogen
 - Keep the arc established when using direct current
 - Produce slag coverage to protect the cooling weld metal

Section 5: Environmental and Natural Resource Systems Questions 41 - 50

41. What is the term used to describe the level of soil acidity in a sample?
- sA
 - pH
 - HCl
 - None of the above
42. A manure slurry is more viscous than liquid manure because it contains a higher percentage of what component?
- Hydrogen
 - Water
 - Solids
 - Phosphorus
43. Points J and K are 700 feet apart. The difference in elevation between J and K is 28 feet. The average slope between J and K is:
- 2%
 - 3%
 - 4%
 - 6%
44. As a general rule, the _____ type of spray nozzle is most preferred for broadcast application of contact herbicides, for an even uniform spray pattern.
- Solid cone
 - Hollow cone
 - Flat fan
 - Flood type
45. When calibrating sprayers for uniformity, it is best to catch and record the number of ounces sprayed by each nozzle over a _____ second period, then replace any nozzle whose output differs more than _____ percent from the average of all nozzles on the sprayer boom.
- 15; 5
 - 20; 10
 - 25; 15
 - 30; 20
46. Which pollutant reduces the rate of growth of plants?
- Ozone
 - Carbon monoxide
 - Sulfur dioxide
 - Nitrogen dioxide
47. If one pot in a drip irrigation system of 100 pots is not getting enough water, one should check the:
- Emitter
 - Humidistat
 - Solenoid valve
 - Timer

48. The best type of irrigation system/s for sloping land is:
- Subsurface irrigation
 - Sprinkler and below surface sub-irrigation
 - Trickle or subsurface irrigation
 - Trickle or sprinkler irrigation
49. Which of the following is considered a manure storage lagoon?
- An outside confined manure storage area which stabilizes the manure through microbial action
 - A farm pond
 - A storage area beneath the slatted floor in a confinement building
 - A blue metal structure with an airtight lid
50. A pesticide label specifies that 2.5 pints of pesticide concentration, mixed with 30 gallons of water, are to be applied per acre. How many gallons of pesticide concentration are required to treat a 160-acre field?
- Note: 128 ounces = 1 gal 16 ounces = 1 pint
- 32 gallons
 - 50 gallons
 - 64 gallons
 - 3200 gallons