

**2014 Wyoming State Agricultural Mechanics
Career Development Event: Plant Production Systems**

You will have 60 minutes to complete this examination. Answer the multiple-choice questions by selecting the one best answer for each question and bubbling in the answer on the provided scantron.

SECTION 1: Machinery & Equipment Systems Questions 1-10

1. _____ **Cone-shaped large round bales result from which of the following conditions?**
 - a. Feeding too much hay into one side of the baler
 - b. Too much hay going into the middle of the baler
 - c. Windrows that are too small
 - d. Windrows that are too far apart

2. _____ **When purchasing a tractor, the salesperson describes the power as the amount of weight the unit can pull at a given speed. What kind of power is being described by the sales person?**
 - a. Engine power
 - b. Drawbar power
 - c. Power takeoff power
 - d. Hydraulic power

3. _____ **Which of the following implements is used to fluff up and spread out forage for faster drying?**
 - a. Parallel-bar rake
 - b. Tedder
 - c. Windrower
 - d. Finger wheel rake

4. _____ **Which of the following types of hay conditioners uses a row of fast spinning tines to condition hay?**
 - a. Crimper
 - b. Crusher
 - c. Dehydrator
 - d. Impeller

5. _____ **Which of the following types of large round balers produce bales with a low density inner core?**
- a. Variable chamber
 - b. Fixed chamber
 - c. Belt-type
 - d. Chain-type
6. _____ **A diesel engine produces blue-colored exhaust. What is the most likely cause?**
- a. Low engine temperature
 - b. Combustion of engine oil
 - c. Restricted air intake
 - d. Turbocharger failure
7. _____ **A diesel engine produces white-colored exhaust. What is the most likely cause?**
- a. Low engine temperature
 - b. Combustion of engine oil
 - c. Restricted air intake
 - d. Turbocharger failure
8. _____ **The average farm tractor will convert about what percentage of PTO (power take-off) power to drawbar power?**
- a. 40 percent
 - b. 55 percent
 - c. 86 percent
 - d. 100 percent
9. _____ **The theoretical field capacity of a machine such as a disk harrow or chisel plow is a function of what two factors?**
- a. Tillage depth and working width
 - b. Travel speed and working width
 - c. Tractor power output and draft load
 - d. Machine rating and velocity

10. _____ **What is the name of the device used to measure tractor PTO (power take-off) horsepower?**
- a. Dynamometer
 - b. Load cell
 - c. Wattmeter
 - d. Calorimeter

Section 2: Electrical Systems Questions 11 – 20

11. _____ **When determining the correct combination of electrical box size and appropriate number of conductors, what is the box fill volume allowance for each ungrounded 12 gauge conductor that enters or exits an electrical box?**
- a. 0
 - b. 1
 - c. 2
 - d. 3
12. _____ **What is the unit of measure of electrical pressure that relates to current flow through a given resistance?**
- a. Ohmage
 - b. Amperage
 - c. Voltage
 - d. Wattage
13. _____ **The National Electric Code (NEC) requires that conductor insulation be color-coded. Which of the following conductor insulation colors indicates the grounded conductor?**
- a. Green
 - b. Black
 - c. White
 - d. Red
14. _____ **What type of switches must a four-way switch be used in combination with in order to independently control lights from three different locations?**
- a. Two four-way switches
 - b. Three single-pole switches
 - c. Two three-way switches
 - d. Three rotary switches

15. _____ **Which of the following is the proper name for the electrical conductors that travel from the power company's transformer to a residence?**
- a. Service drop
 - b. Distribution drop
 - c. Meter drop
 - d. Transmission drop
16. _____ **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?**
- a. One-half hour
 - b. One hour
 - c. Two hours
 - d. Three hours
17. _____ **The force that causes electrons to flow in a circuit.**
- a. Watts
 - b. Amperage
 - c. Current
 - d. Voltage
18. _____ **A GFCI is required in all but one of these locations:**
- a. Outlets 1-2 feet off the floor in a garage
 - b. Outlets on the ceiling in a garage
 - c. Near the kitchen sink
 - d. Near the bathroom sink
19. _____ **Wire diameter, exclusive of insulation, is generally expressed using:**
- a. Tenth of an inch
 - b. Metal gauge
 - c. Standard Wire Gage
 - d. American Wire Gage
20. _____ **The smallest gage of copper wire the National Electrical Code allows for house wiring is:**
- a. #4
 - b. #12
 - c. #6
 - d. #14

Section 3: Energy Systems Questions 21 – 30

21. _____ **The bottom ring on the piston is called the:**
- a. Keystone ring
 - b. Compression ring
 - c. Oil ring
 - d. Centering ring
22. _____ **In small diesel engines _____ is taken in during the intake stroke.**
- a. Air only
 - b. Fuel only
 - c. Air and fuel
 - d. Fuel and water
23. _____ **On most small engines the crankshaft endplay is set by:**
- a. Crankshaft main seal
 - b. Shims on the crankshaft main bearing
 - c. The gasket between the block housings
 - d. Springs behind the crankshaft
24. _____ **When the piston of the four stroke small engine reaches the bottom of the cylinder on the intake stroke it starts upward on what stroke?**
- a. Exhaust
 - b. Combustion
 - c. Compression
 - d. Power
25. _____ **The spark plug is fired by secondary voltage from the:**
- a. Coil
 - b. Points
 - c. Battery
 - d. Flywheel magnets
26. _____ **In the electronic ignition the spark originates from the:**
- a. Points
 - b. Battery
 - c. Condenser
 - d. Flywheel magnets

27. _____ **What does the Octane rating of gasoline indicate?**
- a. The ability of the engine to prevent engine compression
 - b. The inability of the engine to prevent engine knock
 - c. The ability of the engine to prevent engine knock
 - d. The ability of the engine to prevent engine post ignition
28. _____ **Modern small engines use a solid-state ignition system to open and close the primary circuit. What part of the small engine ignition system opened and closed the primary circuit prior to the solid-state system?**
- a. Transistors
 - b. Breaker Points
 - c. Integrated chips
 - d. Coil
29. _____ **What is the part of the coil that is made of several thousand turns of fine gage wire?**
- a. The secondary circuit
 - b. The main circuit
 - c. The primary circuit
 - d. The complete circuit
30. _____ **The intake valve of a 4-stroke single-cylinder small engine is opened and closed by the action of what component?**
- a. Piston
 - b. Throttle
 - c. Wrist pin
 - d. Camshaft

Section 4: Structural Systems Questions 31 – 40

31. _____ **What electrical device is a necessary component of an electrical welding machine and is used to step up or step down the voltage and amperage as needed to perform welding operations?**
- a. Alternator
 - b. Generator
 - c. Rheostat
 - d. Transformer

32. _____ **What is the maximum hose pressure in pounds per square inch (psi) for acetylene fuel gas used in oxyacetylene cutting equipment?**
- a. 5 psi
 - b. 15 psi
 - c. 45 psi
 - d. 90 psi
33. _____ **Which of the following shielded metal arc welding electrodes is designated as a low hydrogen electrode?**
- a. E6010
 - b. E6011
 - c. E7018
 - d. E7024
34. _____ **What is the recommended eye protection shade number for a welding helmet lens used when welding with 1/8 inch electrodes?**
- a. No. 4 lens shade
 - b. No. 6 lens shade
 - c. No. 8 lens shade
 - d. No. 10 lens shade
35. _____ **National Electrical Manufacturers Association (NEMA) has classified electric arc welders primarily by duty cycle. What is the minimum duty cycle rating of a NEMA Class I machine?**
- a. 30%
 - b. 60%
 - c. 90%
 - d. 120%
36. _____ **What is a common name for the shielded metal arc welding process?**
- a. Wire welding
 - b. Stick welding
 - c. MIG welding
 - d. Tungsten welding

37. _____ **What is the length of the most commonly used electrode for the process of shielded metal arc welding?**
- a. 8 inches
 - b. 10 inches
 - c. 14 inches
 - d. 18 inches
38. _____ **Ductility is the ability of a metal to do what before it breaks?**
- a. Resist penetration
 - b. Return to its original shape after stretching
 - c. Elongate
 - d. Harden
39. _____ **What welding agency or entity does the acronym AWS identify?**
- a. Alternative Welding System
 - b. Associated Welding Stores
 - c. Arc Welding System
 - d. American Welding Society
40. _____ **On a typical shielded metal arc welding E7018 electrode the 70 indicates what value for tensile strength?**
- a. 70 psi tensile strength
 - b. 700 psi tensile strength
 - c. 7,000 psi tensile strength
 - d. 70,000 psi tensile strength

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

41. _____ **A manure slurry is more viscous than liquid manure because it contains a higher percentage of what component?**
- a. Hydrogen
 - b. Water
 - c. Solids
 - d. Phosphorus

42. _____ **Which of the following are major nutrients of manure?**
- a. Water, soil, and straw
 - b. Hydrogen, methane, and ulraine
 - c. Nitrogen, phosphorus, and potassium
 - d. Phosphorus, herbicide, and phosphate
43. _____ **What are two sources of water that increase the amount of liquid manure that must be dealt with at a livestock facility?**
- a. High humidity and irrigation water
 - b. Low humidity and irrigation water
 - c. Wash water and rain water runoff
 - d. Underground water lines and water wells
44. _____ **What occurs when water infiltrates the soil and removes nutrients?**
- a. Fusion
 - b. Percolation
 - c. Gravitational water
 - d. Leaching
45. _____ **What type of bacteria does not require the presence of free or dissolved oxygen for metabolism?**
- a. Anaerobic
 - b. Aerobic
 - c. Dehydrated
 - d. Consolidated
46. _____ **In a farming situation, freshly collected manure was found to be 30 percent solids and 70 percent moisture by weight. The collected manure was stockpiled in a covered structure for several months and during that time 30 percent of the manure's original moisture content evaporated and/or drained away. If 6 tons of the drier manure is applied to crop fields, what approximate weight (in pounds) of the applied manure is actually solid?**
Note: 1 ton = 2000 pounds
- a. 1,445 pounds
 - b. 4,557 pounds
 - c. 7,889 pounds
 - d. 10,089 pounds

47. _____ **Stress cracks in grain corn kernels can be caused when high temperature grain drying is followed by which process?**
- a. Slow heating of the dried grain
 - b. Rapid cooling of the dried grain
 - c. Waterification of the dried grain
 - d. Rapid heating of the dried grain
48. _____ **What determines the temperature to which seed grain should be dried?**
- a. Differs significantly between seed types
 - b. Depends directly on the relative humidity of the ambient (outside) air
 - c. For maximum seed viability the temperature is relatively high 400 F
 - d. For maximum seed viability the temperature is relatively low such as 100 F
49. _____ **Which of the following are two types of fans that used to force air through grain in a grain bin?**
- a. Centrifugal and axial
 - b. Turbine and axial
 - c. Tubular and elastic
 - d. Static and dielectric
50. _____ **What characteristic is the most useful for evaluating a fan used to dry grain while stored in a bin?**
- a. Gallons per minute (gpm)
 - b. Pounds per square inch (psi)
 - c. Bushels per hour per kiloWatt (bph/kW)
 - d. Cubic feet per minute per bushel (cfm/bu)