



2002 State Competition
FFA Agricultural Mechanics Contest
University of Missouri
100 points

Contestant # _____
Contestant Name _____
Chapter _____

Written Exam

Oxy-Acetylene

1. The type of flame to use when welding aluminum is:
 - a. Slightly carburizing
 - b. Slightly oxidizing
 - c. Neutral

2. A loud shrill noise is heard while operating an oxyacetylene welder. This is most likely the beginning of a:
 - a. Backfire
 - b. Forefire
 - c. Flashback

3. In order to protect your eyes from the light emitted from an oxy-acetylene flame, the operator should use at least a number:
 - a. 3 shade lens
 - b. 4 shade lens
 - c. 5 shade lens
 - d. 6 shade lens

4. A oxyacetylene welding rod is rated for tensile strength as is an arc welding rod. If you have a rod that is designated as R45, the tensile strength of the weld can be as high as:
 - a. 45 psi
 - b. 450 psi
 - c. 4,500 psi
 - d. 45,000 psi

5. A device that is suitable to light an oxyacetylene welder is:
 - a. Farmer match
 - b. Hot metal
 - c. Pilot light
 - d. Spark lighter/striker
 - e. Both c & d are correct

6. The type of regulator most commonly used by the novice oxyacetylene operator is:
 - a. Single stage
 - b. Two stage
 - c. Three stage
 - d. Four stage

7. Assume you have just purchased the hoses and regulators for an oxyacetylene welder. The hose that would be used to contain the oxygen would most likely be _____ in color and the fittings would have _____ hand threads.
 - a. Red; left-hand
 - b. Red; right-hand
 - c. Green, left-hand
 - d. Green, right-hand

8. Which of the following gases would be contained in a seamless drawn-steel cylinder?
 - a. Oxygen
 - b. Acetylene
 - c. Propane
 - d. MAPP

9. Which of the following cylinders would have a bursting disc as a safety device?
 - a. Oxygen
 - b. Acetylene
 - c. Propane
 - d. MAPP

10. Complete combustion of one volume of acetylene gas requires:
 - a. One volume of oxygen.
 - b. 1.5 volumes of oxygen.
 - c. 2 volumes of oxygen.
 - d. 2.5 volumes of oxygen.

11. When shutting off the oxyacetylene flame during the day, the valve to close first is the:
 - a. Oxygen
 - b. Acetylene
 - c. It really does not matter, they can be shut down in any order.

12. You are about to weld mild steel to cast iron. The filler rod you should select should be made from:
 - a. Mild steel.
 - b. Cast iron.
 - c. Brazing rod.
 - d. None of the above, the two cannot be joined using this type of welding equipment.

13. Which of the following ratios would be considered the maximum withdrawal rate?
- 1/4 cylinder volume per hour
 - 1/2 cylinder volume per hour
 - 1/6 cylinder volume per hour
 - 1/7 cylinder volume per hour
14. The torch valve has been shut off yet the working pressure side of acetylene regulator valve increases to an unusually high level. This is called:
- creep.
 - jump.
 - frost & freezing.
 - purging.
15. The valve on an oxygen cylinder is most always made from:
- Iron.
 - Brass.
 - Copper.
 - Aluminum.
16. Which of the following should **not** be adjusted in any way while oxy-acetylene cutting?
- speed of travel
 - gas pressure
 - distance from metal
 - angle from metal
17. A loud snap or pop is heard while oxy-acetylene welding. This is called a:
- backfire.
 - popping off.
 - flashback.
 - None of the above are correct.

Electrical Motors

18. Universal motors are most commonly available in sizes of _____ horsepower or less.
- 1/8
 - 1/4
 - 1/2
 - 3/4
19. The windings of three- phase induction motors are located approximately _____ degrees out of phase from each other.
- 90
 - 120
 - 180
 - 240

20. The starting torque of a motor varies with classification of the motor. The most common classification is:
- A
 - B
 - C
 - D
21. An inline fuse with a rating of _____ amps may be used to test a capacitor.
- $\frac{1}{4}$
 - $\frac{1}{3}$
 - $\frac{1}{2}$
 - 1
22. A motor with a full- load current of 12.5 amps can be protected from running overload protection by a(n) _____ amp use. (Use minimum rating)
- 10
 - 12
 - 15
 - 17
23. A motor with a full-load current of 25 amps must be run overloaded since you cannot purchase the correct size motor. If the service factor is 1.25, how many amps can this motor pull? (Assume the duty factor is continuous.)
- 25
 - 28.75
 - 31.25
 - 32.5
24. A motor's nameplate provides information about all of the following except_____.
- RPM
 - Class rating
 - Temperature drop
 - Voltage
25. The theoretical speed (RPM) of an electric motor that has one pair of poles is:
- 3600 rpm.
 - 3450 rpm.
 - 1800 rpm.
 - 1725 rpm.
26. The starting windings for electrical motors are wired in _____ with the running windings.
- series
 - parallel
 - services-parallel
 - None of the above are correct.

27. Electrical motors made for the United States and Canada are designed to operate at _____.
- 60 cycles a second
 - 60 cycles a minute
 - 50 cycles a second
 - 50 cycles a minute
28. Motors need adequate cooling or all of these problems can occur except _____.
- Breakdown of the insulation of the winding conductors
 - Overloading of the motor due to partial shorts in the windings
 - A higher amperage draw resulting in greater voltage drop
 - A higher voltage draw resulting in excessive RPMs to motor
29. If a motor has a specific time on its nameplate such as 15, it's time rating (duty) at rated full load is _____.
- 5 minutes
 - 10 minutes
 - 15 minutes
 - 20 minutes
30. All of the following are factors that can affect the life of a motor except _____.
- Dust
 - Water and moisture
 - Dry air
 - Excessive oiling
31. Which of the following is **not** a protective enclosure for an electric motor?
- drip-proof
 - splash proof
 - totally enclosed
 - explosion proof
 - all of the above are protective enclosures
32. Time- delay fuses hold five times their rating for _____ seconds.
- 5
 - 8
 - 10
 - 12
33. For every 330 feet above an elevation of 3300 feet, a motor must be derated _____ percent.
- 1
 - 2
 - 3
 - 4

Repair and Maintenance

34. You should replace a grinding wheel when it is what distance away from the flange.
- $\frac{1}{2}$ "
 - $\frac{3}{4}$ "
 - 1"
 - 1 $\frac{1}{4}$ "
35. The angle on a cold chisel should be
- 45
 - 55
 - 60
 - 75
36. When installing a new wooden hammer handle you should use
- only metal wedges
 - only wood wedges
 - both wood and metal wedges
 - none of the above
37. Which of the following is **not** a type of peen hammer
- ball peen
 - ripping claw
 - curved claw
 - brick
38. Which type of hammer can be safely used to shape metal on an anvil?
- ball peen
 - ripping claw
 - curved claw
 - sledge
39. Bonding metals and alloys that melt at temperatures below 840 F is
- soldering
 - bronzing
 - fusing
 - brazing
40. A 16 inch band saw can be used to cut the center of stock up to
- 8in
 - 15in
 - 16in
 - 32in

41. A miter gage is used to
 - a. measure an angle
 - b. guide stock in to a saw at a desired angle
 - c. measure the motor life of a miter saw
 - d. measure a miter saw blade angle

42. When placing stock in a vise it should be tightened securely to prevent
 - a. breaking a saw blade if cutting
 - b. accuracy in cutting
 - c. coming out
 - d. all of the above

43. Which of the following is not a good method for removing a broken belt
 - a. screwdriver and punch
 - b. screw extractor
 - c. drilling
 - d. torching

44. A common problem with wooden handles is
 - a. rotting
 - b. splitting
 - c. rusting
 - d. bending

45. A solvent recommended for removing grease and light wax is
 - a. gasoline
 - b. kerosene
 - c. turpentine
 - d. water

46. The tool rest on a bench grinder should be secured _____ from the stone.
 - a. 1/16"
 - b. 1/8"
 - c. 1/4"
 - d. 3/8"

47. The size of a bench saw is determined by measuring the: _____ .
 - a. dimensions of the table
 - b. dimensions of the base
 - c. size of the motor
 - d. size of the blade.

48. The name given to the tool that is used to check the squareness of the stone in a bench grinder is:
- combination square
 - emery wheel dresser
 - emery wheel square
 - none of the above are correct.
49. A safe way to grind your metal with the bench grinder is to:
- wear leather gloves
 - hold the metal in your bare hands
 - grip the metal with a pair of pliers
 - b or c are correct.
 - a, b, or c are correct.
50. The size of a band saw is determined by:
- the width of the blade.
 - the dimensions of the "table".
 - the length of the blade.
 - the depth of the throat.

Concrete & Plumbing

51. A cubic yard of concrete containing 9.5 pounds of water and 22 pounds of cement has water-cement ratio of _____.
- .33
 - .37
 - .43
 - .46
52. When grading a lot prior to pouring a slab of concrete, the finished surface should _____.
- Be nearly level.
 - Slope from front to back.
 - Slope away from the building.
 - Slope toward the center of the building.
53. The main purpose of rebar in concrete is to _____.
- Increase the tensil strength
 - Resist vertical loads
 - Increase lateral strength
 - All of the above

54. The prefabricated panel sections most commonly used to form concrete walls are constructed of _____.
- Plywood panels and wood studs
 - Plywood panels and metal frames
 - Metal panels and wood frames
 - All metal
55. Sidewalks are commonly poured _____ thick.
- 3"
 - 4"
 - 5"
 - 6"
56. The 4" (W4.0) in welded wire fabric designed as 6 x 6 – W4.0 x W4.0 indicates that the wire is _____.
- 4"x4" squares
 - 4 gauge wire
 - 4 hundredths of an inch cross sectional area
 - none of the above
57. The maximum allowable slump for concrete used for beams and reinforced walls is _____.
- 1"
 - 2"
 - 3"
 - 4"
58. An effective method for curing a concrete slab is to _____.
- Spread waterproof paper or plastic film over the slab
 - Cover the slab with boards
 - Leave the edge forms in place
 - Place a layer of sand over the slab
59. The banging noise in pipes caused by a quick-closing valve is referred to as _____.
- Water hammer
 - Valve hammer
 - Valve bang
 - Hammer-valve
60. Vertical plastic tubing should be supported every _____.
- Story
 - 48 inches
 - 4 feet
 - 5 ½ feet

61. Which of the following is not valid method of joining plastic pipe?
- Solvent weld joint
 - Insert fitting joint with clamping rings
 - Insert fitting joint with hose clamps
 - Metal coupler joint
62. Which of the following is not a type of valve used in plumbing?
- Wedge valve
 - Gate valve
 - Relief valve
 - Globe valve
63. What is the main disadvantage of using cast iron soil pipe?
- Corrosion
 - Water absorbency
 - Low tensile strength compared to weight
 - Non-uniform wall thickness
64. What do the letters K, L, M, and DWV mean when used to describe copper tubing?
- Wall thickness
 - Strength
 - Outside diameter
 - Inside diameter
65. Annealed copper tubing is also referred to as _____.
- Hard copper
 - Soft copper
 - Strait copper
 - Coiled Copper
66. Hard copper tubing is commonly sold in _____ ft lengths.
- 8'
 - 10'
 - 12'
 - 20'

Ag. Machinery

67. Which of the following tillage implements is not a primary tillage tool?
- Moldboard plow
 - Field cultivator
 - Chisel plow
 - Subsoiler (v-ripper)

68. Which of the following is ***not*** a type of harrow?
- disk-tooth
 - roller
 - tine-tooth
 - spike-tooth
69. The machine horsepower requirement:
- can exceed the power supply available.
 - should ***not*** exceed the power supply available.
70. A baler operator notices that the large round bale is lop-sided. The source of the problem is a/an:
- faulty monitor.
 - twine arm is not wrapping the bale properly.
 - operator failed to "weave" as he was baling.
 - none of the above .
71. The spray pattern of a field sprayer is best adjusted by:
- increasing pressure.
 - decreasing pressure.
 - using nozzle tips with different orifices.
 - changing boom length.
72. A 25 foot wide disk being pulled at 6.5 mph has a theoretical field capacity of:
- 12.5 acres/hour
 - 16.9 acres/hour
 - 19.7 acres/hour
 - 20.0 acres/hour
73. Penetration of a disk into the ground depends on:
- Hitch angle
 - Soil type
 - Soil moisture
 - All of the above
74. During the planting season, a farmer decides to recheck the plant population of his/her corn. The farmer has a 6 row-30 inch row width planter. When examining the how many seeds he is planting he learns that there are 470 total seeds for the 6 rows after planting 60 feet. How many seeds per acre is the farmer applying?
- 22,748
 - 22,700
 - 22,800
 - 22,730

75. How many tons per hour would a farmer bale if he/she is baling a 25' windrow that yields 2.5 tons/acre? Assume he/she is driving 6 mph and operating at 75% efficiency.
- 13.63 tons/hr
 - 17.61 tons/hr
 - 34.09 tons/hr
 - 35.09 tons/hr
76. 1000 R.P.M. power take-off shafts are usually equipped with:
- 21 splines
 - 22 splines
 - 6 splines
 - 5 splines
77. The outer end of a mower cutter bar:
- Should lead or be set ahead of the inner end of the cutter bar.
 - Should lag or be set behind the inner end of the cutter bar.
 - Should neither lag nor lead the inner end of the cutter bar.
 - Should be ignored when adjusting your mower.
78. The greatest cause of wear in hydraulic systems is:
- moisture
 - dirt
 - rust
 - none of the above
79. Banana shaped small square bales are caused by:
- a dull knotter knife
 - a dull bale chamber knife
 - improper tractor PTO speed
 - incorrect needle timing
80. What type of nozzle is ideal for broadcast spraying ?
- Flat fan
 - Hollow Cone
 - Flood
 - Full cone
81. A spray tip that is installed on your sprayer has a 110° spray angle this means you must _____ the boom as compared to using the sprayer with a tip capable of producing an 80° spray angle.
- raise
 - lower
 - keep it the same

Tractor Power

82. If a shovel on a row-crop cultivator is set too flat, it will:
- penetrate too deeply.
 - not penetrate.
 - penetrate only slightly.
 - penetrate moderately.
83. If an excess amount of winter wheat seem to circle the reel then:
- You are operating at a speed too fast for the platform.
 - You have the reel of the combine set too high.
 - You are operating at a speed too slow for the platform.
 - You have the reel of the combine set too low.
84. What type of PTO do most tractors currently have?
- Independent
 - Continuous running
 - Transmissions Driven
 - Hydraulic
85. One horsepower is equal to:
- 33,000 ft, lb/sec
 - 550 ft, lb/min
 - 33,000 ft, lb/min
 - 550 ft, lb/hr
86. Diesel engine knock becomes worse if ignition delay is
- Decreased
 - Increased
 - Closed
 - Delayed
87. Torque is a
- Turning effort
 - Parallel effort
 - Horizontal effort
 - Vertical effort
88. Governors are used to
- Increase engine speed
 - Decrease engine speed
 - Regulate engine speed
 - Kill the engine

89. There are two types of valves in an engine, the intake and exhaust, which is larger?
- Intake
 - Exhaust
 - Both are same
 - Engine only has one valve
90. Which is not one of the valve train of an engine?
- Crank Shaft
 - Camshaft
 - Tappets
 - Rocker arms
91. Some tractors have a 24-volt system. How is this accomplished?
- Two 12-volt batteries in series
 - Two 12-volt batteries in parallel
 - This is impossible
 - One 24-volt battery
92. Diesel engines have a/an:
- Carburetor
 - Injection pump
 - Splash injections
 - None of the above
93. Turbo chargers are powered by
- Exhaust
 - Belt
 - Mechanical
 - Clutch
94. Which fuel has a lower flash point?
- Gasoline
 - #1 Diesel
 - #2 Diesel
 - Kerosene
95. A pre cleaner is used for:
- Oil.
 - Fuel.
 - Air.
 - Antifreeze.

96. Where are nearly all American tractors tested?
- Michigan
 - Illinois
 - Missouri
 - Nebraska
97. What tool is used to measure tractor PTO horsepower?
- Disc brake on PTO shaft
 - Dynamometer
 - Brush Hog
 - Computer
98. Most commonly firing order starts with what cylinder?
- 4
 - 3
 - 2
 - 1
99. The type of diesel fuel injection system that has been looked at by diesel engine manufactures as a better system to deploy on the engine is:
- common rail
 - distributor pump (mechanical)
 - in-line injector pump
 - electronically controlled unit injectors
100. The primary responsibility of a fuel filters on an engine is to:
- remove water from the fuel.
 - warm the fuel prior to injection.
 - remove rust and dirt particles.
 - all of the above are correct.