

## Written Exam

### Electrical Circuits

1. The name given to electricity flowing in a circuit.
  - A. Amperage
  - B. Voltage
  - C. Current
  - D. Resistance
  
2. The force that causes electrons to flow in a circuit.
  - A. Watts
  - B. Amperage
  - C. Current
  - D. Voltage
  
3. A material with low resistance to the flow of electricity.
  - A. Insulator
  - B. Conductor
  - C. Circuit
  - D. Watt
  
4. A unit of electrical power.
  - A. Horse-Power
  - B. Watt
  - C. Amp
  - D. Ohm
  
5. Which of the following does **not** have constant voltage or constant polarity.
  - A. Alternating Current
  - B. Direct Current
  - C. Series Circuit
  - D. Parallel Circuit

6. Which of the following has only one path for electricity to flow.
- A. Alternating Current
  - B. Direct Current
  - C. Series Circuit
  - D. Parallel Circuit
7. The formula: Volts = Amps x Resistance is called:
- A. Bernoulli's Principle
  - B. Ohm's Law
  - C. Circuit Law
  - D. Charles Law
8. How many watts are in a kilowatt?
- A. 1000
  - B. 10000
  - C. 100
  - D. 10
9. You have just walked by and noticed that your partner has connected his/her multi-tester (volt/ohm meter) to a circuit in series. They are most likely measuring:
- A. Ohms
  - B. Volts
  - C. Amps
  - D. None of the above are correct
10. A cable in front of you is labeled AWG 12 GROUND TYPE UF:
- A. The cable has black- red- white- green- or bare conductors.
  - B. The cable has Black- white- green and bare conductors.
  - C. The cable has Black- red- green and bare conductors.
  - D. The cable has Black - white- and bare conductors.
11. To control an electrical device (light bulb) from **four** locations:
- A. Two 4-way switches are connected in the traveler wires between two 3-way switches.
  - B. four 3-way switches are installed in the circuit.
  - C. 2 single pole single throw and 1 single pole double throw switches are used.
  - D. Three 4-way switches are connected in the traveler wires between two 3-way switches.

12. Which of the following locations are suitable for use of type **NM** cable?
- A. Dry or non-corrosive locations
  - B. Moist locations.
  - C. Underground
  - D. All of the above
13. You open up an electrical junction box and note that a wire that is green in color (the insulation that is..) This is the:
- a. Grounding conductor
  - b. Grounded conductor
  - c. Hot or current carrying conductor
  - d. Wild leg
14. Where must a GFCI be located?
- a. Bedroom
  - b. Living Room
  - c. Kitchen
  - d. Foyer
15. Which wire should never be fused?
- a. Neutral Wire
  - b. Hot Wire
  - c. Gray colored Wire
  - d. None of the above.
16. The minimum size service entrance for a residential dwelling is:
- a. 200 amps
  - b. 100 amps
  - c. 60 amps
  - d. None of the above are correct
17. What is/are the allowable number of conductors under each terminal screw of any electrical device?
- a. 1
  - b. 2
  - c. 3
  - d. 4

## **Machinery**

18. A 540 R.P.M. power take-off shaft is equipped with how many splines?
- A. 21 splines
  - B. 22 splines
  - C. 5 splines
  - D. 6 splines
19. A combine operator notices that there is too much trash (Ground up weeds) in the tailings. What would correct this problem?
- A. Reduce cylinder speed
  - B. Increasing ground speed
  - C. Opening up chaffer & extension
  - D. Decreasing cleaning fan speed
20. During the planting season, a farmer decides to recheck the plant population of his/her corn. The farmer has a 12 row-30 inch row width planter. When examining the how many seeds that he/she is planting he/she learns that there are 1,000 total seeds for the 12 rows after planting 60 feet. How many seeds per acre is the farmer planting?
- A. 28,700
  - B. 21,400
  - C. 26,100
  - D. 24,200
21. If nozzle pressure is reduced, then drift?
- A. Increases
  - B. Decreases
  - C. Is not changed
  - D. None of the above
22. What tillage tool does the best job of leveling a seedbed?
- A. Field cultivator
  - B. Moldboard plow
  - C. Chisel plow
  - D. Offset disc

23. What should an operator do when safety decals become lost or damaged?
- A. Still be aware even though they are not there
  - B. Paint over the spot to prevent rust
  - C. Install new decals
  - D. Not worry about it
24. How many acres would be covered if your mower conditioner was rated at 20 acres per hour and you operated it for 12 hours at 87.5% efficiency?
- A. 190 acres
  - B. 210 acres
  - C. 240 acres
  - D. 255 acres
25. What type of crop is typically planted with a grain drill?
- A. Tomatoes
  - B. Field corn
  - C. Cotton
  - D. Wheat
26. What is the first thing that you do when unplugging a baler?
- A. Shut off baler and power source
  - B. Remove all necessary shields to access the plug
  - C. Try to reach the plug and push it through while the baler is running
  - D. Stand on the baler and jump up and down
27. What does theoretical field capacity stand for?
- A. Amount of crop one field can hold
  - B. Amount of harvested grain a field produces
  - C. The amount of acres a given implement can cover in one hour
  - D. Amount of acres “actually” covered in one hour
28. What type of combine attachment removes the head and seed of small grain crops and leaves the stalk?
- A. Stripper head
  - B. Grain table
  - C. Corn head
  - D. Row crop head

29. You have noticed a LOT of chaff in the clean grain tank. To correct this situation, you should:
- A. Slow down the fan speed
  - B. Increase the fan speed
  - C. Slow down the cylinder speed
  - D. Open the pre-cleaner
30. What is the purpose of the feederhouse on a combine?
- A. Thresh the grain
  - B. Separate the grain
  - C. Feed an even crop mat into the machine
  - D. Clean the grain
31. What would be proper clothing for mixing pesticides?
- A. Sandals
  - B. Long sleeve shirt and pants
  - C. Sleeve less t-shirt
  - D. Cloth gloves
32. What type of machinery would have a hydrostatic drive?
- A. Combine
  - B. Self-propelled windrower
  - C. Self-propelled sprayer
  - D. All of the above
33. What type of tillage tool works well to reduce soil compaction?
- A. Row cultivator
  - B. Tandem disc
  - C. V-ripper
  - D. Rotary hoe

### **Arc Welding**

34. The tensile strength of a E6011 electrode is:
- A. 60,000 pounds foot
  - B. 60,000 pounds per square inch
  - C. less than a
  - D. less than b
  - E. none of the above

35. An example of a HIGH TITANIA POTASSIUM electrode is:
- A. E6011
  - B. E6013
  - C. E7024
  - D. E7018
36. Which of the following shielding gases result in greater penetration when MIG welding?
- A. Argon
  - B. Carbon Dioxide
  - C. Helium
  - D. Argon/Carbon Dioxide mix
37. Which of the following is not an example of a deoxidizing agent for MIG welding?
- A. Silicon
  - B. Manganese
  - C. Iron
  - D. Titanium
38. The shielding gas that is recommended to weld aluminum with a MIG welder is:
- A. Carbon Dioxide
  - B. Argon
  - C. Carbon Dioxide / Argon mix
  - D. None of the above are correct
39. Distortion is caused by:
- A. fewer, intermittent welds 6 or 8 inches apart
  - B. Long, continuous beads
  - C. Fewer, intermittent welds 9 - 10 inches apart
  - D. Welding in such a way that your bead is flat and narrow (less than 3/8")
40. Which of the following is used to adjust the current on an arc welder?
- A. Amperage adjustment knob
  - B. Voltage adjustment knob
  - C. Electrode adjustment holder
  - D. Duty cycle adjustment knob

41. Which of the following is an advantage of a low hydrogen electrode?
- A. ability to weld medium to high carbon steel
  - B. welds rusty metal well
  - C. it works exceptionally well with AC current
  - D. it works well with DC(-) current
42. A "rule of thumb" to follow when welding is to select a filler rod that:
- A. has a similar composition as the metal to be welded.
  - B. is at least  $\frac{1}{2}$  as small as the metal to be welded.
  - C. is brown in color.
  - D. is at least  $\frac{1}{4}$  as small as the metal to be welded.
43. A welding machine with a temperature rise of  $110^\circ$  is:
- A. better than a welding machine with a temperature rise of  $120^\circ\text{F}$ .
  - B. of inferior quality when compared with a welder that has a temperature rise of  $120^\circ\text{F}$ .
  - C. no better than a welder that has a temperature rise of  $120^\circ\text{F}$ .
44. A welding machine with 90 volts open circuit voltage will:
- A. strike an arc more easily than a welder with 100 open circuit voltage.
  - B. strike an arc less easily than a welder with 100 open circuit voltage.
  - C. not strike an arc any better than a welder that has 100 open circuit volts.
45. The type of flux coating on E6010 electrodes is:
- A. High cellulose potassium.
  - B. High cellulose sodium.
  - C. High titania potassium.
  - D. High titania sodium.
46. Reverse polarity, when DC arc welding means that:
- A. current flows from the electrode to the work.
  - B. current flows from the work to the electrode.
  - C. current flows in both directions (see a & b above).
  - D. you are welding in a reverse direction.

47. You are welding with an E7018 electrode. You note that you have "porosity" in the weld zone. Which of the following is not a common reason for this condition?
- A. rust present on base metal
  - B. too long arc length
  - C. water present on base metal
  - D. too short arc length
48. The drying oven temperature for an E6011 electrode is:
- A. 140 degrees F
  - B. 250 degrees F
  - C. 400 degrees F
  - D. No drying oven is recommended
49. What is meant by a duty cycle?
- A. The percentage of time in a 5 minute period that a welder can actually be used
  - B. The percentage of time in a 10 minute period that a welder can actually be used
  - C. The percentage of time in a 15 minute period that a welder can actually be used
  - D. The percentage of time in a 30 minute period that a welder can actually be used

### **Small Gas Engines**

50. Which of the following is not part of the valve train?
- A. Push Rod
  - B. Piston
  - C. Rocker Arm
  - D. Valve
51. The name of the cleaning solution that is recommended to clean the foam air cleaning element for a Briggs and Stratton engine is:
- A. Kerosene
  - B. Hot soapy water
  - C. gasoline
  - D. mineral spirits
52. The camshaft of a small 2-stroke gasoline engine rotates:
- A. twice as fast as the camshaft in a four-stroke engine.
  - B. as fast as the camshaft in a two-stroke engine.
  - C. 1/4 as fast as the camshaft in a two-stroke engine.
  - D. none of the above are correct.

53. The purpose of the engine governor is:
- A. maintain varying engine speeds.
  - B. allow the engine to respond to varying loads.
  - C. to close the throttle and choke the engine.
  - D. A and B are correct.
54. One type of engine from the same brand or manufacturer could have all the same:
- A. Serial number
  - B. Engine number
  - C. Model number
  - D. Accessory sequencing number
55. Which of the following indicates the correct sequence for a 4-cycle engine?
- A. Intake - compression - power - exhaust
  - B. Intake - compression - exhaust - power
  - C. Intake - power - exhaust - compression
  - D. Intake - power - compression exhaust
56. Torque is
- A. Measure of RPMs
  - B. Measure of turning effort
  - C. Power
  - D. Speed of turn
57. When setting the gap of a sparkplug you should use a/an:
- A. Flat feeler gage.
  - B. Inside micrometer.
  - C. Vernier caliper.
  - D. Round feeler gage.
58. How many cubic inches of displacement does a single cylinder engine have with a one inch stroke and  $3 \frac{5}{8}$ " bore?
- A. 10.3 Cubic inches
  - B. 41.3 Cubic inches
  - C. 70.6 Cubic inches
  - D. 35.3 Cubic inches

59. There is usually more than one of this type of ring on a piston.
- A. Oil Ring
  - B. Compression ring
  - C. Connecting ring
  - D. Cap ring
60. Which type of air cleaner is most frequently found on a new small gas engine?
- A. Oil bath
  - B. Paper (pleated)
  - C. Foam-osmosis
  - D. All of the above
61. What is an Octane Rating?
- A. Quality of fuel
  - B. Measure of knock resistance
  - C. Ability to atomize
  - D. Atomic structure
62. What is viscosity?
- A. Ability of a liquid to flow
  - B. Boiling temperature of a liquid
  - C. Volume of liquid
  - D. Lubricating quality of a fluid
63. What is valve overlap?
- A. Intake and exhaust valves are open simultaneously
  - B. One valve opens at the same time as another closes
  - C. One valve lies on top of another
  - D. No valve is open at the same time as another
64. What tool would be used to measure diameter of a crankshaft?
- A. Outside Micrometer
  - B. Feeler gage
  - C. Telescoping gage
  - D. Inside Micrometer

65. The ratio of maximum volume to clearance volume in a cylinder is?
- A. Torque ratio
  - B. Compression ratio
  - C. Fuel ratio
  - D. Piston ratio
66. The valve you have removed from your small gas engine is questionable. After grinding it you reference the Briggs and Stratton manual to determine the allowable margin dimensions for your valve. At what point should the valve be replaced?
- A. 1/64" margin or less
  - B. 2/64" margin or less
  - C. 1/32" margin or less
  - D. 2/32" margin or less
67. Under ideal combustion conditions, the pounds of air, in weight, to one pound of gasoline is:
- A. 12 pounds
  - B. 13 pounds
  - C. 14 pounds
  - D. None of the above are correct.

### **Carpentry**

68. Which building material has the lowest R-value per inch.
- A. Gypsum board
  - B. Wood
  - C. Fiberglass Batt
  - D. Concrete
69. When figuring heat loss for a building constructed on a concrete slab, one should consider
- A. Perimeter
  - B. Area
  - C. Both
  - D. Neither

70. How long is a 9 penny nail
- A. 2
  - B. 2 1/4
  - C. 2 3/4
  - D. 3
71. When mailing a tin roof where should the nail be placed
- A. Valley
  - B. Ridge
  - C. Neither
  - D. Does not matter
72. According to APA standards a B-D plywood panel is acceptable for which application(s)
- A. Interior
  - B. Exterior
  - C. Both
  - D. Continuous moisture
73. A roof with a 1/6 pitch means:
- A. Rise is 4" per foot run
  - B. Run is 4" per foot rise
  - C. Rise is 6" per foot run
  - D. Run is 6" per foot rise
74. The horizontal members on the wall of a pole barn to which the tin is attached are called
- A. Purlin
  - B. Headers
  - C. Girts
  - D. Studs
75. The horizontal member between the stud and foundation in balloon frame construction is
- A. Joist
  - B. Plate
  - C. Apron
  - D. Sill

76. Good ventilation in confinement buildings control
- A. Temperature
  - B. Humidity
  - C. Noxious gases
  - D. All of the above
77. To take advantage of solar heating the open side of a U-barn should face the
- A. North
  - B. South
  - C. East
  - D. West
78. Which lumber will have the greatest tension parallel to grain of wood
- A. Douglas fir
  - B. Spruce
  - C. White oak
  - D. Southern pine
79. Failure of a column will occur due to
- A. Buckling
  - B. Shear
  - C. Crushing
  - D. Both A & C
80. The shortest piece of wood that can be safely planed is:
- A. 9 inches
  - B. 12 inches
  - C. 15 inches
  - D. 18 inches
81. When sanding your wood, especially when “finishing” your wood prior to varnishing the wood, you should sand:
- A. With the grain
  - B. Against the grain
  - C. It just does not matter

82. When cutting against the grain of 1" \* 6" board, what type of saw blade should be used?
- A. Cross cut
  - B. Rip cut
  - C. None of the above apply
83. The most correct power tool to use when cutting a 2" \* 8" \* 16' piece of lumber to 10' long is:
- A. Table Saw
  - B. Radial Arm Saw
  - C. Wood Band Saw
  - D. Jig Saw

### **Soil & Water Conservation**

84. Which of the following is not a result of Soil Erosion?
- A. Improved infiltration rate
  - B. Loss of nutrients
  - C. Loss in Production Potential
  - D. Reduced Storage Capacity
85. Which of the following will not reduce wind erosion.
- A. Windbreaks
  - B. Strip cropping
  - C. Crop residue
  - D. Conventional tillage practices
86. The name of the farming practice that involved "farming across" the slope?
- A. Strip cropping
  - B. Contour Farming
  - C. No-till farming
  - D. Crop rotation
87. This type of erosion results from a combination of raindrop splash and surface runoff.
- A. Channels
  - B. Gullies
  - C. Sheet
  - D. Freezing and thawing

88. A farm pond contains 1,401,625 gallons of water. How many acre-feet does it contain?
- A. 1140 acre-ft
  - B. 4.3 acre-ft
  - C. 20.4 acre-ft
  - D. 100 acre-ft
89. How many acres are covered by a piece of land measuring 5280 ft by 2640 ft?
- A. 640 acres
  - B. 1 acre
  - C. 150 acres
  - D. 320 acres
90. Assume the angle of a slope remains constant: If you increase the length of a the slope it:
- A. Increases soil erosion and run-off water.
  - B. Increases soil erosion and yet reduces run-off water.
  - C. Decreases soil erosion and run-off water.
  - D. Decreases soil erosion but increases run-off water.
91. Which of the following is a source of error when leveling?
- A. Using clean optics.
  - B. Settling of the rod or level.
  - C. Testing the level frequently when in use.
  - D. Placing the level on firm ground.
92. Given a 1320 ft center pivot irrigation system How many acres does it irrigate in one full pass?
- A. 150 Acres
  - B. 160 Acres
  - C. 135 Acres
  - D. 126 Acres
93. What is the length of a Gunter's chain?
- A. 66 feet
  - B. 100 feet
  - C. 250 feet
  - D. 300 feet

94. If farming on a contour with a 30 foot implement, how far apart should the terraces be spaced?
- A. 30 feet
  - B. 90 feet
  - C. 120 feet
  - D. 130 feet
  - E. None of the above
95. What type of erosion control practice is used when grass strips are planted between growing crops?
- A. Contour farming
  - B. Minimal tillage
  - C. Strip cropping
  - D. No-till farming
96. Which of the following is an appropriate use of a "hand level"?
- A. Differential leveling
  - B. Profile leveling
  - C. Checking to see if a given point is level with a contour line
  - D. None of the above are correct
97. When using the universal soil-loss equation  $A = RKLSCP$ , the term "K" is a function of:
- A. rainfall
  - B. soil erodibility
  - C. slope length
  - D. slope gradient
98. Erosion produced channels that can be obliterated by tillage are called:
- A. gully erosion.
  - B. rill erosion.
  - C. sheet erosion.
  - D. wind erosion.
99. You have just overheard your neighbor say that the ground he is working is alkaline. Which of the following pH levels below is most alkaline?
- A. 11
  - B. 9
  - C. 7
  - D. 5

100. The wind has been blowing excessively for several hours. A cloud of dirt can be seen from the distance, and it appears to originate from a field that you are renting. What should you do to limit the erosion? Remember, this must be done ASAP.
- A. Planting trees
  - B. Utilize Strip cropping procedures
  - C. Use your chisel plow to rough up the surface of the soil
  - D. None of the above are correct