

**State Ag Mechanics Exam
2017**

Theme: "Materials Handling"

Directions: Write your answers on the computer scantron bubble sheet. Put your name on the answer form. Read each question carefully and select the correct answer from the list provided for the specific question. GOOD-LUCK!!!

ELECTRICITY

1. Electricity is the flow of electrons through a conductor.
 - a) True
 - b) False

2. A conductor allows protons to flow in one direction only.
 - a) True
 - b) False

3. The pressure or force that pushes the electrons through the conductor is called?
 - a) amperage or current
 - b) resistance or ohms
 - c) voltage
 - d) watts or power
 - e) none of the above

4. The quantity of electron flow or the number of electrons flowing is called?
 - a) amperage or current
 - b) resistance or ohms
 - c) voltage
 - d) watts or power
 - e) none of the above

5. A byproduct of electron flow is?
 - a) power
 - b) fission
 - c) condensation
 - d) heat

6. The unit for electrical power, (such as the size or rating of a heater) is called?
 - a) ohms
 - b) voltage
 - d) amps
 - e) none of the above

7. An electric bill is calculated by the number of kilowatt-hours used times the cost for a kilowatt-hour.
- True
 - False
8. Opposition to electron flow in a conductor or circuit is called?
- amperage or current
 - resistance or ohms
 - voltage
 - watts or power
 - none of the above
9. Electricity in this country is produced by AC generators at large power plants.
- true
 - False
10. Electrons that flow one direction and do not reverse their flow is called DC or alternating current.
- True
 - False
11. Flashlight and car batteries store electricity and release it as AC current.
- True
 - False
12. A magnetic force field is created around the conductor when electrons flow through that conductor.
- True
 - False
13. Insulators prevent electron flow because they have which of the following properties?
- low resistance
 - high resistance
 - low voltage
 - high voltage
14. Hertz refers to the number of times AC changes direction in a second.
- True.
 - False
15. Which of the following is true regarding conductors and resistance?
- as conductor length increase's so does resistance
 - as the area of a conductor increases, resistance goes down
 - as the temperature of a conductor goes up; resistance goes up
 - all of the above
 - none of the above

16. A closed circuit is one in which the electrons can flow.
- a) True
 - b) False
17. A short circuit is when all of the electricity bypasses the intended load.
- a) True
 - b) False
18. Which of the following may be used to safely protect the circuit from current surges?
- a) fuse
 - b) circuit breaker
 - c) copper penny
 - d) all of the above
 - e) only a & b are correct
19. The wire that represents the ungrounded conductor has what color insulation?
- a) black
 - b) white
 - c) red
 - d) green
 - e) none of the above
20. In a series circuit, if the first light bulb burns out, the rest of the lights will?
- a) burn normal
 - b) burn less bright
 - c) burn brighter
 - d) not burn at all
 - e) none of the above
21. Which of the following are required for a proper circuit in addition to a switch, conductors, load, and over-current protection?
- a) amperage
 - b) voltage source
 - c) resistance
 - d) all of the above
 - e) none of the above
22. Stray voltage can affect livestock production.
- a) True
 - b) False

23. When wiring a simple one way switch to control a light circuit, the switch is connected to which of the wires?
- a) Black
 - b) White
 - c) Purple
 - d) Black & white
 - e) Any of the above
24. Your body must absorb 10 amps of current before electrocution will take place.
- a) True
 - b) False
25. Before working on an electrical circuit, the first thing you should do is be sure the electrical circuit is off.
- a) True
 - b) False

ELECTRIC MOTORS

26. Electric motors draw 3-4 times their running amperage during their initial start up
- a. true
 - b. false
27. Electric motors are a relative inexpensive source of power.
- a. true
 - b. false
28. Electric motors are approximately 45 % efficient.
- a. true
 - b. false
29. A car starter is an example of an AC motor.
- a. true
 - b.false
30. A dual voltage motor is one that can run on either 110 or 220 volts electricity.
- a. true
 - b.false
31. The type of electric motor used to drive a feed auger or silo unloader is?
- a.universal
 - b.capacitor
 - c.repulsion start
 - d.split-phase
32. The type of electric motor used in an electric drill?
- a.universal
 - b.capacitor
 - c.repulsion start
 - d.split-phase

33. This type of electric motor would most likely be found driving an exhaust fan or other low torque applications.
- a.universal
 - b.capacitor
 - c.repulsion start
 - d.split-phase

TRACTOR OPERATION

34. If you drive a tractor on the highway for only a short distance a slow moving vehicle emblem is not required.
- a) True
 - b) False
35. To safely operate a tractor on sloped surfaces the operator should drive directly up and down the slope and not across the slope.
- a) True
 - b) False
36. The 2 standard PTO shaft speeds on a tractor are 540 and 1000 rpms.
- a) True
 - b) False
37. The PTO shaft may be slid on or attached while the tractor engine is running.
- a) True
 - b) False
38. Overhead electrical power lines are a safety hazard when moving grain augers.
- a) True
 - b) False
39. The operator should never start the tractor from the ground.
- a) True
 - b) False
40. A tractor can be used to haul many things, such as grain, manure, feed, and extra riders.
- a) True
 - b) False

“MECH” MATH

41. A silo 20 feet in diameter and 60 feet tall could hold how many cubic feet of silage?
- a) 1200
 - b) 24000
 - c) 18840
 - d) none of the above

42. If a ton of silage is equal to 50 cubic feet and the yield is 20 tons per acre, how many acres could be harvested and put into this silo?
- a) 12.84
 - b) 18.84
 - c) 24.84
 - d) none of the above
43. Ten 100 watt light bulbs that burn for 1 hour is how many Kwh?
- a) 1
 - b) 10
 - c) 100
 - d) 1000
44. A concrete pad that is to support a grain bin is 24' in diameter and 6 inches deep. How many cubic feet of concrete will it take to form the pad?
- a) 144
 - b) 226
 - c) 360
 - d) 552
45. A yard of concrete is how many cubic feet?
- a) 3
 - b) 9
 - c) 18
 - d) 27
46. A water pump that will pump at a rate of 50 cubic feet per minute has an output in gallons of how much?
- a) 6.67
 - b) 12.34
 - c) 24.68
 - d) 4.1
 - e) none of the above
47. A 1000 watt heater that is powered by a 240 volt voltage source would have a current of how many amps?
- a) 16.17
 - b) 12.17
 - c) 8.17
 - d) 4.17
48. An electrical load with 5 ohms of resistance and powered by 120 volts would have a current flow of how many amps?
- a) 6
 - b) 12
 - c) 18
 - d) 24

49. How many cubic inches in a board foot of lumber?

- a) 12
- b) 24
- c) 96
- d) 124
- e) 144

50. If an irrigation ditch has to have a 0.2% slope to make the water flow through it. How many inches of drop or slope would there be for every 100 feet of horizontal distance?

- a) 2.4
- b) 4.1
- c) 6.1
- d) 1.2

FIELD OPERATIONS

51. Which of the following will hold the least moisture?
- sand
 - silt
 - clay
 - Does not matter
52. Increased amounts of crop residue will have no effect on the cropping practices for the next year?
- true
 - false
53. The sprayer boom must be parallel to the ground at all times?
- true
 - false
54. Sprayer speed does not have an effect on the amount of chemical applied per acre?
- true
 - false
55. A diesel engine burning bio diesel will produce less emissions of?
- CO₂
 - Sulphur
 - PAH's
 - All of the above
56. If $(\text{speed} \times \text{width})/8.25 = \text{the capacity of a machine}$, then an 8 row 30" corn planter pulled at a speed of 5.5 mph would be able to do?
- 13.3 acres/hour
 - 6.3 acres/hour
 - 15.3 acres per hour
 - None of the above
57. Which of the following statements is true regarding machine performance?
- Actual capacity is equal to theoretical capacity
 - Actual capacity is less than theoretical capacity
 - Actual capacity is greater than theoretical capacity
 - None of the above
58. A field with a lot of crop residue will require which of the following?
- Increase spray pressure
 - Decrease spray pressure
 - Lower spray boom height
 - Higher spray boom height

59. Which of the following row widths will have the corn seeds planted closer together?
- a. 40"
 - b. 36"
 - c. 30"
 - d. All the same
60. The number of square feet in 1 acre is?
- a. 640
 - b. 5280
 - c. 24,500
 - d. 43,560
 - e. None of the above

VENTILATION

61. Which of the following will hold the most moisture?
- a. Cold air
 - b. Warm air
 - c. Hot air
 - d. Does not matter
62. Which air mass will rise up in a livestock building?
- a. Cold air
 - b. Warm air
 - c. Both will rise equally
 - d. None of the above
63. Trapped moisture in a livestock building may cause which of the following?
- a. Sickness
 - b. Deterioration to the building materials
 - c. High humidity
 - d. All of the above
64. Which of the following conditions will cause moisture condensation on the inside of a livestock building?
- a. Cold air on the outside of the roof, warm air on the inside
 - b. Cold air on the outside of the roof, cold air on the inside
 - c. Warm air on the outside, cool air on the inside
 - d. None of the above
65. Animals inside a building will produce which of the following that will need to be ventilated?
- a. Methane
 - b. Moisture
 - c. Heat
 - d. All of the above

66. In a naturally ventilated livestock building, where should the air vents be placed for the air exiting the building?
- Middle of the wall
 - Bottom of the wall
 - Top of the wall
 - Peak of the roof or ridge
67. In a naturally ventilated livestock building, where should the air vents be placed for the fresh air entering the building?
- Middle of the wall
 - Bottom of the wall
 - Top of the wall
 - Peak of the roof or ridge
68. A poorly ventilated livestock building in which the incoming cool air enters too fast would cause?
- Drafts
 - Adequate temperature exchange
 - Improved air exchange
 - None of the above
69. The device that will turn ventilation fans on & off automatically by temperature variations is called a?
- Humidistat
 - Thermocouple
 - Thermostat
 - Rheostat

FORMULAS

Area of circle = $r^2 \times 3.14$ Volume = area \times height

1 cubic foot of water equals 7.5 gallons

Watts = Volts \times Amps

Volts = Amps \times Resistance(ohms)

Slope = rise/run