

2018 MN FFA Ag Mechanical and Technical Systems Exam

Bubble in the most correct answer for each question on the top half of the back side of your scantron.

Metal Fabrication – (SMAW, TIG, Plasma, Hot Metal)

- Annealing means to _____.
 - control the temperature of the metal using electromagnets
 - rapidly cool metal in water or oil
 - heat to a high temperature and immediately cool
 - heat metal to a high temperature and cool very slowly
- The purpose of the flux coating on an electrode is to _____.
 - protect the weld from oxygen
 - electrically insulate the wire core of the electrode
 - promote solidification of the weld pool
 - All of the above.
- All SMAW welding machines are constant current; this means they _____.
 - are constantly on
 - charge the particles in the electrode positively
 - are easy to arc on nonferrous metals
 - provide an even supply of amperage to the electrode
- A machine's _____ is a rating that indicates how long the machine can continuously operate at a given amperage during a ten-minute period without overheating.
 - duty cycle
 - load rating
 - maximum work
 - maximum current
- Slag is _____.
 - weld waste and impurities that form at the top of the weld bead
 - easy to remove; promotes rapid cooling
 - settles to the root of the weld and provides added strength to the weld
 - a defect that causes brittleness in the weld
- Fast-freeze electrodes _____.
 - have heavy iron powder flux and make smooth welds with easy-to-remove slag
 - provide deep penetration, light slag, and the ability to weld out of position
 - provide medium penetration and smooth depositions at moderately high rates
 - provide light penetration, light slag, and smooth deposition
- A diffuser on a plasma cutter, also known as a swirl ring, _____.
 - diffuses gas at the end of the cut
 - creates high energy to ionize plasma
 - causes the gas to swirl and energize
 - All of the above.
- When plasma cutting, dross is _____.
 - the expelled gas from the torch tip
 - the wrinkled edge of cut metal
 - the debris created by the cutting action
 - the space of the cut left by the torch tip

9. The two main differences between a dedicated SMAW machine and one designed for GTAW are:
- A. the addition of high-frequency starting and remote control
 - B. the addition of shielding gas flow rate and amperage controls
 - C. the addition of amperage control and a clean cycle for aluminum
 - D. There are no differences.
10. The difference in the hazards between GTAW and SMAW is that GTAW produces ____.
- A. less light and twice the smoke
 - B. more light and twice the smoke
 - C. less light and less smoke
 - D. more light and less smoke

Building Construction

11. Load-bearing members support _____
- A. only the roof
 - B. a specific portion of the building's load
 - C. the siding and interior walls
 - D. the floors and ceilings
12. Pole frame construction consists of _____
- A. posts and stud wall structure
 - B. steel beams and rafters
 - C. stud walls and bricks for the exterior covering
 - D. posts as the main wall structure
13. The advantage of post and truss framing is that it _____
- A. creates large open areas inside the building
 - B. is the least expensive system of framing
 - C. is the easiest type to use for multistory building
 - D. is the easiest to brace and add subfloors
14. Purlins _____
- A. are boards used to connect trusses or rafters
 - B. provide an attachment point for roofing materials
 - C. add strength to the structure
 - D. All of the above
15. The main reason for slope of a roof is _____
- A. increase storage space above ceiling.
 - B. follows local customs on visual appeal
 - C. visual appeal
 - D. adequate drainage
16. The most commonly used material for agricultural roofs is _____.
- A. metal
 - B. wood
 - C. asphalt
 - D. fiberglass
17. Shingles are generally installed _____.
- A. in overlapping layers
 - B. with nails in the tar layer
 - C. with 1" – 3" of each shingle exposed
 - D. during cool weather to avoid heat issues for workers

18. The stress caused by or the weight of everything placed on, in, or temporarily attached to a structure, is referred to as a(n) _____.
- A. environmental load
 - B. static load
 - C. dead load
 - D. live load
19. Insulation prevents heat transfer by _____.
- A. reducing water vapor escape
 - B. separating the inside from the outside
 - C. preventing air movement
 - D. filling voids in wall space
20. Ventilation of a structure is all of the following, *except* _____.
- A. critical to confined livestock's quality of air
 - B. important for maintaining dry crawlspaces
 - C. critical for improving insulation value
 - D. critical for reducing heat in attics and thus buildings

COMBINES

21. Which of these is **not** a part of the cleaning unit on the combine?
- A. fan
 - B. chaffer
 - C. beater
 - D. sieve
22. What percent of the threshing (removing kernel from cob or bean from pod) is completed at the cylinder/rotor concave area?
- A. 100%
 - B. 90%
 - C. 80%
 - D. 70%
23. Inspecting the grain in the grain tank we noticed a large number of broken seed. What can the operator adjust to correct this problem?
- A. slow the combine down less MPH
 - B. speed up the cylinder
 - C. slow the cylinder down
 - D. speed up the fan
24. This hydraulic pump can change output flow without a change in rpm.
- A. fixed displacement
 - B. open centered
 - C. variable displacement
 - D. positive displacement
25. The basic rule for setting reel speed is:
- A. reel speed is equal to ground speed
 - B. reel speed is 50% faster than ground speed
 - C. reel speed is 25% faster than ground speed
 - D. reel speed is 25% slower than ground speed
26. Knife register on a combine cutter bar refers to:
- A. the centering of the cutter bar knife in the guards at the end of both back and forward motions of the bar.
 - B. the length of the forward stroke of the cutter bar
 - C. proper spacing of guards on the header
 - D. adjustment is by use of single or dual point knives

27. A foaming condition of the hydraulic system indicates:
- A. air in the system
 - B. cross contamination of oils
 - C. water in the oil
 - D. foaling oil
28. Which of the following statements is **not** true regarding crop threshing in the combine:
- A. for a small seed crop it is best to run a narrow cylinder to concave spacing.
 - B. if the concave is set too close for the crop harvested, straw will be excessively torn up and more horsepower will be required.
 - C. because concave to cylinder spacing is critical, be sure the concave is kept parallel to the cylinder or rotor
 - D. a basic solution to reduce grain cracking is to slow the engine speed as it will slow all combine functions proportionally.
29. The final cleaning of grain in the combine is accomplished at the:
- A. sieve
 - B. chaffer
 - C. finger bar
 - D. chaffer extention
30. The proper flow pattern for grain in a combine is:
- A. cutting, feeding, threshing, separating, handling
 - B. cutting, threshing, feeding, separating, handling
 - C. cutting, feeding, threshing, separating, cleaning, handling
 - D. cutting, feeding, threshing, cleaning, separating, handling

ENGINE SYSTEMS

31. Bernoulli's principle states that air flowing through a narrowed portion of a tube increases in velocity and decreases in pressure. The application of this principle is used in a(n):
- A. carburetor venture
 - B. engine intake system
 - C. piston head design
 - D. hydraulic cylinder design
32. The wear in an engine cylinder that is defined as the difference in cylinder diameter at points 90 degrees apart in the same plane is called?
- A. distortion
 - B. out-of-round
 - C. taper
 - D. optical
33. Which of the following will results in excessive black engine exhaust:
- A. lean air fuel ratio
 - B. worn valve guides
 - C. rich air fuel ratio
 - D. low octane gasoline
34. A _____ is an integral thin cast strip designed to provide efficient air circulation and dissipation of heat away from the engine cylinder block into the air stream.
- A. cooling tower
 - B. cooling fin
 - C. cooling fan
 - D. cooling throat

35. The purpose of the primary winding in an ignition system is:
- A. to reinforce the secondary windings which increases reliability
 - B. to allow the secondary fields to collapse and the lines of magnetic flux pass into the primary windings inducing enough voltage to jump the spark plug gap.
 - C. to allow a storage facility for the magnetic flux when the transmitter opens the circuit
 - D. to induce current into the secondary winding to fire the spark plug.
36. The part of the engine valve that makes contact with the valve seat to seal the combustion chamber is called the:
- A. valve margin
 - B. valve stem
 - C. valve face
 - D. valve seal
37. The intake manifold of the diesel engine allows
- A. air to enter the cylinder past the intake valve
 - B. fuel and air to enter the cylinder past the intake valve
 - C. fuel to enter the cylinder past the intake valve
 - D. air to enter the cylinder and exhaust gases to escape
38. When referring to diesel fuel grades:
- A. no. 1 diesel fuel is a higher class of volatile fuel than no. 2
 - B. no. 2 diesel fuel is a higher class of volatile fuel than no.1
 - C. no. 2 diesel fuel is recommended for extreme cold weather conditions
 - D. no. 1 diesel fuel is recommended for high power demands due to its higher btu's per gallon over no.2
39. The _____ transmits power to the driving axles and allows the two rear wheels to turn at different rates of speed while still propelling their share of the load:
- A. transmission
 - B. torque converter
 - C. differential
 - D. clutch
40. What tool is used to check the freezing protection of an antifreeze solution?
- A. barometer
 - B. spectrometer
 - C. thermometer
 - D. hydrometer

ELECTRIC CIRCUITS

41. To control a light bulb from three locations you will need:
- A. to locate the light between two three way switches
 - B. 2 single pole single throw switches
 - C. 3 three way switches
 - D. 2 three way switches and a 4-way switch located between the 3 way switches
42. This unit is used like a toggle switch to turn a line of power on and off at the main panel but also has an overload safety device incorporated:
- A. fustat
 - B. fusetron
 - C. circuit breaker
 - D. panel switch

43. The label on electric wire is NM 12-2 w/G. The letters NM stand for:
- A. non-metallic
 - B. neutral mode
 - C. non-conductive
 - D. N stands for 12 wire and M stands for model (2 wire)
44. When attaching wire to a screw terminal it should be turned:
- A. clockwise around the terminal
 - B. counterclockwise around the terminal
 - C. either direction is fine
 - D. at least twice around the terminal
45. Single pole switches have two terminals or in some cases a third, which is ground. Which of the following statements is true?
- A. switches are always wired to hot wires only
 - B. both terminals are green colored
 - C. wires must be attached on the terminals to follow the flow of the current
 - D. switches are wired to black color coded wires
46. Which of the following statements is **not** true when describing 3-way switches?.
- A. 3- way switches are used in pairs to control a light or receptacle from two locations
 - B. 3- way switches have three brass terminals
 - C. there are no "on" or "off" markings on 3- way switches
 - D. 3- way switches have three terminals, one black or copper colored and two brass or silver colored
47. The power carrying wires on 14/3 w/G cable are color coded:
- A. black only
 - B. red only
 - C. black and red
 - D. white only
48. Voltage is electrical "pressure" and can be measured by a voltmeter, which is attached (120 volt current)
- A. across the black and white wire
 - B. across the black and red wire
 - C. across two black conductors to measure current flow
 - D. across two black conductors to measure the difference in current flow
49. An example of a normally open (NO) switch is a:
- A. light switch
 - B. electric motor switch
 - C. door bell
 - D. circuit breaker
50. When wiring a duplex receptacle:
- A. the white wire is connected to the brass colored screw
 - B. the ground wire is connected to the green screw
 - C. the black wire is connected to the silver colored screw
 - D. all of the above are correct

2018 Ag Mechanical and Technical Systems Exam Key

1. D
2. A
3. D
4. A
5. A
6. B
7. C
8. C
9. B
10. D
11. B
12. D
13. A
14. D
15. D
16. A
17. A
18. D
19. C
20. C
21. C
22. A
23. C
24. C
25. C

26. A
27. A
28. D
29. A
30. C
31. A
32. B
33. C
34. B
35. D
36. C
37. A
38. A
39. C
40. D
41. D
42. C
43. A
44. A
45. C
46. B
47. C
48. A
49. C
50. B