ANSWERS TO EXAMINATION Do Not Distribute

2009 Examination for the National Agricultural Mechanics Career Development Event: PROCESSING SYSTEMS

Mark all answers on the Scantron sheet using a pencil. *Read each question carefully and identify the single correct answer. Use the blank sheets of paper to do all scratch work. Students will need a calculator to complete this examination, but they are* ***not allowed*** *to share a calculator with another student.*

SECTION 1: MACHINERY & EQUIPMENT SYSTEMS Question 1-20

1. What is the name of the tillage system that leaves about one third of the soil covered with crop residue and includes no-till, strip-till, ridge-till, and mulch-till?
A. Deep-plow tillage
B. Conservation tillage
C. Conventional tillage
D. Aeration tillage
Answer B. Reference: http://www2.ctic.purdue.edu/Core4/support/OrderInfo/ct.pdf

2. What essential nutrient required for plant growth do legume cover crops provide?
A. Nitrogen
B. Phosphorus
C. Potassium
D. Gypsum
Answer A. Reference: **http://agron.scijournals.org/cgi/content/abstract/76/1/51**

3. What is the name of the farming practice where the annual crop grown alternates in a planned pattern?
A. Irrigation
B. Pest mitigation
C. Crop rotation
D. Crop dehydration
Answer C. Reference: (http://www.ers.usda.gov/Data/Organic/glossary.htm

4. Which of the following is a list of fertilizer application techniques?
A. Broadcasting, fumigation, and subsoiling
B. Surface banding, mitigating, and saturating
C. Deep banding, subsoiling, and surface banding
D. Deep banding, broadcasting, and surface banding
Answer D. Reference: http://www.jstor.org/stable/4045585?seq=4&cookieSet=1

5. What are the two main types of threshing systems found on combine harvesters?
A. Centrifugal and conventional
B. Rotary and conventional
C. Side-hill and nonconventional
D. Full fingered and nonconventional
Answer B. Reference: http://tractors.wikia.com/wiki/Combine_harvester

Leon, I could not verify question 6. Please double check.

6. A rotary threshing system includes what mechanical component?
A. Straw walker
B. Shaker pan
C. Cleaning shoe
D. Cylinder bar
Answer C. Reference: http://tractors.wikia.com/wiki/Combine_harvester

7. A small utility vehicle is equipped with a carbureted gasoline engine. The carburetor utilizes a restricted air passage to enable the fuel and air to mix. What is the name of the restricted air passage?
A. Throttle valve
B. Choke valve
C. Venturi
D. Needle valve
Answer C: Mechanical Technology in Agriculture, Johnson et al, p. 368

8. What is the approximate compression ratio for the pistons of a gasoline engine?
A. 1 to 1
B. 8 to 1
C. 14 to 1
D. 22 to 1
Answer B: Introduction to Agricultural Engineering Technology, Field and Solie, p. 56

DO NOT WRITE OR MARK ON EXAM

9. What is the maximum length of time the starter (starter motor) be operated during each attempt to start a tractor?
A. 5 second
B. 10 seconds
C. 30 seconds
D. 60 seconds
Answer C: Mechanical Technology in Agriculture, Johnson et al, p. 394

10. In a conservation tillage system such as mulch tillage, approximately how much of the soil surface should remain covered by crop residues?
A. 10 percent
B. 30 percent
C. 70 percent
D. 100 percent
Answer B: Farm Power and Machinery Management, Hunt, p. 100

11. Under ideal conditions, which of the following primary tillage implements results in the best residue burial and superior soil pulverization?
A. Moldboard plow
B. Chisel plow
C. Subsoiler
D. Disk harrow
Answer A: Farm Power and Machinery Management, Hunt, pp. 100-101

12. Which of the following will cause an increase in planting rate (seeds/acre) for a row crop planter that uses a ground-driven metering system?
A. Increase in the travel speed of the planter
B. Reduction in the travel speed of the planter
C. Over inflation of the planter's drive wheel tires
D. Under inflation of the planter's drive wheel tires
Answer D: Planting – FMO Deere and Company, pp. 25-26

13. The theoretical field capacity of agricultural machinery is a function of what two primary factors?
A. PTO speed and maximum torque of the tractor
B. Effective swath width and travel speed of the machinery
C. Machine weight and drawbar horsepower
D. Machine capacity and machine operating life
Answer B: Introduction to Agricultural Engineering Technology – Field and Solie, p. 124

14. What tractor power train component allows each tractor drive wheel to rotate at a different speed and still propel its own load?
A. Clutch
B. Final drive
C. Differential
D. Transmission
Answer C: Preventive Maintenance – FMO Deere and Company, p. 137

15. When purchasing a tractor, the salesperson describes the amount of weight the unit can pull at a given speed. What kind of power is being described by the salesperson?
A. Engine horsepower
B. Drawbar horsepower
C. PTO (power take-off) horsepower
D. Hydraulic horsepower
Answer B: Machinery Maintenance – FOS Deere and Company, p. 19

16. 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
Answer A: Introduction to Agricultural Engineering – Roth and Field, p. 67

17. Which of the following would be considered a fuel conservation technique?
A. Shifting to a lower gear and throttling up when pulling a light load
B. Shifting to a higher gear and throttling down when pulling a light load
C. Operating the tractor at partial load
D. Making unnecessary trips through the field
Answer **B**: Machinery Management – FBM Deere and Company, p. 79

DO NOT WRITE OR MARK ON EXAM

18. A small utility vehicle utilizes a 12-volt electrical system to power two 37.5-Watt halogen headlights. How much electrical amperage is needed to power the two headlights? Note: Watts = Volts x Amps

A. 4.20 amps
B. 6.25 amps
C. 7.75 amps
D. 9.20 amps

Answer B: (2 x 37.5 Watts) = (12 Volts x ? Amps) => 6.25 amps

19. What approximate horsepower is produced by the PTO of a tractor, with a torque of 1,400 foot-pounds, when operated at 1,000 revolutions per minute? **PTO horsepower = (Torque in foot-pounds) x (Rotational Speed in revolutions per minute) / 5252**

A. 267 horsepower
B. 289 horsepower
C. 323 horsepower
D. 367 horsepower

Answer **A**: PTO horsepower = (Torque x Rotational Speed) / 5252 = (1,400 x 1,000) / 5252 = 266.565 hp

20. A field implement has an effective field capacity of 86 acres in an 8-hour day. What is the equipment's approximate field efficiency if the swath width is 16 feet and the average travel speed is 6.5 miles per hour?

Note: Effective Field Capacity in acres / hour = (Field Efficiency in percent) x (Speed in miles / hour) x (Width in feet) / 8.25

A. 65 percent
B. 75 percent
C. 85 percent
D. 95 percent

Answer C: 85.276 % = 0.85276 = FE = [(EFC x 8.25) / Speed x Width)] = [(86 ac/8 hr) x 8.25] / (6.5 mph x 16 ft)

SECTION 2: INDUSTRY AND MARKETING SYSTEMS Question 21-40

21. Which of the following can be defined as "the rental charge for the use of capital"?

A. Depreciation
B. Interest
C. Investment
D. Rate of return

Answer B: Farm and Ranch Business Management, 2004. John Deere, p A-5

22. How is a businesses' net worth calculated?

A. Annual profit minus annual expenses
B. Annual profits plus annual expenses
C. Total assets minus total liabilities
D. Total assets plus total liabilities

Answer C: Farm and Ranch Business Management, 2004. John Deere, p 3-4

23. Which of the following is a fixed cost?

A. Cost of seed, fuel and fertilizer
B. Taxes on land and buildings
C. Taxes on income and purchases
D. Cost of labor, marketing, and machine repair

Answer B: Farm and Ranch Business Management, 2004. John Deere, p A-11

24. Which method of accounting reports income and expenses for the time period in which they occur?

A. Accrual method
B. Cash method
C. Double entry method
D. Single entry method

Answer A: Farm and Ranch Business Management, 2004. John Deere, p 2-6

25. Which of the following would be considered a liability in farm accounting?

A. A debt owed to you by another farmer
B. A bill that you owe at the farm supply store
C. Money in your checking account
D. The cash value of your life insurance policy

Answer B: Farm and Ranch Business Management, 2004. John Deere, p 3-2 to 3-3

26. Which of the following is an example of real property?

A. Land
B. Livestock
C. Machinery
D. Stocks and bonds

Answer A: Farm and Ranch Business Management, 2004. John Deere, p 11-26

27. In a farming operation, an operating loan could be legitimately used to purchase which of the following?

DO NOT WRITE OR MARK ON EXAM

A. A building
B. Fertilizer
C. Land
D. A tractor
Answer B: Farm and Ranch Business Management, 2004. John Deere, p A-7

28. What type of insurance gives a farmer protection against financial loss if a combine or tractor burns?
A. Accident and health insurance
B. Property insurance
C. Liability insurance
D. Life insurance
Answer B: Farm and Ranch Business Management, 2004. John Deere, p 11-13

29. Which of the following types of farm business organization requires the issuance of stocks?
A. Limited partnership
B. Partnership
C. Sole proprietorship
D. Corporation
Answer D: Farm and Ranch Business Management, 2004. John Deere, p 10-9

30. What type of business arrangement gives a farmer the right to use a tractor owned by a machinery dealership for a certain period of time in exchange for one or more payments?
A. Barter
B. Borrow
C. Lease
D. Sale.
Answer C: Farm and Ranch Business Management, 2004. John Deere, p A-6

31. When moving a tractor up a steep incline, such as the loading ramp of a transport trailer, which of the following is the recommended procedure?
A. Back up the incline
B. Drive diagonally up the incline
C. Drive forward up the incline in a low gear
D. Drive forward up the incline in a high gear
Answer: A. JD Farm & Ranch Safety

32. Which one of the following is an appropriate situation to use a manually adjustable rollover protective structure (ROPS) in the down (non-protective) position?
A. When the tractor will be operated on a family owned farm
B. When the tractor will be operated on a public road at a higher speed
C. When used on a tractor for operations requiring less than 30 horsepower
D. When used in an orchard or inside a building where the overhead clearance is limited
Answer: D. Hunt, Farm Power and Machinery Mgt

33. A farm tractor is required to have a slow moving vehicle (SMV) emblem displayed when it is operated on public thoroughfares and this indicates that it will travel at what speed?
A. Between 5 and 10 miles per hour when operated on public thoroughfares
B. No more than 15 miles per hour when operated on public thoroughfares
C. No more than 25 miles per hour when operated on public thoroughfares
D. Between 30 and 50 miles per hour when operated on public thoroughfares
Answer: C. JD Farm and Ranch Safety Mgt

34. Which one of the following will increase the average operating costs, on a per hour basis, for a tractor?
A. Purchase a new loader with cash
B. Increase the total annual hours of operation
C. Decrease the total annual hours of operation
D. Own and operate the loader for a longer period of time
Answer: C. JD Machinery Management

35. When pulling or towing a heavy load behind a tractor where should a tow chain be attached to the tractor?
A. The top link of three point hitch of the tractor
B. The tractor's rear axle
C. The tractor's drawbar
D. The tractor's ROPS
Answer: C. JD Farm & Ranch Safety

36. Which one of the following costs is generally considered to vary with machine use?
A. Annual cost for labor
B. Annual cost for equipment shelter

DO NOT WRITE OR MARK ON EXAM

C. Annual cost for equipment taxes
D. Annual cost for the interest on the loan for the equipment's purchase
Answer: A. JD Machinery Management

37. When is it more economical to own agricultural equipment as opposed to leasing or renting that equipment?
A. When the savings can be placed in a low interest bearing account
B. When repair costs are determined to be more than the fixed cost of ownership
C. When fixed costs of ownership are determined to be more than the leasing costs
D. When the equipment will have a high annual use and the required capital for purchase is available
Answer D: Wendell Bowers, Deere & Company, 1981, p 145

38. Which one of the following is a typical operational (variable) cost associated with owning agricultural machinery?
A. Taxes on the machinery
B. Machinery insurance costs
C. Depreciation on the equipment
D. Fuel and oil costs to run machinery
Answer D: FMO Fundamentals of Machine Operation- Machinery Management, Wendell Bowers, Deere & Company, 1981, p. 56

39. The inside measurements of the dump bed on a truck are 20 feet long, 54 inches deep, and 7.5 feet wide. What is the approximate capacity of the truck bed in cubic yards if a load is struck level across the top?
1 cubic yard = 27 cubic feet, 12 inches = 1 foot
A. 7 yd^3
B. 16 yd^3
C. 25 yd^3
D. 32 yd^3
Answer C: Volume = Length x Depth x Width = 20 ft x (54/12) ft x 7.5 ft x 1 yd^3 / 27 ft^3 = 25 yd^3

40. A loader uses two hydraulic cylinders, 2.5 inches in diameter and 36 inches long, to raise and lower the loader lift arms. If the loader's hydraulic system can generate a maximum pressure of 2,200 pounds per square inch, what is the approximate maximum lifting force (pounds) that each cylinder can produce?
Note: Force in pounds = (Pressure in pounds per square inch) x (Cross Sectional Area in square inches)
Cross sectional area of cylinder in square inches = Area of circle = π x $(\text{radius})^2$
A. 4,566 pounds
B. 10,799 pounds
C. 16,311 pounds
D. 22,155 pounds
Answer B: Force = Pressure x Cross-Sectional Area = 2,200 lb/in^2 x π x $(1.25\ in)^2$ = 10,799 lb

SECTION 3: ENERGY SYSTEMS Question 41-60

41. What are the values that an electrical multi-meter will normally measure?
A. Wattage, voltage, and amperage
B. Voltage, amperage, and ohms
C. Amperage, ohms, and wattage
D. Ohms, wattage, and voltage
Answer B

42. What Wattage value is equivalent to one horsepower?
A. 400 Watts
B. 746 Watts
C. 1200 Watts
D. 1564 Watts
Answer B: http://imsonline.tamu.edu/Courses/Samples/221IntroAgMec/221docs/8795_ST.pdf

43. When measuring voltage with an electrical multi-meter, where must the two meter leads be connected?
A. One lead to an ungrounded connection and one lead to a grounded connection
B. One lead to a grounded connection and one lead to a grounding connection
C. One lead to a grounded connection and one lead to a neutral connection
D. One lead to a neutral connection and one lead to a grounding connection
Answer A:

44. When making an amperage reading, what advantage does a meter with induction clamp-on jaws have over a meter that uses two leads to measure current?
A. The clamp-on jaws can be used on two, three, or four electrical conductors simultaneously
B. The clamp-on jaws can be used to measure amperage while the circuit is disconnected and the load is not operating
C. The clamp-on jaws can be used to measure amperage, voltage, and Wattage
D. The clamp-on jaws can be used on a single conductor without having to connect directly to an operating electrical circuit
Answer D

DO NOT WRITE OR MARK ON EXAM

45. When overload protection is selected for installation inside a motor or motor controller, it should be sized for what part of the circuit?
A. The amperage of the conductors used in the supply power to the motor's circuit
B. The safe operating amperage of the service entrance conductors
C. The safe operating amperage of the motor
D. The amperage of the motor's circuit protection
Answer C Agricultural Electrification, Southwestern, pg 347

46. What is the unit of measure for electrical pressure that relates to current flow through a given resistance? It can be measured with or without an electrical load operating.
A. Ohms
B. Amps
C. Volts
D. Watts
Answer C: Agriculture Wiring Handbook, page 3.

47. Which of the following statements about the American Wire Gauge (AWG) conductor rating system is true?
A. The smaller the AWG number the larger the diameter of the conductor
B. The larger the AWG number the larger the diameter of the conductor
C. The smaller the AWG number the smaller the diameter of the conductor
D. The larger the AWG number the longer the conductor
Answer: A. AAVIM ELECTRICAL WIRING, page73

48. Modern portable 120-volt electrical power tools that have a two-prong plug (no grounding prong), have what safety feature to reduce the likelihood of electrical shock to operators?
A. An internal transformer to allow low voltage operation
B. Thicker insulation on the hot conductor of the electrical cord that powers the tool
C. Cast aluminum hand grip to ground the operator
D. Double insulation construction
Answer D

49. A portable 120-volt electrical power tool with double insulation construction has what safety features?
A. A plastic (insulated) external housing (body) and insulation on the internal motor windings
B. Rubber insulation on the power cord (wire) with plastic internal gears and moving parts
C. The power cord (wire) has a three prong plug that includes a grounding prong
D. The insulation on the hot (ungrounded) conductor of power cord is twice as thick as single insulated power tools
Answer A

50. The load-carrying capacity of a conductor is measured in what unit of electrical measurement?
A. Ohms
B. Voltage
C. Amperes
D. Frequency
Answer C. AAVIM Electrical Wiring, Ninth Edition, pg 74

51. Which one of the following phrases correctly describes the "hot" conductor with black insulation in a 120-volt electrical circuit?
A. Grounded conductor
B. Grounding conductor
C. Ungrounded conductor
D. Ground fault conductor
Answer C. Ungrounded. AAVIM Electrical Wiring, Ninth Edition, pg 78

52. Which one of the following statements correctly identifies an electrical ground? Not an electrical short.
A. The connection of two hot conductors
B. The connection of hot and neutral conductors
C. The connection of hot conductors to earth
D. The connection of neutral conductors to earth
Answer D. National Electric Code, Article 100, pg 27

53. What amperage rating should be used when computing an estimated motor load for a single electrical motor?
A. 105 percent of the motor's full-load current rating
B. 125 percent of the motor's full-load current rating
C. 150 percent of the motor's full-load current rating
D. 175 percent of the motor's full-load current rating
Answer B. Ag Wiring Handbook, Fourteenth Edition, Pg 74

54. What terminology correctly identifies the reduction in voltage, caused by the resistance that occurs between the power supply and the load?

DO NOT WRITE OR MARK ON EXAM

A. Short circuit
B. Power factor
C. Voltage drop
D. Ground fault
Answer C: Agricultural Wiring Handbook. Page 3

55. What device is connected to the internal wiring of an electrical motor and is designed to disconnect the operating circuit if the insulation on the windings of the motor become overloaded because of excessive amperage?
A. UL test
B. Universal reset
C. Double insulation
D. Thermal protection
Answer D http://imsonline.tamu.edu/Courses/Samples/221IntroAgMec/221docs/8795_ST.pdf

56. What does the service factor of a motor indicate?
A. The recommended hours of operation between routine maintenance
B. The percent overload that the motor can tolerate on a continuous basis
C. The life in hours for a motor under normal operating conditions
D. The motor's amperage draw during continuous operation
Answer B - http://imsonline.tamu.edu/Courses/Samples/221IntroAgMec/221docs/8795_ST.pdf

57. Which of the following is probably the reason that an electric motor hums when it is turned on and will not start until the motor shaft is spun by hand?
A. The starting winding is burned out
B. The running winding is burned out
C. The circuit breaker servicing the motor is burned out
D. The electrical circuit servicing the motor is burned out
Answer A - http://imsonline.tamu.edu/Courses/Samples/221IntroAgMec/221docs/8795_ST.pdf

58. An 120-volt electrical circuit will include eight incandescent lighting fixtures, each having a maximum rated capacity of 1200 watts. What is the maximum load the circuit will carry? Note: Wattage = voltage x amperage
A. 20 amps
B. 40 amps
C. 60 amps
D. 80 amps
Answer : D. amps = 80 9600 watts = 120 volt x ? amps

59. The monthly charge to operate an electrical system is 15 cents per kilowatt hour (KWH) for the first 1000 hours and 17.5 cents for each hour greater than 1000 hours. If the system uses 1485 KWHs of electricity during a single month, what is the approximate monthly cost, in dollars, to operate the system? (1 Kilowatt = 1000 Watts)
A. $118.84
B. $154.84
C. $198.84
D. $234.88
Answer B. $234.875 = (1000 KWH x $0.15/KWH) + [(1485-1000) x $0.175] AAVIM Understanding Electricity. Pages 74-76

60. An 120-volt electrical circuit will operate a 1200-watt resistance heater and four 200-watt incandescent light bulbs. If the circuit is operated 6.5 hours each day for 90 days, how many kilowatt hours will the electrical system use during the time period? Note: Kilowatt hours = $\frac{\text{Total Watts x Total hours}}{1000}$
A. 960 kilowatts hours
B. 1170 kilowatts hours
C. 1340 kilowatts hours
D. 1590 kilowatts hours
Answer B. 1170 kilowatts hours = [(1200 Watts + 800 Watts) x 6.5 hours/day x 90 days] / 1000

SECTION 4: STRUCTURAL SYSTEMS Questions 61-80

61. Which of the following is correct regarding foundations for wooden frame construction?
A. Wooden frame buildings are built with direct contact to water
B. Wooden frame buildings are typically built on slab, crawl space, and basement foundations
C. Wooden frame buildings are built with direct contact to soil
D. Foundations are not important as long as the building is well constructed
Answer B Agriscience Mechanics, 1998, Interstate Publishers, p 333

62. Which of the following statements is correct regarding plywood appearance grades?
A. Appearance grades are designated by five or more letters
B. Only the front side of a plywood sheet is graded
C. Plywood appearance grade for the front and back surfaces are designated by two letters

DO NOT WRITE OR MARK ON EXAM

D. Plywood appearance grades are designation by the letters are N, F, W and R
Answer C Mechanical Technology in Agriculture, 1998, Interstate Publishers, p 578

63. Which of the following statements is correct regarding CPVC pipe installation?
A. CPVC may be legally installed for all construction plumbing applications
B. The inside diameters of CPVC and PVC pipe are the same
C. The color of CPVC pipe is white in color
D. CPVC can be used with hot water and water that contains caustic chemicals
Answer D Agriscience Mechanics, 1998, Interstate Publishers, p 560

64. How are wood screws sized?
A. According to length and diameter
B. According to thread pitch and length
C. According to corrosion resistance and application
D. According to head diameter and gauge
Answer A Agriscience Mechanics, 1998, Interstate Publishers, p 286

65. Which of the following statements is correct with regard to the brazing process?
A. A brazing joint is weaker than a soldered joint
B. Brazing is used to join metals with tightly fitting joints
C. Brazing does not require a high welding temperature like soldering
D. Brazing cannot be used to join dissimilar metals
Answer B Modern Welding, 1992, Goodheart-Willcox, p 195

66. Which of the following statements is correct regarding the methods of applying brazing flux?
A. Flux may be sprayed on, brushed on, or applied with a pressurized applicator
B. Brazing rods are not available with a flux coating for brazing applications
C. Powdered flux will not adhere to a heated brazing rod for brazing applications
D. Brazing flux is only available as a powder for brazing applications
Answer A Modern Welding, 1992, Goodheart-Willcox, p 200

67. Which of the following statements is correct with regard to the brazing process?
A. When using flux, the base metals are not mechanically and/or chemically cleaned
B. The base metals that are to be joined must be spaced slightly apart for the capillary action of the brazing process to work properly
C. The base metals to be joined must be heated to a temperature slightly above the melting point of the brazing rod
D. The brazing rod must be heated to a temperature slightly above the melting point of the base metal
Answer C Modern Welding, 1992, Goodheart-Willcox, p 207

68. Which of the following colors are used to correctly identify oxygen and acetylene hoses?
A. Red for acetylene, green for oxygen
B. Green for acetylene, red for oxygen
C. Yellow for acetylene, green for oxygen
D. Green for acetylene, yellow for oxygen
Answer A: Modern Agricultural Mechanics

69. Which one of the following statements is correct with respect to wearing safety glasses while welding?
A. Safety glasses are not needed when a welding helmet is worn, because the helmet protects the eyes from all welding related hazards
B. Safety glasses are not needed for other metal working activities as long as a face shield is worn while welding
C. Safety glasses should be darkly tinted to protect the eyes from all electric and flames arcs from welding processes
D. Safety glasses should be worn continuously while working with or near metal working activities
Answer D: Safety glasses should be worn continuously while working with or near metal working activities

70. What is the name of the cleansing agent that is used to facilitate the removal of oxides, release trapped gases and slag, and chemically cleanse the metal during the welding, brazing, and/or soldering processes?
A. Striker
B. Lintel
C. Pixel
D. Flux
Answer D: Modern Agricultural Mechanics

71. Which one of the following welding related safety concerns is more likely to occur gradually over an extended period of time?
A. Injury to eyes from flying metal or sparks
B. Blisters on eyes from watching a welding arc without proper eye protection
C. Burns from the handling of or coming in contact with heated metals
D. Hearing loss caused by extended exposure to elevated sound levels
Answer D : Hearing loss caused by extended exposure to elevated sound levels

72. What are the stresses commonly evaluated in the design of agricultural structures?

DO NOT WRITE OR MARK ON EXAM

A. Tension and compression
B. Rust and corrosion
C. Failure and destruction
D. Hydration and oxidation
Answer A: Tension and compression Welding Principles and Applications 4th Ed.

73. What is the most common type of steel used in the construction of agricultural buildings, fences, and gates?
A. Cast iron
B. Mild steel
C. Stainless steel
D. Wrought iron
Answer B: Mild steel Welding Principles and Applications 4th Ed.

74. What is the scientific symbol for the element of iron?
A. Ir
B. Cu
C. Fe
D. Ni
Answer C: Fe

75. What is the maximum recommended 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
Answer B Agricultural Mechaincs, Fundatmentals and Applications, 2002, p 289

76. What is the name of the automatic plumbing valve that allows liquid to flow in only one direction, but prevents the liquid from draining back when the line is not pressurized?
A. Stop-and-waste valves
B. Gate valves with back flow protection
C. Compression hose faucets
D. Check valves with back flow protection
Answer D, Modern Agricultural Mechanics

77. Ductility is the ability of a metal to do what before it breaks?
A. Resist penetration
B. Return to it original shape after stretching
C. Elongate
D. Harden
Answer C: Modern Welding, Andrew Althouse, Carl Turnquist, Kevin Bowditch, and William Bowditch, The Goodheart-Willcox Company

78. Which pipe measurement allows all standard threaded steel pipe, regardless of the pipe's classification or schedule, to fit standard pipe fittings?
A. O.D. (outside diameter)
B. I.D. (inside diameter)
C. Wall thickness
D. Length
Answer A Agriculture Mechanics Fundamentals & Applications, 4th Edition, Delmar Publishing, Page 485

79. Steel rod is sold for $1.74 per linear foot and steel pipe is sold for $2.86 per linear foot. If 10.5 feet of rod and 20.5 feet of pipe are purchased, what is the total price for the metal before taxes?
A. $42.30
B. $54.50
C. $68.70
D. $76.90
Answer D: $ 76.90 = [(10.5 ft) x ($1.74 / ft)] + [(20.5 ft) x ($2.86 / ft)] = $18.27 + $58.63

80. Steel tubing weighs 1.45 pounds per linear foot and costs $129.88 for a 20-foot length. Steel rod weighs 2.74 pounds per linear foot and cost $178.75 for a 20-foot length. If 98 pounds of each type of steel is purchased, which of the following statements is correct?
A. 98 pounds of steel tubing will be exactly the same length as 98 pounds of steel rod
B. 98 pounds of steel tubing will provide more linear feet of length than 98 pounds of steel rod
C. 98 pounds of steel rod will provide more linear feet of length than 98 pounds of steel tubing
D. 98 pounds of steel tubing or 98 pounds of steel rod will each be more than 50 linear feet in length
Answer B : Rod 35.766 ft. = [(1ft / 2.74 lbs) x (98 lbs)] Tubing 67.586 ft = [(1ft / 1.45 lb) x (98 lbs)

DO NOT WRITE OR MARK ON EXAM

DO NOT WRITE OR MARK ON EXAM

SECTION 5: ENVIRONMENTAL AND NATURAL RESOURCE SYSTEMS Question 81-100

81. What is the primary purpose of the spinner located below the feed chute on a granular fertilizer spreader?
A. Force air through the hopper and aid the gravity feed process
B. To improve the uniform distribution of the granular fertilizer
C. Vary the distance that fertilizer is thrown during turns and stops
D. Mix fertilizer and water together prior to injection in the soil
Answer: B ASABE Standard: and Calibrating Granular Broadcast Spreaders

82. Which of the following statements describes effective swath width for a broadcast granular fertilizer spreader?
A. The maximum distance that fertilizer is thrown behind the hopper of a spreader
B. The maximum width that fertilizer is thrown to the left and right of the granular fertilizer spreader
C. The width of a fertilizer application that achieves uniform deposition rates with appropriate overlap between adjacent passes
D. The width of a fertilizer application that achieves maximum deposition rates without having to overlap between adjacent passes
Answer: C ASABE Standard: Calibrating Granular Broadcast Spreaders

83. Which of the follow describes the benefit of conducting a spread pattern test for a granular fertilizer spreader?
A. The uniformity of the fertilizer distributed over the effective swath width
B. The volume of the fertilizer that is distributed directly behind the power unit towing the fertilizer spreader
C. The width of a fertilizer application that achieves maximum deposition rates
D. The number of pounds of fertilizer that are distributed beyond the effective swath width
Answer: A ASABE Standard: Calibrating Granular Broadcast Spreaders

84. A spinner is an important component on many granular pesticide applicators. Which of the following statements is correct with regard to how the spinner's rotating speed effects granular fertilizer distribution?
A. Increasing spinner speed (revolutions per minute) decreases the distance that granular fertilizer is thrown
B. Increasing spinner speed (revolutions per minute) increases the distance that granular fertilizer is thrown
C. Decreasing spinner speed (revolutions per minute) increases the travel speed for the application
D. Decreasing spinner speed (revolutions per minute) decreases the travel speed for the application
Answer: B ASABE Standard: Calibrating Granular Broadcast Spreaders

85. How will a 15 mile per hour wind, blowing perpendicular to the direction of travel, effect the distribution of a liquid fertilizer being applied by a spray boom positioned 30 inches above the ground?
A. Increases off target fertilizer movement
B. Decreases off target fertilizer movement
C. Increases the effectiveness of fertilizer application
D. Decreases the amount of fertilizer required for a application
Answer: A ASABE Standard: Calibrating Granular Broadcast Spreaders

86. Which of the following is the best option to reduce the off target movement of a liquid fertilizer being applied by a boom sprayer?
A. Decrease the height of the spray boom above the ground
B. Decrease the droplet size of the spray to allow for better coverage
C. Increase the spray pressure (pounds per square inch) being used to deliver the fertilizer
D. Increase the travel speed (miles per hour) of the fertilizer application
Answer: A ASABE Standard: Calibrating Granular Broadcast Spreaders

87. What values are used to calculate the application rate of granular applications in pounds per acre?
A. Use travel speed in miles per hour, effective swath width in feet, and delivery rate in pounds to calculate application rate
B. Use effective swath width in feet, delivery rate in pounds, and granular size in inches to calculate application rate
C. Use delivery rate in pounds, granular size in inches, and travel speed in miles per hour to calculate application rate
D. Use granular size in inches, travel speed in miles per hour, and travel speed in miles per hour to calculate application rate
Answer: A ASABE Standard: Calibrating Granular Broadcast Spreaders

88. Which of the follow correctly describes the relationship between application rate (pounds per acre) and the overlap between multiple passes of a granular fertilizer spreader?
A. Less overlap between passes will increase the travel speed for application
B. Less overlap between passes will decrease the travel speed for application
C. Greater overlap between passes will increase the overall application rate
D. Greater overlap between passes will decrease the overall application rate
Answer C: ASABE Standard: Calibrating Granular Broadcast Spreaders

89. When liquid pesticide is applied with a traditional boom sprayer, if all other variables remain constant, which of the following will result in a decreased chemical application rate?
A. Reduce the travel speed of the sprayer
B. Increase the travel speed of the sprayer
C. Replace the existing nozzles with nozzles having a larger tip size
D. Increase the spray pressure at the nozzle
Answer B: Applying Pesticides Correctly – Private Applicator Supplement, United States Environmental Protection Agency Bulletin E-2474, p. 4-19.

DO NOT WRITE OR MARK ON EXAM

90. Which of the following pesticide spray equipment components directly controls the pressure developed at the sprayer nozzle and the quantity of spray delivered to the nozzles?
A. Strainer
B. Screen
C. Nozzle body
D. Pressure regulator
Answer D Applying Pesticides Correctly – Private Applicator Supplement, United States Environmental Protection Agency Bulletin E-2474, p. 3-9.

91. Which of the following is a true statement with respect to groundwater and liquid chemical contamination?
A. Groundwater is easily cleaned after it becomes contaminated
B. Chemicals are not transported into to groundwater by leaching
C. Shallow groundwater is more susceptible to contamination than deeper groundwater
D. Contamination is more likely with clay soils than with sandy soils
Answer C Applying Pesticides Correctly – Private Applicator Supplement, United States Environmental Protection Agency Bulletin E-2474

92. If other variables remain constant, which of the following adjustments to spray equipment will result in the greatest increase in application rate?
A. Increase the travel speed 20 percent
B. Decrease the travel speed 20 percent
C. Increase the spray pressure 10 percent
D. Decrease the spray pressure 10 percent
Answer B: Applying Pesticides Correctly – Private Applicator Supplement, United States Environmental Protection Agency Bulletin E-2474

93. If other variables remain constant, which of the following adjustments to spray application equipment will have the described effect?
A. Doubling the travel speed will double the spray application rate (gallons per acre)
B. Doubling the spray pressure will double the spray application rate (gallons per acre)
C. Doubling the travel speed will reduce the application rate (gallons per acre) by one-half
D. Doubling the spray pressure will reduce the application rate (gallons per acre) by one-half
Answer C: Applying Pesticides Correctly – Private Applicator Supplement, United States Environmental Protection Agency Bulletin E-2474

94. Which of the following conditions are most likely to reduce the likelihood of off target movement by liquid chemical?
A. High spray pressure, high temperature, no wind, and high humidity
B. Low spray pressure, low temperature, low wind speed, and high humidity
C. High spray pressure, low temperature, high wind speed, and low humidity
D. Low spray pressure, high temperature, high wind speed, and low humidity
Answer B: Applying Pesticides Correctly – Private Applicator Supplement, United States Environmental Protection Agency Bulletin E-2474

95. Which of the following is the most common error made by applicators when applying granular fertilizer with a towed spreader?
A. Improper fertilizer type being applied for the crop being treated
B. Improper loading of the spreader resulting in poor operation of the hopper delivery system
C. Improper overlap distance between passes resulting in under or over application
D. Improver travel speed when operating wheel driven spreaders
Answer C

96. Which of the following statements is true with regard to granular fertilizer spreaders?
A. Fertilizers with different densities have the same rate of flow and distance of throw
B. Operating spreaders with low quantities of fertilizer does not influence application rate
C. Fertilizers with different particle sizes have the same rate of flow and distance of throw
D. Operating spreaders with spinners over sloped terrain result in uneven distribution of fertilizer
Answer D

97. Which of the following results in feed problems from the hopper to the spinner of a fertilizer spreader?
A. Normal motion and agitation of the spreader during operation
B. Uniform granule size and density
C. Wet or damp fertilizer granules
D. Fine rather than course granular fertilizer is used
Answer C

98. Approximately how many acres are in a rectangular field measuring 1200 feet by 363 feet?
Note: 1 acre = 43, 560 square feet
A. 1 acre
B. 5 acres
C. 10 acres
D. 20 acres
Answer C: 10 acres = (1200 ft x 363 ft) x (1 acre/43,560 ft)

99. What is the approximate speed, in miles per hour, of a fertilizer spreader that travels 300 feet in 25.6 seconds?
Note: 5,280 ft = 1 mile 3600 seconds = 1 hour
A. 4.0 miles per hour
B. 5.5 miles per hour
C. 6.5 miles per hour
D. 8.0 miles per hour
Answer D: 8 mph . 7.99 mph = (300 ft / 25.6 sec) x (3600 sec / 1 hr) x (1 mi / 5,280 ft)

100. If a field has an area of 230 acres, what is the equivalent size in hectares?
Note: 1 acre = 43,560 square feet 1 hectare = 10,000 square meters 1 square foot = 0.0929 square meter
A. 0.9 hectares
B. 9.3 hectares
C. 93.1 hectares
D. 931.4 hectares
Answer C ha = 1 ha / 10,000 m^2 x 230 ac x 43,560 ft^2 / ac x $(0.0929\ m)^2$ / 1 ft^2 = 93.138 ha

End of Examination

The five year rotating schedule beginning with the year 2008:

YEAR	EVENT THEME
2008	Processing Systems
2009	Plant Production Systems
2010	Integrated Pest Management
2012	Material Handling Systems