

HVAC PRACTICE TEST

A. Principles of Electrical and Refrigeration Theory

1. What is the symbol for impedance?

- a. R
- b. I
- c. Z
- d. P

2. The safety ground conductor for A/C circuit is usually color coded _____.

- a. red
- b. green
- c. black
- d. white

B. Air Conditioning

3. Heat which causes a change in temperature of a substance is called:

- a. latent heat.
- b. sensible heat.

- c. superheat.
- d. regular heat.

4. What is heat, which causes a change in the state of a material without a change in temperature, called?

- a. Latent heat
- b. Sensible heat
- c. Superheat
- d. Regular heat

C. Commercial Air Conditioning

5. What is a sling psychrometer used to measure?

- a. Latent heat
- b. Super heat
- c. Wet and dry bulb temperature
- d. Barometric pressure

6. A compressor is operating with a discharge pressure of 235.3 psig and a suction pressure of 35.3 psig. What is the compression ratio (pumping ratio)?

- a. 10:1

- b. 8:1
- c. 7:1
- d. 5:1

D. Commercial Refrigeration

7. In a (direct expansion) evaporator, liquid refrigerant must boil away as close to the end of the coil as possible in order to:

- a. ensure proper oil return.
- b. ensure that frost does not accumulate.
- c. sub-cool the compressor.
- d. operate at high efficiency.

8. An thermal expansion valve that is stuck wide open will cause _____.

- a. low suction pressure
- b. a flooded evaporator
- c. excessive superheat
- d. a starved evaporator

E. Heat Pump Service

9. What is the major difference between a heat pump and an air conditioner?

- a. Condenser
- b. Thermostatic expansion valve
- c. Evaporator
- d. Reversing valve

10. What device controls the supplementary electric heat according to the outdoor temperature?

- a. Auxiliary temperature control
- b. Outdoor auxiliary thermostat
- c. Outdoor ambient thermostat
- d. Indoor thermostat only

F. Heat Pump Installation

11. Which of the following is not a factor that should be considered when installing an outdoor unit?

- a. Return air
- b. Wind factors
- c. Sound transmission
- d. Snow fall

12. What is the minimum clearance for access panels on an outdoor condensing unit?

- a. 36 inches
- b. 30 inches
- c. 15 inches
- d. 10 inches

G. Gas, Oil and Combustion

13. One BTU is the amount of heat required to raise the temperature of:

- a. one pound of ice one-degree Fahrenheit.
- b. one pound of water one-degree Fahrenheit.
- c. one gallon of water one-degree Fahrenheit.
- d. one gallon of water eight degrees Fahrenheit.

14. What is the primary composition of natural gas?

- a. 65 percent methane
- b. 75 percent methane
- c. 85 percent methane

- d. 95 percent methane

H. Electric Heat

15. The electric heat element is usually made of what material?

- a. Copper with a brass coating
- b. Nickel with a cadmium coating
- c. Nickel and steel
- d. Nickel and chromium

16. Which of the following is an example of a resistive load?

- a. Bimetal switch
- b. Crankcase heater
- c. Transformer
- d. Motor

I. Residential Heat Load Calculation

17. An oversized heating and cooling system can cause which of the following?

- a. Operating cost and relative humidity in the structure will decrease significantly.
- b. Moisture damage to a furnace heat exchanger and inadequate humidity removal during cooling cycles.

- c. The structure will develop low humidity levels in the cooling season and high humidity in the winter.
- d. Equipment will last longer and require less energy to operate due to the shorter run time.

18. When the temperatures of a structure both inside and outside are equal, there is _____.

- a. no heat transfer
- b. latent heat transfer to the outside
- c. thermal heat transfer of sensible heat
- d. a lower rate of relative humidity

J. Universal R-410A Safety and Training

19. Polyolester (POE) oils stored in plastic containers will _____.

- a. separate
- b. become more alkaline
- c. become acidic
- d. absorb moisture through the plastic

20. R-407C has _____-.

- a. a foul odor
- b. to be charged in the vapor phase
- c. the ability to fractionate
- d. no temperature glide

K. Green Awareness

21. What is a carbon footprint?

- a. The carbon deposits from burning gasoline.
- b. The amount of carbon dioxide that is produced to support your lifestyle.
- c. The amount of carbon in the atmosphere produced by the world's lifestyle.
- d. The amount of carbon in the stratosphere.

22. What is energy management?

- a. A rule that the total amount of energy stays constant in an isolated system over time.
- b. Recovering energy lost while using mechanical equipment.
- c. Reading the electric and fuel gas meters every month.
- d. The monitoring and controlling of energy consuming devices

HVAC GENERAL - Practice Test

23. Two locations where a cold air return should be installed:

- a. Open area of wall and low to the ground.
- b. Behind appliances and high on the wall.
- c. Open area of wall and high on the wall.
- d. Behind appliances and low to the ground.

24. Which of the following is a law of thermodynamics:

- a. Heat is a form of matter.
- b. Heat moves toward a place with higher intensity.
- c. Heat moves toward a place with lower intensity.
- d. Heat moves toward a place with a higher temperature.

25. Sensible heat describes _____.

- a. How fast heat will travel.
- b. The quantity of heat.
- c. The volume of heat.
- d. How hot something feels.

26. Latent heat measures _____.

- a. The temperature of heat in a substance.
- b. The quantity of heat in a substance.
- c. The velocity of heat in a substance.
- d. The heat potential of a substance.

27. Latent heat is measured in _____.

- a. Degrees Celsius, Fahrenheit and Kelvin
- b. International System of Units
- c. British Thermal Units
- d. Board of Trade Unit

28. If 1 pound of water warms to 60 degrees F from 55 degrees F, what btu of latent heat will it have absorbed?

- a. 2.5
- b. 5
- c. 10
- d. 15

29. What is the amount of heat energy required to evaporate 1 pound of water?

- a. 370 btu
- b. 570 btu
- c. 770 btu
- d. 970 btu

30. In an air conditioning and refrigeration system, what occurs in an evaporator?

- a. The refrigerant absorbs the latent heat.
- b. The refrigerant evaporates latent heat.
- c. Latent heat is condensed.
- d. Latent heat is released.

31. In an air conditioning and refrigeration system, what occurs in a condenser?

- a. The refrigerant absorbs the latent heat.
- b. The refrigerant releases the latent heat.
- c. Latent heat is pressurized.
- d. Latent heat is increased.

32. In a sealed system, pressure and temperature _____.

- a. are inversely proportional
- b. go in opposite directions up and down
- c. are equal
- d. follow each other up and down

33. Which of the following is not a type of compressor?

- a. Lateral
- b. Reciprocating
- c. Rotary
- d. Screw
- e. Centrifugal

34. In Fahrenheit, the boiling point of water is _____.

- a. 100 degrees
- b. 112 degrees
- c. 212 degrees
- d. 221 degrees

35. To change Fahrenheit to Celsius, which formula is used?

- a. $C = (F + 32) - 1.8$
- b. $C = (F - 32) \times 1.8$
- c. $C = (F - 32) / 1.8$
- d. $C = (F - 32) + 1.8$

36. Which of the following is not a method by which heat may be transferred from a warmer substance to a colder substance?

- a. Conduction
- b. Retraction
- c. Convection
- d. Radiation

37. What btu of heat is required to raise 1 pound of ice 1 degree F when the temperature is below 32 degrees F?

- a. .25
- b. .5
- c. 1
- d. 1.5

38. What btu of heat is required to raise 1 pound of steam 1 degree F above the temperature of 212 degrees F?

- a. .25
- b. .5
- c. 1
- d. 1.5

39. A day-ton of refrigeration is the amount of refrigeration produced by melting 1 ton of ice at a temperature of 32 degrees F in 24 hours.

- True
- False

40. Ice exerts pressure _____.

- a. Upwards
- b. Laterally
- c. Downwards
- d. In all directions

41. Pressure is usually measured in _____.

- a. Pounds per square foot
- b. Pressure per square foot
- c. Pounds per square inch
- d. Pressure per square inch

42. Atmospheric pressure, at sea level, is 14.7 psia.

- True
- False

43. When one rises into the atmosphere, the atmospheric pressure decreases by 1 psi for every _____.

- a. 2,343 feet
- b. 3,334 feet
- c. 2,500 feet
- d. 5,280 feet

44. Vaporization can be increased by _____ the pressure on a liquid.

- a. Increasing

- b. Equalizing
- c. Reducing

45. Every mechanical refrigeration system has _____ different pressure levels.

- a. 2
- b. 3
- c. 4
- d. 5

46. Pressure on the high pressure side of a mechanical refrigeration unit is called _____.

- a. suction pressure
- b. discharge or head pressure
- c. differential I pressure
- d. absolute pressure

47. The exertion of pressure on a substance with a constant temperature increases its volume in proportion to the increase in pressure. T or F

- True
- False

48. Oxygen depletion safety systems shall shut off the gas supply to the main and pilot burners when the oxygen in the surrounding atmosphere is depleted to the percent concentration specified by the manufacturer, but not lower than _____ percent.
- A.10
 - B.12
 - C.18
 - D.20
49. . What is the required outdoor air ventilation rate for the bathrooms in motels?
- A.100 cfm
 - B.75 cfm
 - C.25cfm
 - D.10 cfm
50. . The condensate line for a 20 ton package unit will be a minimum of _____ diameter.
- A.1/2
 - B.3/4
 - C.1
 - D.1 1/4
51. . A thermocouple strength is measured in _____.
- A.microamps
 - B.millivolts
 - C.microvolts
 - D.milliamps
52. . A circuit having a supply voltage of 240 volts and a resistance reading of 100 ohms will have an amperage reading of _____.
- A..41
 - B.2.4
 - C.4.8
 - D.can not tell by information given above
53. . Unvented room heaters shall not have an input rating in excess of _____ btu/hr.
- A.20,000
 - B.100,000
 - C.80,000
 - D.40,000
54. . If you add refrigerant to an air conditioner that has an external equalized TXV, the subcooling will _____.
- A.go up
 - B.go down
 - C.be the same as superheat
 - D.adding refrigerant to this system does not effect sub-cooling
55. A liquid is considered flammable if it has a flash point below _____ degrees and has a vapor pressure not exceeding 50 psia.
- A.75
 - B.212
 - C.125
 - D.100
56. . Factory built chimneys for medium heat appliances producing flue gases having a temperature above _____ degrees, measured at the entrance to the chimney, shall comply with UL 959.
- A.500
 - B.750
 - C.1000
 - D.2500

57. . Smoke detectors shall be installed in return air systems with a design capacity greater than _____ cfm.

- A.1200
- B.1600
- C.2000
- D.2400

58. . The lowest portion of a floor furnace shall not have less than a _____ inch clearance from grade.

- A.10
- B.14
- C.needs to have access to crawl under
- D.6

59. . What combustion air (one opening method) is needed for appliances totaling 350,000 btu?

- A.7"
- B.10"
- C.14"
- D.16"

60. . A safety belt lanyard shall be a minimum of 1/2" nylon, or equivalent, with a maximum length to provide for a fall of no greater than _____ feet.

- A.5
- B.10
- C.8
- D.6

61. . Quantities of flammable and combustible liquid in excess of _____ gallons shall be stored in an acceptable or approved cabinet.

- A.5
- B.10
- C.25
- D.50

62. Passageways around boilers shall have an unobstructed width of not less than _____ inches.

- A.10
- B.16
- C.18
- D.24

63. . The equivalent length of a 8" diameter mitered 90 degree elbow is _____.

- A.5'
- B.1'7"
- C.1'
- D.2'6"

64. . Which of the following areas can fuel fired appliances not draw combustion air from?

- A.Garages
- B.Outdoors
- C.Attics
- D.Storage Closets

65. 42. Tare weight (when talking about recovery tanks) means?

- A.The weight of the refrigerant to be added
- B.The weight of the refrigerant already in the tank
- C.The weight of the tank
- D.The weight to be allowed for accidental seepage.

66. 39. Guards are required when appliances, equipment, fans or other components that require service and roof hatch openings are located within _____ feet of the roof edge.

- A.5
- B.10
- C.15
- D.there is no distance requirement

67. 51. Water is considered a refrigerant. What is its name?

- A.R-1270
- B.R-401
- C.R-718
- D.R-170

68. 81. The maximum horizontal support spacing for pex piping shall be a minimum of _____ inches?

- A.20
- B.24
- C.32
- D.48

69. . A 14 inch gas vent protruding through a roof and located within 8 feet of a vertical wall must terminate not less than _____ feet above highest point it passes through the roof.

- A.1
- B.2
- C.3
- D.4

70. .All gas piping installed on top of roofs shall be elevated not less than _____ inches off the roof surface.

- A.3.5
- B.4.5
- C.6
- D.2

71. .Welding cylinders shall be moved by _____?

- A.dolly or hand truck
- B.a minimum of two people
- C.rolling across the floor
- D.tilting and rolling them on their bottom edges

72.. .The length of pipe to be cut of 3/4" pipe that has a 90 and a 45 at each end is _____.

- A.17 5/8"
- B.17 1/4"
- C.18"
- D.18 5/8"

73. . A vent shall terminate through a 12/12 roof slope by _____ feet as long as it is no closer than 8' from a vertical wall.

- A.2
- B.8
- C.4
- D.5

74. .A level service space in front of an appliance mounted in an attic shall not be less than _____

- A.30" wide x 30" deep
- B.30" wide x 36" deep
- C.36" wide x 30" deep
- D.42" wide x 30" deep

75. . Openings in screens, louvers and grills for exhaust openings shall be _____

- A.No less than 1/2 in or more than 3/4 inch
- B.no less than 3/4 inch
- C.no less than 1/4 inch or more than 1/2 inch
- D.no less than 1/4 inch

76. . What is the function of a heat anticipator wire in the thermostat?

- A.To extend the heat cycle
- B.To reduce the heat cycle based on amperage of heat circuit
- C.To shut off heat cycle when temperature is reached
- D.There is no heat anticipator wire in any thermostat

77. . Whats the normal voltage of a control circuit for residential service?

- A.10 volts
- B.24 volts
- C.120 volts
- D.240 volts

78. . A mechanical draft venting system shall terminate at least ____ feet above any forced air inlet located within 10 feet.

- A.3
- B.5
- C.10
- D.15

79. . If a heat pump needs to have an accumulator installed in it, it should be installed in the _____.

- A.suction line outside of the unit
- B.discharge line
- C.liquid line
- D.suction line between the reversing valve and the compressor

80. . Where unvented infrared heaters are installed, natural or mechanical means shall provide outdoor ventilation air at a rate of not less than _____ of the aggregate input rating of all such heaters installed in the space.

- A.2cfm per 1000 btu/h
- B.5cfm per 2000 btu/h
- C.8cfm per 5000 btu/h
- D.4cfm per 1000 btu/h

81. . I have control circuits that total .8 amps. The control secondary voltage is 120 volts. What is th minimum wattage of the transformer needed for this application?

- A.75
- B.200
- C.50
- D.100

82. . A minimum openable area to the outdoors shall be _____ percent of the floor area being naturally ventilated.

- A.1
- B.2
- C.3
- D.4

83. . What is the minimum openable area required for natural ventilation?

- A.1 % of floor area
- B.2 % of floor area
- C.3 % of floor area
- D.4 % of floor area

84. How many amps can a 40va, 120volt transformer with a 24volt secondary carry?

- A.2.0
- B.1.7
- C.3.0
- D.0.3

85. Where openings below grade provide required natural ventilation, the outside horizontal clear space measured perpendicular to the opening shall be _____ times the depth of the opening.

- A.1.5
- B.2
- C.2.5
- D.3

86. .In exterior walls and bearing partitions, any wood stud is permitted to be cut or notched not to exceed _____ percent of its depth.

- A.10
- B.25
- C.35
- D.40

87. . Equipment and appliances installed at grade level shall be supported on a level concrete slab or other approved material extending not less than _____ inches above adjoining grade.

- A.1
- B.2
- C.3
- D.4

88. . The internal diameter of 2 inch type L copper is _____

- A.1.985
- B.1.959
- C.1.90
- D.2.2

89. . Which of the following should not be used as a test medium for testing gas piping?

- A.nitrogen
- B.air
- C.carbon dioxide
- D.oxygen

90. . What effect would hooking up a 240 volt transformer to a 208 volt supply voltage have on the secondary voltage?

- A.secondary voltage will be less
- B.secondary voltage will be more
- C.primary voltage has no effect on secondary voltage
- D.secondary voltage is always rated on the transformer

91. . Test pressure used when testing new gas systems shall be no less than _____ times the proposed maximum working pressure but not less than 3 psig irrespective of design pressure.

- A.1.5

- B.2.5
- C.3
- D.5

92. . Interior spaces intended for human occupancy shall be provided with active or passive space-heating systems capable of maintaining a minimum of _____ degrees at a point 3 feet above floor on the design heating day.

- A.56
- B.60
- C.64
- D.68

93. . The minimum clearance from appliances mounted below grade shall be at least?

- A.8 inches
- B.10 inches
- C.12 inches
- D.36 inches

94. . Underground ducts shall have a minimum slope of _____ inch per foot to allow drainage to a point provided with access.

- A.1/8
- B.1/16
- C.1/4
- D.1

95. Support bracing for 1 1/4" copper tubing shall be at intervals no less than _____ feet.

- A.3
- B.4
- C.6
- D.10

96. . Where equipment requiring access and appliances are installed on roofs or elevated structures at a height exceeding _____ feet, such access shall be provided by a permanent approved means of access.

- A.10
- B.16
- C.20
- D.26

97. Outlets for exhaust that exceeds _____ degrees shall be designed as a chimney.

- A.350
- B.450
- C.500
- D.600

98. If you install a 20 mfd capacitor and a 40 mfd capacitor in parallel, you receive a total capacitance of _____.

- A.10 mfd
- B.30 mfd
- C.60 mfd
- D.13.3 mfd

99. . How thick of a pad shall a condensor be mounted on when installed on grade surfaces?

- A.2 inches minimum
- B.3 inches minimum
- C.4 inches minimum
- D.6 inches minimum

100. . Gas piping systems that are to be supplied with a gas of a specific gravity of _____ or less can be sized directly from the tables provided in the international fuel gas code.
- A. .60
 - B. .70
 - C. .90
 - D. 1.0
101. . Ducts shall be supported with approved hangers at intervals not exceeding _____ feet.
- A. 5
 - B. 10
 - C. 8
 - D. 25
102. _____ motors driving exhaust fans shall not be placed inside booths and ducts
- A. Large horsepower
 - B. Fractional horsepower
 - C. Electric
 - D. Permanent split capacitor
103. . Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials a minimum of _____ feet or by a noncombustible barrier at least 5 feet high having a fire resistance rating of at least 1/2 hour.
- A. 10
 - B. 20
 - C. 25
 - D. 35
104. . The minimum fire protection rating for a fire damper installed in less than 3 hour fire resistance rated assemblies is _____ hours.
- A. 0.5
 - B. 1.0
 - C. 1.5
 - D. 3.0
105. Refrigerant piping that crosses an open space that affords passageway in any building shall not be less than _____ above the floor unless the piping is located against the ceiling of such space
- A. 6'6"
 - B. 7'3"
 - C. 8'0"
 - D. 10'0"
106. . I have a 1025 rpm motor with a 3.5" motor pulley and i need a blower rpm of 400 rpm. What size blower pulley do i need?
- A. 6
 - B. 7
 - C. 8
 - D. 9
107. . What is the minimum height of a guard when a unit is mounted close to the edge of a roof?
- A. 24 inches
 - B. 42 inches
 - C. 48 inches
 - D. 60 inches