

NATE Air Conditioning Installation & Service

Practice Test Questions

- 1.) A good evacuation of a refrigerant circuit to remove non-condensables will help ensure:
- A. Higher condensing temperatures
 - B. Higher suction pressures
 - C. Low suction line pressure drop
 - D. *Higher efficiency and capacity*
- 2.) A condensing unit should be mounted on a slab that is level to:
- A. *Allow any accumulated water to evenly run out of the cabinet*
 - B. Increase airflow through the fin area
 - C. Prevent the unit from tipping over
 - D. Make certain any top discharge air blows straight up
- 3.) Low airflow over a residential split system air conditioning evaporator can cause:
- A. *Liquid floodback to the compressor*
 - B. A decrease in compression ratio
 - C. An increase in suction line superheat
 - D. Oil logging in the evaporator
- 4.) Which of the following is the correct sequence of work?
- A. *Attach the gauge manifold, recover refrigerant, replace the filter core, evacuate the system, recharge the system*
 - B. Recover the refrigerant, evacuate the system, replace the filter core, recharge the system
 - C. Attach the gauge manifold, evacuate the system, replace the filter core, recover the refrigerant, recharge the system
 - D. Attach the gauge manifold, recharge the system, evacuate the system, replace the filter core
- 5.) As the pressure on the liquid is increased, the vaporization temperature of the liquid:
- A. Decreases
 - B. *Increases*
 - C. Remains unchanged
 - D. Varies
- 6.) An oil separator must be mounted:
- A. *Level*
 - B. Below the compressor crankcase
 - C. Above the compressor crankcase
 - D. In the suction line
- 7.) Which of the following metering devices controls evaporator pressure:
- A. Thermostatic expansion valve
 - B. Fixed orifice
 - C. Low side float
 - D. *None of these*

8.) The purpose of the external equalizer on the thermostatic expansion valve is:

- A. To equalize evaporator pressure drop with respect to the TEV
- B. To equalize the evaporator pressure drop
- C. To help prevent liquid floodback
- D. To allow the high side pressure to equalize to the low side when the compressor cycles of

9.) The higher the MERV rating of a filter-drier, the:

- A. More efficient the drier at absorbing moisture
- B. Less efficient the drier at absorbing moisture
- C. Smaller the particles the filter can entrap
- D. MERV does not apply to filter-driers

10.) Zeolite is used with:

- A. Refrigerant filter-driers
- B. HEPA filters
- C. Pipe threads
- D. Solder

11.) Vacuum pressures are measured in:

- A. Microns
- B. Millimeters of mercury
- C. Inches of mercury
- D. All the above

12.) The number 25,400 relates to:

- A. Microns/Inch
- B. BTU/Ton
- C. CFM/HP
- D. CFM/Ton

13.) The general rule of thumb for airflow is:

- A. 400 CFM/Ton
- B. 400 CFM/HP
- C. 6 CFM/Square Inch
- D. 144 CFM/Cubic Inch

14.) A double suction riser is used to:

- A. Help improve refrigerant return
- B. Allow the compressor to pump at a greater capacity
- C. Decrease suction line resistance
- D. Improve oil return as system capacity changes

15.) A service technician measures a return air temperature of 80 degrees and a supply air temperature of 55 degrees. What, if anything, may be wrong with this air residential split system air conditioning unit?

- A. Low on refrigerant charge
- B. Low on evaporator airflow
- C. Refrigerant overcharge
- D. There is probably nothing wrong with the system

16.) The normal compression ratio for a typical comfort air conditioning application should be in the range of:

- A. 1 to 2
- B. 1.5 to 2.25
- C. 2 to 3
- D. 2.75 to 3.75

17.) All else being normal, if a system shows a high low-side superheat with high condenser subcooling, what is most likely the problem?

- A. Refrigerant overcharge
- B. Refrigerant undercharge
- C. *A partial refrigerant restriction*
- D. There is probably no problem

18.) All else being normal, if a system shows a low, low-side superheat with high condenser subcooling, what is most likely the problem?

- A. *Refrigerant overcharge*
- B. Refrigerant undercharge
- C. A partial restriction
- D. There is probably no problem

19.) All else being normal, if a system shows a high, low-side superheat with low condenser subcooling, what is most likely the problem?

- A. Refrigerant overcharge
- B. *Refrigerant undercharge*
- C. A partial restriction
- D. There is probably no problem

20.) A grille equipped with a damper control is called:

- A. A vane
- B. *A register*
- C. A louver
- D. A damper

21.) A pressure relief valve is:

- A. *Direct pressure acting*
- B. Remote pressure activated
- C. Manually operated
- D. Reverse pressure acting

22.) A parallel compressor system in which both the crankcase oil level and refrigerant gas pressure are equalized is a:

- A. *Double pipe crankcase equalizer system*
- B. Single pip crankcase equalizer system
- C. Surrounding the tubes
- D. On both sides

23.) In a direct expansion chiller used on air conditioning applications, the refrigerant is on what side of the tubes?

- A. Around the diverter
- B. In the tubes
- C. Surrounding the tubes
- D. On both sides

24.) The total minimum open area for air to flow through on a supply air register is called:

- A. Free area
- B. Open area
- C. Core area
- D. Drop area

25.) Which type of copper tubing has the thickest wall?

- A. Type L
- B. Type K
- C. Type M
- D. Type DWV

26.) What is the gross weight of a refrigerant cylinder?

- A. The weight of the cylinder minus the refrigerant
- B. The weight of the cylinder plus the weight of the refrigerant
- C. The weight of the cylinder's refrigerant capacity
- D. The weight of the cylinder and the box around the cylinder

27.) What does an anemometer measure?

- A. Feet (The anemometer only measures feet while the operator uses a stop watch or second hand on a watch. This is a typical "trick" question to watch for.)
- B. Feet per minute
- C. Cubic feet per minute
- D. Vacuum pressure in microns

28.) The term "induced draft" most likely refers to:

- A. A compressor
- B. A type of control
- C. A type of cooling tower
- D. A type of test instrument

29.) What fitting should be used to connect 1/4" copper tubing to a 1/4" internal pipe thread opening on a compressor crankcase?

- A. A union
- B. A half union
- C. A tee
- D. A street ell

30.) Which of the following compressors has the fewest moving parts?

- A. Rotating vane rotary.
- B. Fixed vane rotary
- C. Scroll
- D. Reciprocating

- 31.) A hot liquid line with a low to normal high side pressure is an indication of:
- A. An overcharged system
 - B. An undercharged system
 - C. Air in the system
 - D. A restricted filter-drier
- 32.) Air and water are directed counterflow so as to:
- A. Average the flow rate
 - B. Gain the greatest amount of heat transfer
 - C. Reach the lowest apparatus dew point
 - D. Control the humidity
- 33.) Which of the following applications is not a mechanical cooling system?
- A. Cascade system
 - B. Reciprocating compression system
 - C. Evaporative cooling
 - D. Centrifugal compression system
- 34.) A compressor is short cycling. Which of the following would not be the cause?
- A. Low pressure controller differential set too close
 - B. Automatic reset high pressure control differential set too close
 - C. Low refrigerant charge
 - D. Leaking compressor suction valve
- 35.) The position of the valve stem on the suction service valve is normally:
- A. Fully-backseated
 - B. Full-frontseated
 - C. Midseated
 - D. Half cocked
- 36.) Of the three fundamental fan laws, one states that the power varies by the ___ of the speed:
- A. Square
 - B. Cube
 - C. Rate
 - D. Inverse
- 37.) Abnormally low suction pressure can be caused by which of the following:
- A. Dirty air filter
 - B. Partially restricted filter-drier
 - C. Shortage of refrigerant
 - D. Any or all of these
- 38.) Which of the following compressor oil types is generally considered the most compatible with HFC refrigerants?
- A. POE
 - B. AB
 - C. Mineral
 - D. Vegetable

39.) The factor determining the correct quantity of air for each room in a building is:

- A. *The calculated heat load for each room*
- B. The size of the room
- C. The size of the ducts
- D. The customer's preference

40.) Refrigerant 22 is classified as an:

- A. *A-1 refrigerant*
- B. A-2 refrigerant
- C. B-1 refrigerant
- D. B-2 refrigerant

41.) Which of the following combinations of instruments can be used to measure airflow in CFM on an electric furnace?

- A. *A thermometer, ammeter and voltmeter*
- B. A thermometer, tachometer and voltmeter
- C. A tachometer, pitot tube and ammeter
- D. A gauge manifold set, thermometer and voltmeter

42.) A rotating vane anemometer measures:

- A. CFM
- B. RPM
- C. FPM
- D. *Feet*

43.) A lockout relay is also called:

- A. An impedance relay
- B. Reset relay
- C. Neither A or B
- D. *Both A and B*

44.) A lockout relay can be reset by:

- A. De-energizing the main power
- B. Pushing the reset button
- C. Turning the breaker off and back on
- D. *All the above*

45.) A voltage measured across a switch means:

- A. The switch is closed
- B. *The switch is open*
- C. The switch is bad
- D. The switch is wearing out

46.) When installing add-on split system air conditioning for a residence, you should never:

- A. Drill holes through outside cement walls
- B. Fish new thermostat wires through walls where power wires are also located
- C. *Fish thermostat wires inside EMT along with power wiring*
- D. Install the new evaporator coil in a downflow style furnace cabinet

47.) In a series circuit, the current:

- A. *Is the same throughout the series path*
- B. Varies according to the wire size
- C. Is always one-half the voltage
- D. Passes the voltage on its way back

48.) Jumping a wire across terminals R and G on the subbase of the thermostat will cause:

- A. *The blower motor to operate*
- B. The condenser fan to come on
- C. The gas valve to become energized
- D. The compressor to start

49.) A fully hermetic compressor on a 3-ton residential split system has three electrical terminals on the side of the compressor. An ohmmeter reads the following: terminal A to B = 20 ohms, A to C = 15 ohms and B to C = 5 ohms. There was a reading of infinity between all three terminals to ground. Which terminal is the common terminal?

- A. Terminal A is common
- B. Terminal B is common
- C. *Terminal C is common*
- D. There is no common terminal on this type compressor

50.) A 3-ton residential split system should move about how many CFM total?

- A. 800 CFM
- B. 1000 CFM
- C. *1200 CFM*
- D. 1500 CFM

51.) An R-22 air conditioning system is operating with a head pressure of 220 psig and a suction pressure of 68.5 psig. A temperature measurement taken on the suction line 8 inches from the suction service valve reads 60 degrees. A temperature measurement taken on the liquid line leaving the condenser reads 90 degrees F. What is the low side superheat?

- A. 10 degrees of superheat
- B. 15 degrees of superheat
- C. *20 degrees of superheat*
- D. 30 degrees of superheat

52.) A hot wood stove gives up heat to the room by:

- A. Conduction
- B. Convection
- C. Radiation
- D. *All three at the same time*

53.) Maintaining manufacturer-specified clearances on all sides of a condensing unit is:

- A. Necessary in residential applications only
- B. Necessary in commercial applications only
- C. Only necessary if required by local codes
- D. *Necessary whenever locating the equipment*

54.) Which of the following conditions would typically require locating supply registers in the floors of both upper and lower levels of a two-story residence?

- A. *In predominately colder climates, when the furnace is located in the basement*
- B. In predominately colder climates, when the furnace is located in the attic
- C. In predominately warmer climates, when the furnace is located in the basement
- D. In predominately warmer climates, when the furnace is located in the attic

55.) A customer's compressor has failed and they wish to replace the outdoor unit only. To properly replace the unit it must be sized to match:

- A. The cooling load of the space
- B. *The capacity of the evaporator*
- C. The size of the slab
- D. The available clearances around the unit

56.) Cased coils should be mounted to furnace cabinets with:

- A. Drywall screws
- B. Sheet metal screws
- C. Tension straps
- D. *Duct tape*

57.) A rejected bid that was accompanied by a specification sheet for proposed work by an HVAC contractor becomes the property of:

- A. The customer
- B. *The contractor*
- C. Any competitor
- D. Anyone who has a copy

58.) The Fahrenheit scale is based on boiling water at sea level at what temperature?

- A. 459 degrees
- B. *212 degrees*
- C. 180 degrees
- D. 100 degrees

59.) Zero pounds gauge corresponds on the absolute scale to:

- A. 144
- B. 212
- C. *14.7*
- D. zero

60.) Hidden heat in refrigeration work is referred to as:

- A. Intensity of heat
- B. *Latent heat*
- C. Heat and thermometer can "sense"
- D. Cold

61.) Absolute zero on the Fahrenheit scale is:

- A. *-459 degrees*
- B. -273 degrees
- C. -100 degrees
- D. 0 degrees

62.) A ton of refrigeration is a unit equal to:

- A. 2,880,000 BTU per day
- B. 12,000 BTU per hour
- C. 2,000 BTU per minute
- All of these are correct

63.) The heat used to change a liquid to a gas is called the latent heat of:

- A. Absorption
- B. Vaporization
- C. Fusion
- D. Liquid

64.) A thermometer is said to "sense" what?

- A. Heat of fusion
- B. Latent heat
- C. Sensible heat
- D. Specific heat

65.) Five pounds of water is heated by two degrees F. How many BTU were added to the water?

- A. 25 BTU
- B. 10 BTU
- C. 5 BTU
- D. 2 BTU

66.) The amount of heat required to melt one pound of ice at 32 degrees F is:

- A. 212 BTU
- B. 180 BTU
- C. 144 BTU
- D. 970 BTU

67.) Superheat is added:

- A. In changing a liquid to a vapor
- B. In raising the temperature of water
- C. After all the liquid has been changed to vapor
- D. None of these is correct

68.) Subcooling is:

- A. Heat added or removed in changing the temperature of a liquid
- B. Heat which causes a liquid to turn into a solid
- C. Heat removed from a liquid below 0 degrees F
- D. Heat removed below the subheat temperature

69.) The saturation temperature is:

- A. Never actually reached
- B. When water is at 0 degrees F
- C. The same as the condensing temperature and boiling temperature
- D. The reciprocal of the inverse of the superheat ratio

70.) Cold is:

- A. Any temperature below 98.6 degrees F
- B. A temperature lower than 50 degrees F
- C. *A relative term with no specific temperature*
- D. A temperature near absolute zero

71.) As the pressure over a liquid is lowered,

- A. Temperature decreases
- B. Temperature increase
- C. The boiling point of the liquid increases
- D. *The boiling point of the liquid decreases*

72.) As heat is added to a substance,

- A. The molecules move slower
- B. It becomes even easier to add still more heat
- C. The substance loses heat
- D. *The molecules move faster*

73.) The amount of heat it takes to change the temperature of one pound of a substance by one degree Fahrenheit is called:

- A. Subcooling
- B. *Specific heat*
- C. Superheat
- D. Specific density

74.) The specific heat of a substance changes when:

- A. The temperature is greater than 100 degrees
- B. The substance changes weight
- C. The temperature falls below 30 degrees
- D. *The substance changes state*

75.) A half-filled cylinder of refrigerant at 80 degrees F will be:

- A. Superheated
- B. Subcooled
- C. *Saturated*
- D. Subheated

76.) The air you are breathing is:

- A. *Superheated*
- B. Subcooled
- C. Saturated
- D. Subheated

77.) The three methods of heat transfer are:

- A. *Conduction, convection and radiation*
- B. Conduction, convection and evaporation
- C. Condensation, convection and radiation
- D. Convection, radiation and sublimation

- 78.) As a gas is compressed,
- A. *Temperature and pressure increase*
 - B. Pressure decreases and volume increases
 - C. Temperature decreases and pressure increases
 - D. Temperature and pressure decreases

- 79.) When compressed enough and then cooled, a gas will:
- A. Explode
 - B. Sublimate
 - C. Flame off
 - D. *Condense*

- 80.) The condensing temperature and the ____ temperature mean the same thing.
- A. Superheated
 - B. Subcooling
 - C. *Saturation*
 - D. Sublimated

- 81.) The evaporator is a
- A. High pressure component
 - B. *Low pressure component*
 - C. High and low pressure component
 - D. None of these are correct

- 82.) The two components that contain coils are:
- A. Condenser and compressor
 - B. *Condenser and evaporator*
 - C. Evaporator and compressor
 - D. Evaporator and accumulator

- 83.) Refrigerant vaporizes in the:
- A. Condenser
 - B. *Evaporator*
 - C. Compressor
 - D. Oil separator

- 84.) The two components that divide the high pressure side from the low pressure side of a system are the:
- A. Compressor and condenser
 - B. *Compressor and metering device*
 - C. Condenser and evaporator
 - D. Liquid line and suction line

- 85.) The pipe which connects the evaporator to the compressor is the:
- A. *Suction line*
 - B. Liquid line
 - C. Discharge line
 - D. Hot gas line

- A. Suction line
- B. Liquid Line
- C. Discharge line
- D. Hot has line

The pip that connect the compressor to the condenser is. The -

87.) Which of the following refrigerants would be used with POE oil?

- A. R-22
- B. R-12
- C. R-502
- D. R-410A

88.) The discharge line temperature of a reciprocating compressor should never be allowed to exceed how many degrees F?

- A. 190 degrees
- B. 225 degrees
- C. 325 degrees
- D. 375 degrees

89.) Refrigerant becomes superheated in the:

- A. Evaporator
- B. Evaporator and suction line
- C. Evaporator, suction line and compressor
- D. Bottom of the condenser

90.) Refrigerant is in its saturated state in the:

- A. Compressor
- B. Liquid line
- C. Condenser
- D. Suction line

91.) The temperature-pressure chart works:

- A. Where refrigerant is saturated
- B. Where refrigerant is superheated
- C. Where refrigerant is subcooled
- D. Wherever the manifold gauges are attached

92.) Which service valve should never be frontseated while the compressor is operating?

- A. Compressor suction service valve
- B. Compressor discharge service valve
- C. King valve
- D. Schrader valve

93.) How many microns are there per inch of mercury?

- A. 762,000 microns/inch
- B. 0 microns/inch
- C. 7,000 microns/inch
- D. 25,4000 microns/inch

- 94.) A manifold gauge set is properly attached to the suction and discharge valves on a compressor. In order to read the high and low side pressures of the system, what position should the service valves on the compressor be in?
- A. Frontseated
 B. Midseated
 C. Backseated
 D. None of these
- 95.) A manifold gauge set is properly attached to the suction and discharge valves on a compressor. In order to read the high and low side pressures of the system, what position should the gauge manifold valves be in?
- A. **Fully clockwise**
 B. Fully counterclockwise
 C. Midseated
 D. None of these
- 96.) A 125 pound cylinder of R-22 is stored in a room at 80 degrees Fahrenheit. The pressure in the cylinder should be:
- A. **144 psig**
 B. 160 psig
 C. 175 psig
 D. 80 psig
- 97.) Vacuum pressures are measured in:
- A. Inches of mercury
 B. Inches of water
 C. Microns
 D. Both A & C
- 98.) Then condenser gives up:
- A. Sensible heat
 B. Latent heat
 C. Specific heat
 D. Sensible and latent heat
- 99.) What is the purpose of the valve installed on the high side of the system and which causes the condenser to flood with liquid refrigerant under certain circumstances?
- A. **It controls the head pressure during periods of low outside ambient temperatures.**
 B. It controls the head pressure during periods of high outside ambient temperatures.
 C. It allows the refrigerant to back up into the condenser when the thermostatic expansion valve throttles back.
 D. It allows a larger system to operate without the need for a receiver.
- 100.) A thermostatic expansion valve controls:
- A. Evaporator pressure
 B. Evaporator temperature
 C. Evaporator superheat
 D. All of the above

Answers:

- 1.) D
- 2.) A
- 3.) A
- 4.) A
- 5.) B
- 6.) A
- 7.) D
- 8.) A
- 9.) D
- 10.) A
- 11.) D
- 12.) A
- 13.) A
- 14.) D
- 15.) B
- 16.) D
- 17.) C
- 18.) A
- 19.) B
- 20.) B
- 21.) A
- 22.) A
- 23.) B
- 24.) A
- 25.) B
- 26.) B
- 27.) A-The anemometer only measures feet while the operator uses a stop watch or second hand on a watch.
This is a typical "trick" question to watch for.
- 28.) C
- 29.) B
- 30.) C
- 31.) B
- 32.) B
- 33.) C
- 34.) D
- 35.) A
- 36.) B
- 37.) D
- 38.) A
- 39.) A
- 40.) A
- 41.) A
- 42.) D
- 43.) D
- 44.) D
- 45.) B
- 46.) C
- 47.) A
- 48.) A
- 49.) C
- 50.) C
- 51.) C
- 52.) D

- 53.)D
- 54.)A
- 55.)B
- 56.)D
- 57.)B
- 58.)B
- 59.)C
- 60.)B
- 61.)A
- 62.)B
- 63.)B
- 64.)C
- 65.)B
- 66.)C
- 67.)C
- 68.)A
- 69.)C
- 70.)C
- 71.)D
- 72.)D
- 73.)B
- 74.)D
- 75.)C
- 76.)A
- 77.)A
- 78.)A
- 79.)D
- 80.)C
- 81.)B
- 82.)B
- 83.)B
- 84.)B
- 85.)A
- 86.)C
- 87.)D
- 88.)B
- 89.)C
- 90.)C
- 91.)A
- 92.)B
- 93.)D
- 94.)B
- 95.)A
- 96.)A
- 97.)D
- 98.)D
- 99.)A
- 100.) C