PRACTICE EXAM 9: RACM RED SEAL SIMULATION (125 QUESTIONS)

1. A technician measures a suction pressure of 59 psig on an R-134a system with a saturation temperature of 35°F. The suction line temperature at the same point reads 50°F. What is the superheat?

A. 9°F, which is below the target range and indicates an overcharged condition

B. 15°F, a normal value indicating the metering device is feeding correctly

C. 24°F, suggesting the system is undercharged and starved of refrigerant

D. 0°F, meaning liquid refrigerant is returning to the compressor

2. Under CSA B52, what is the primary purpose of a machinery room ventilation and refrigerant-detection system?

A. To recover refrigerant automatically during a leak event

B. To maintain a constant room temperature for compressor efficiency

C. To detect refrigerant concentration and exhaust it before reaching hazardous levels

D. To pressurize the room and prevent outside air infiltration

3. A halide torch flame turns bright green when held near a fitting. What does this indicate?

A. The presence of moisture inside the refrigerant lines

B. A properly brazed joint with no contamination

C. A leak of a chlorine-bearing refrigerant at that point

D. Excessive non-condensable gases in the condenser

4. When brazing copper-to-copper joints, why is dry nitrogen purged through the tubing during the process?

A. To increase the internal pressure and test for leaks simultaneously

B. To cool the joint rapidly and prevent annealing of the copper

C. To add moisture that improves filler-metal flow into the joint

D. To prevent the formation of copper oxide (scale) inside the tubing

5. A TXV-controlled evaporator shows hunting (cyclic surging of refrigerant flow). Which is the most likely cause?

A. The condenser fan motor is running in reverse

B. An incorrectly sized valve or improperly located sensing bulb

C. The high-pressure cutout is set too low

D. The liquid line filter-drier is completely clean

6. What does subcooling at the condenser outlet primarily indicate?

A. The amount of superheat added in the suction line

B. That the compressor discharge valves are leaking

C. The evaporator is flooding with liquid refrigerant

D. That refrigerant has cooled below its saturation temperature, confirming a liquid column

7. A compressor draws high amperage and trips on overload shortly after start. The condenser is clean and airflow is normal. What should be checked first?

A. The thermostat differential setting

B. The evaporator defrost timer

C. The suction line insulation thickness

D. High head pressure from overcharge or non-condensables

8. Which refrigerant property is described by "glide"?

A. The pressure drop across the metering device

B. The viscosity of the compressor lubricating oil

C. The temperature difference between bubble point and dew point in a zeotropic blend

D. The rate at which refrigerant absorbs moisture

9. Per safe handling practice, why must a refrigerant cylinder never be filled beyond 80% of its volume?

A. To leave room for the addition of dye for leak detection

B. To keep the cylinder light enough for one-person handling

C. To allow space for liquid expansion and prevent hydrostatic rupture as temperature rises

D. To reserve capacity for non-condensable gases

10. An air-cooled condenser has a high temperature split between ambient air and condensing temperature. What is the likely cause?

A. Refrigerant undercharge in the system

B. Dirty condenser coil or restricted airflow

C. Oversized metering device

D. Low ambient operating conditions

11. What is the function of an accumulator in a refrigeration circuit?

A. To store excess liquid refrigerant during high-load conditions only

B. To increase suction superheat by adding heat to the vapor

C. To filter acid from the refrigerant after a burnout

D. To prevent liquid refrigerant slugging from reaching the compressor

12. A pressure-temperature relationship on a P-T chart is used primarily to:

A. Calculate the compression ratio of the system

B. Determine the correct wire gauge for the compressor

C. Find saturation temperature for a measured pressure when charging or checking superheat

D. Size the condenser fan motor

13. During evacuation, a micron gauge rises and stabilizes at a level above the target after the vacuum pump is isolated. This indicates:

A. The vacuum pump oil needs no change

B. The system has reached a deep vacuum successfully

C. Remaining moisture or a small leak in the system

D. The gauge is reading the pump's ultimate vacuum only

13. (continued — disregard duplicate)

14. A capillary-tube system is critically charged. What is the main consequence of overcharging it?

A. High head pressure and possible liquid floodback to the compressor

B. Insufficient refrigerant reaching the evaporator

C. Reduced subcooling at the condenser

D. The capillary tube freezing solid with no flow

15. Which control directly protects the compressor against loss of lubrication?

A. The defrost termination thermostat

B. The head-pressure control valve

C. The crankcase heater thermostat

D. The oil-pressure safety (differential) control

16. On a refrigerant recovery operation, what determines whether you can recover into liquid versus vapor?

A. The color of the refrigerant cylinder

B. The length of the recovery hoses

C. The recovery method and machine capability, plus system charge size

D. The brand of the recovery machine only

17. A walk-in freezer evaporator ices over completely between defrost cycles. The defrost heaters test good. What is the most likely cause?

A. Defrost cycle frequency or duration set too short for the load

B. The condensing unit is oversized for the box

C. The TXV superheat is set too high

D. The liquid line solenoid is stuck open

18. What is the purpose of a head-pressure control on a system operating in low ambient conditions?

A. To increase suction pressure during defrost

B. To maintain adequate condensing pressure for proper TXV operation

C. To bypass the compressor during start-up

D. To reduce subcooling in winter operation

19. Two refrigerants commonly used as lower-GWP replacements in new commercial equipment include:

A. R-12 and R-502

B. R-454B and R-32

C. R-22 and R-123

D. R-11 and R-113

20. A system using a thermostatic expansion valve has an external equalizer line. Its purpose is to:

A. Drain oil back to the compressor crankcase

B. Vent non-condensables from the condenser

C. Compensate for evaporator pressure drop so superheat control stays accurate

D. Equalize pressures during the off cycle for easier starting

21. When silver-brazing a joint on a system that will carry HFC refrigerant, the filler metal selected should:

A. Be appropriate for the base metals and rated for the joint's service pressure and temperature

B. Always contain a minimum of 45% silver regardless of application

C. Be a soft solder with a low melting point under 250°F

D. Match the color of the copper tubing exactly

22. A compressor has tripped on its internal thermal overload repeatedly. After cooling, it restarts but trips again. Measured running amps are well above RLA. The most probable root cause is:

A. A mechanical or electrical problem causing excessive load, such as high head pressure or a failing winding

B. A thermostat set a few degrees too low

C. Normal operation for a hermetic compressor in summer

D. An oversized suction line

23. A refrigerant blend has been topped up as vapor from the cylinder rather than charged as liquid. The risk is:

A. Overcharging the system with oil

B. Excessive subcooling at the condenser

C. Fractionation, changing the blend composition and altering performance

D. Immediate compressor seizure on start-up

24. What does a low superheat reading combined with low suction pressure typically indicate?

A. An overcharged system with floodback

B. A clean, properly operating evaporator

C. A restriction such as a partially plugged filter-drier or metering device, starving the evaporator

D. Excessive condenser airflow

25. Under environmental regulations governing refrigerant handling in Canada, intentional venting of most refrigerants is:

A. Permitted if the charge is under 5 kg

B. Permitted only for natural refrigerants

C. Allowed during routine maintenance only

D. Prohibited; refrigerant must be recovered

26. A capillary-tube domestic refrigerator runs continuously and the cabinet is warm. Suction pressure is low and frost forms only at the evaporator inlet. The likely cause is:

A. Overcharge of refrigerant

B. Condenser fan failure

C. Compressor running in reverse

D. A partial restriction in the capillary tube or drier

27. The main reason to install a filter-drier with the arrow pointing in the direction of flow is to:

A. Reduce the pressure drop to zero across the device

B. Allow the desiccant to release moisture downstream

C. Ensure proper filtration direction and prevent desiccant migration into the system

D. Reverse-flush the system during pump-down

28. A technician finds non-condensable gases in a system. The clearest field symptom is:

A. Suction pressure higher than normal with low superheat

B. Subcooling far above design at low ambient

C. Head pressure higher than the condenser saturation temperature would predict for the measured liquid temperature

D. The compressor short-cycling on low-pressure control

29. What is the function of a liquid-line solenoid valve in a pump-down control scheme?

A. To close on the off cycle so the compressor pumps refrigerant into the condenser/receiver before stopping

B. To meter refrigerant into the evaporator continuously

C. To bypass hot gas during defrost

D. To regulate condenser fan speed

30. Compression ratio is calculated as:

A. Discharge temperature divided by suction temperature in °F

B. Absolute discharge pressure divided by absolute suction pressure

C. Gauge discharge pressure divided by gauge suction pressure

D. Condenser saturation temperature minus evaporator saturation temperature

31. A hermetic compressor has suffered a motor burnout. The recommended cleanup procedure includes:

A. Charging the system immediately without changing components

B. Adding extra oil to dilute the acid

C. Installing suction-line and liquid-line acid-removal driers and following a burnout cleanup procedure

D. Running the system for 24 hours before any service

32. On a P-T chart, R-410A shows pressures significantly higher than R-22 at the same temperature. The practical consequence is that R-410A equipment must:

A. Use components and tubing rated for higher working pressures

B. Operate with lower superheat in all cases

C. Be charged exclusively as vapor

D. Use mineral oil rather than POE oil

33. A TXV system shows high superheat and low suction pressure with the evaporator starved. Bulb is well-mounted and insulated. The most likely valve-related cause is:

A. The valve is underfeeding due to lost charge in the power head or a stuck-closed condition

B. The valve is overfeeding liquid to the compressor

C. The external equalizer is oversized

D. The evaporator is flooded

34. What personal protective practice is essential when charging a system with liquid refrigerant?

A. Wearing only cotton gloves for grip

B. Removing safety glasses to read gauges clearly

C. Charging liquid directly into the suction service valve at full flow

D. Wearing eye protection and gloves to prevent frostbite from contact with liquid refrigerant

35. A condensing unit cycles on the high-pressure control on a hot day. The condenser coil is clean and the fan runs. What should be checked next?

A. The suction line insulation

B. Overcharge or air (non-condensables) in the system

C. The defrost timer setting

D. The crankcase heater operation

36. The purpose of a sight glass in the liquid line is to:

A. Measure the exact refrigerant charge in pounds

B. Indicate the presence of flash gas (bubbles) and, with a moisture indicator, the moisture condition

C. Display the suction superheat directly

D. Show the oil level in the compressor crankcase

37. A system is being commissioned. After evacuation to 500 microns and isolation, the gauge holds steady at 500 microns for 10 minutes. This means:

A. The system still contains significant moisture

B. The vacuum pump has failed

C. The system is dry and leak-free to the standard required for charging

D. Non-condensables remain and must be purged

38. Why is POE (polyolester) oil used with HFC refrigerants instead of mineral oil?

A. POE oil is cheaper than mineral oil

B. Mineral oil has a higher viscosity index

C. POE oil does not absorb any moisture

D. HFC refrigerants are not miscible with mineral oil, so oil would not return to the compressor

39. A defrost cycle on an electric-defrost evaporator should terminate based on:

A. A fixed time only, regardless of coil condition

B. Temperature (coil clear of ice) with a time backup (fail-safe)

C. Suction pressure alone

D. Head pressure rising to the cutout

40. When a low-pressure control is used for temperature control in a pump-down system, the cut-in and cut-out settings determine:

A. The compressor discharge temperature

B. The condenser fan staging

C. The defrost duration

D. The box temperature range by controlling suction pressure points

41. A brazed joint fails and shows a rough, pitted internal surface. The most likely cause during brazing was:

A. Too much silver content in the filler

B. Insufficient cleaning of the joint before assembly

C. Lack of nitrogen purge, causing internal oxidation/scale

D. The joint was overheated by a few degrees only

42. A receiver is installed in a system primarily to:

A. Store the variable refrigerant charge and ensure a solid liquid seal to the metering device

B. Increase the suction superheat

C. Filter acid from the refrigerant

D. Reduce the discharge temperature of the compressor

43. A technician measures 0°F superheat and liquid refrigerant is returning to the compressor. The immediate risk is:

A. Loss of refrigerant charge through the relief valve

B. Excessive condenser subcooling

C. The metering device freezing closed

D. Liquid slugging and compressor valve or mechanical damage

44. What does the term "net refrigerating effect" describe?

A. The heat absorbed per unit mass of refrigerant in the evaporator

B. The total heat rejected at the condenser

C. The work of compression in BTU

D. The latent heat of the oil charge

45. The most accurate method to confirm a system's charge on a TXV system at design conditions is:

A. Weighing the cylinder before and after only

B. Reading the suction pressure alone

C. Matching the sight glass color to a chart

D. Checking subcooling at the condenser against the manufacturer's target

46. A scroll compressor rotates in reverse on three-phase power. The symptom is:

A. Loud noise, no pressure differential developing, and the compressor must have two phases swapped

B. Normal cooling with slightly reduced capacity

C. High subcooling and low head pressure

D. The crankcase heater overheating

47. Why must refrigerant recovery cylinders be DOT/TC-approved and within their hydrostatic test date?

A. To match the color coding of the refrigerant

B. To ensure the cylinder can safely contain the pressure without rupture

C. To allow filling to 100% of volume

D. To reduce the cost of recovery

48. A medium-temperature display case loses capacity in the afternoon. Head pressure climbs, the condenser is clean, and ambient is high. The defect most consistent with these symptoms is:

A. Low refrigerant charge

B. A stuck-open liquid line solenoid

C. Excessive evaporator superheat from a starved coil

D. Condenser undersizing or restricted airflow under peak load

49. A vapour-compression cycle's four main components in refrigerant-flow order are:

A. Compressor, evaporator, metering device, condenser

B. Condenser, compressor, evaporator, metering device

C. Compressor, condenser, metering device, evaporator

D. Evaporator, condenser, compressor, metering device

50. The primary hazard of trapping liquid refrigerant between two closed valves is:

A. Loss of subcooling

B. Reduced compressor capacity

C. Excessive superheat

D. Hydrostatic pressure rise that can rupture the line or component

51. A hot-gas defrost system uses the discharge gas to:

A. Increase the suction superheat directly

B. Warm the evaporator coil and melt accumulated frost

C. Subcool the liquid in the receiver

D. Purge non-condensables from the condenser

52. A technician notes the compressor runs but the system has no cooling and pressures equalize quickly when off. Discharge and suction pressures are nearly equal while running. The likely cause is:

A. Overcharge of refrigerant

B. A plugged liquid-line drier

C. A flooded evaporator

D. An internal compressor problem such as broken valves or a worn pump

53. Charging a system by superheat is the preferred method for systems using:

A. A fixed orifice or capillary-tube metering device

B. A thermostatic expansion valve with a receiver

C. An electronic expansion valve with subcooling control

D. A flooded evaporator with a float

54. A flooded chiller uses which device to maintain the correct liquid level in the evaporator?

A. A capillary tube

B. A thermostatic expansion valve only

C. A low-side float (level control)

D. A fixed orifice plate

55. Why should the suction line be insulated on a low-temperature system?

A. To prevent heat gain and condensation/sweating, maintaining superheat and efficiency

B. To increase the refrigerant subcooling

C. To raise the discharge temperature

D. To reduce the compression ratio directly

56. A technician must work on a system containing an A2L refrigerant. A key safety consideration is:

A. A2L refrigerants are mildly flammable, so ignition sources and ventilation must be managed

B. A2L refrigerants are non-toxic so no ventilation is required

C. A2L refrigerants can be vented freely indoors

D. A2L refrigerants require no leak detection

57. The pressure drop intentionally created by the metering device causes the refrigerant to:

A. Increase in temperature before the evaporator

B. Become a high-pressure liquid

C. Fully condense into subcooled liquid

D. Drop in pressure and partially flash, lowering its temperature for evaporation

58. A walk-in cooler's TXV bulb has lost its charge. The expected symptom is:

A. The valve drives wide open, flooding the evaporator

B. Normal operation with slightly high subcooling

C. Excessive head pressure with the valve unaffected

D. The valve closes (or fails to open), starving the evaporator and raising superheat

59. What is the purpose of a crankcase heater on a compressor during the off cycle?

A. To drive refrigerant out of the oil and prevent foaming/slugging at start-up

B. To heat the discharge line for defrost

C. To raise the suction superheat

D. To warm the condenser in low ambient

60. A system's high-pressure control is a manual-reset type. The reason for manual reset on this safety is:

A. To allow automatic recovery for minor pressure spikes

B. To force a technician to investigate the cause before the system restarts

C. To reduce nuisance defrost cycles

D. To limit the number of compressor starts per hour

61. When measuring superheat to set a TXV, the temperature is taken at the:

A. Liquid line near the condenser outlet

B. Compressor discharge line

C. Suction line near the evaporator outlet, at or near the bulb location

D. Condenser inlet header

62. A refrigerant with a high ODP (ozone depletion potential) such as R-12 has been phased out because it:

A. Has poor lubricating properties

B. Cannot be recovered with standard equipment

C. Is incompatible with copper tubing

D. Contains chlorine that depletes stratospheric ozone

63. A technician finds the liquid-line sight glass full of bubbles even after confirming adequate charge. A likely cause is:

A. Excessive subcooling at the condenser

B. The compressor running in reverse

C. A restriction upstream of the sight glass causing a pressure drop and flash gas

D. The evaporator flooding with liquid

64. The wet-bulb and dry-bulb temperature difference of air across an evaporator is used to determine:

A. The relative humidity and latent load handling of the coil

B. The refrigerant subcooling

C. The compressor compression ratio

D. The condenser temperature split

65. A condenser fan cycling control (fan cycling for head-pressure control) operates by:

A. Modulating refrigerant flow to the evaporator

B. Bypassing hot gas to the suction line

C. Changing compressor speed

D. Switching the condenser fan on and off to hold condensing pressure in a range

66. Before opening a sealed system for repair, the refrigerant must be:

A. Vented slowly to atmosphere to reduce pressure

B. Recovered into an approved recovery cylinder

C. Pumped into the compressor crankcase

D. Frozen by chilling the cylinder

67. A system shows normal subcooling but lower-than-normal superheat and the evaporator is partly flooded. The TXV is most likely:

A. Stuck closed

B. Underfeeding the evaporator

C. Correctly adjusted

D. Overfeeding due to a misadjusted superheat setting or stuck-open condition

68. The latent heat of vaporization is the heat required to:

A. Raise the temperature of a liquid by one degree

B. Change a liquid to a vapor at constant temperature

C. Subcool a liquid below its saturation point

D. Compress a vapor adiabatically

69. A reciprocating compressor's discharge valve is leaking. The diagnostic symptom is:

A. High discharge temperature and reduced capacity with elevated suction pressure

B. Excessive subcooling and low head pressure

C. The evaporator flooding with liquid

D. The crankcase heater cycling rapidly

70. A pressure-regulating valve installed in the suction line to prevent the evaporator pressure from dropping below a set point is a(n):

A. Crankcase pressure regulator (CPR)

B. Evaporator pressure regulator (EPR)

C. Discharge bypass valve

D. Head-pressure control valve

71. Why is it important to leak-test a system with dry nitrogen (with a trace of refrigerant if needed) rather than oxygen?

A. Oxygen reads more accurately on electronic detectors

B. Nitrogen is cheaper than all other gases

C. Oxygen improves the brazed joint quality

D. Oxygen under pressure with oil can ignite or explode, creating a serious safety hazard

72. A technician adds refrigerant to a low-charge R-410A system. Because R-410A is a near-azeotropic blend, it should be:

A. Charged as vapor only to protect the compressor

B. Charged into the discharge line

C. Vented and replaced rather than topped up

D. Charged as liquid (metered) to maintain blend composition

73. The purpose of an oil separator at the compressor discharge is to:

A. Subcool the liquid before the metering device

B. Return oil to the compressor and keep it out of the condenser/evaporator

C. Filter acid from the discharge gas

D. Reduce the compression ratio

74. A system is short-cycling on the low-pressure control. The suction pressure drops quickly after each start. The most likely cause is:

A. Overcharge of refrigerant

B. A flooded evaporator

C. Low refrigerant charge or a restriction starving the evaporator

D. High condenser airflow

75. Why must service ports and gauges be purged of air before charging?

A. To increase the system's subcooling

B. To prevent introducing non-condensables and moisture into the system

C. To raise the suction superheat

D. To cool the manifold gauges

76. A TXV with an MOP (maximum operating pressure) charge limits:

A. The condenser pressure during low ambient

B. The subcooling at the receiver

C. The maximum suction pressure during pull-down to protect the compressor motor

D. The discharge temperature

77. A system using a desiccant filter-drier that has become moisture-saturated will show:

A. Possible acid formation and a moisture indicator color change toward "wet"

B. Increased subcooling at the condenser

C. Lower head pressure than normal

D. Higher net refrigerating effect

78. The function of the evaporator in the refrigeration cycle is to:

A. Absorb heat from the conditioned space, boiling the refrigerant to vapor

B. Reject heat to the outside air

C. Raise the pressure of the refrigerant vapor

D. Meter refrigerant flow into the condenser

79. A compressor is replaced after a burnout. To verify cleanup success, the technician should:

A. Run the system at full load for one week without checks

B. Take an oil acid test after a run-in period and change driers as needed

C. Vent a small amount of refrigerant to atmosphere

D. Add extra oil to neutralize remaining acid

80. What does a "TXV bulb cross-charge" provide compared to a straight liquid charge?

A. More consistent superheat across a wide range of evaporator temperatures

B. Faster off-cycle equalization

C. Lower maximum operating pressure only

D. Higher subcooling at the condenser

81. A system has correct charge and clean coils but poor cooling, with both pressures slightly off and high discharge temperature. The compression ratio is abnormally high. The likely cause is:

A. Excess subcooling at the condenser

B. A flooded evaporator from overcharge

C. The crankcase heater stuck on

D. A restriction or low suction pressure raising the ratio, reducing capacity and overheating the compressor

82. Per safe-handling regulations, a technician who services equipment containing controlled refrigerants in Canada is generally required to hold:

A. An environmental/ozone-depletion handling certification (e.g., a refrigerant-handling card)

B. A real-estate license

C. No certification for systems under 2 kg

D. Only a driver's license

83. A condenser subcooling reading that is much higher than design typically indicates:

A. An undercharged system

B. A starved evaporator

C. An overcharge, with excess liquid backing up in the condenser

D. Non-condensables only

84. When recovering refrigerant from a system with a large liquid charge, using the push-pull method requires:

A. Recovering only as vapor through both ports

B. Heating the recovery cylinder above 80% full

C. Venting the vapor while pulling the liquid

D. A liquid path from the system pushed by vapor pressure into the recovery cylinder

85. A hermetic compressor terminal shows a "spit" or arc and an oily residue. This is a sign of:

A. Normal operation under high load

B. Excessive subcooling

C. A potential terminal fault or impending failure requiring careful inspection

D. Correct crankcase heater function

86. The main reason a system uses a liquid-suction heat exchanger is to:

A. Increase the condenser subcooling only

B. Subcool the liquid and add superheat to the suction vapor, improving efficiency and preventing floodback

C. Reduce the discharge pressure

D. Separate oil from the discharge gas

87. A technician measures airflow across an evaporator that is lower than design. The effect on the refrigeration system is:

A. Lower suction pressure and possible coil icing from reduced load on the coil

B. Higher suction pressure and flooding

C. Increased condenser subcooling

D. No effect on the refrigerant side

88. When pressure-testing a newly assembled system, the test pressure should be:

A. Based on the design working pressure and the standards/manufacturer specifications, using an inert gas

B. As high as the gauge will read

C. Always exactly atmospheric pressure

D. Set with oxygen to detect leaks faster

89. A system using an electronic expansion valve (EEV) controls superheat by:

A. A fixed orifice sized at the factory

B. A controller adjusting valve position based on temperature and pressure sensor inputs

C. The condenser fan speed only

D. A mechanical bulb and diaphragm exclusively

90. The off-cycle equalization in a capillary-tube system allows the compressor to:

A. Build extra subcooling before starting

B. Start against equalized pressures, permitting a low-starting-torque motor

C. Run continuously without cycling

D. Avoid the need for an accumulator entirely

91. A high superheat with normal-to-high suction pressure on a TXV system most often indicates:

A. The valve underfeeding or a low charge, with the coil not fully fed

B. The valve overfeeding liquid

C. A flooded evaporator

D. Excess condenser subcooling

92. The reason for sloping suction lines and using P-traps on long vertical risers is to:

A. Reduce the refrigerant charge required

B. Increase the condenser subcooling

C. Ensure proper oil return to the compressor

D. Lower the discharge temperature

93. A refrigerant's "critical temperature" is the temperature above which:

A. The refrigerant cannot be condensed to a liquid regardless of pressure

B. The refrigerant freezes solid

C. The oil separates from the refrigerant

D. The compressor must shut down

94. A technician suspects a TXV is hunting due to bulb location. The best corrective action is:

A. Increase the system charge until hunting stops

B. Replace the compressor

C. Raise the head pressure setting

D. Relocate and properly insulate the bulb on a clean horizontal suction line section

95. The purpose of a discharge muffler on a compressor is to:

A. Increase the discharge pressure

B. Filter moisture from the discharge gas

C. Dampen gas pulsations and reduce noise

D. Separate oil from the refrigerant

96. When a system is operating with a flooded evaporator (intentional design), capacity control is achieved by:

A. A capillary tube on the suction line

B. A liquid level control maintaining refrigerant level in the evaporator

C. The condenser fan cycling only

D. The crankcase heater modulation

97. A low-temperature system shows oil logging in the evaporator and the compressor is starved of oil. The most likely cause is:

A. Excess subcooling at the condenser

B. The metering device overfeeding liquid

C. Poor oil return due to low refrigerant velocity or improper piping

D. The high-pressure control set too high

98. The primary advantage of using two-stage compression in low-temperature applications is:

A. Reduced compression ratio per stage, improving efficiency and limiting discharge temperature

B. Elimination of the need for any metering device

C. No requirement for an oil separator

D. The ability to vent refrigerant safely

99. A relief valve on a refrigerant receiver is set to:

A. Open at the normal operating pressure to bleed off vapor continuously

B. Maintain the suction pressure during pump-down

C. Control the condenser fan staging

D. Relieve at a pressure below the vessel's design limit to prevent rupture from overpressure

100. A system has a TXV with the bulb mounted on the bottom of the suction line. The likely problem is:

A. The valve overfeeds because the bulb reads liquid refrigerant temperature

B. Poor contact and inaccurate sensing, since the bulb may read oil/liquid pooling rather than vapor temperature

C. The valve closes fully and starves the coil permanently

D. No effect; bulb position does not matter

101. When charging an HFC system in cold weather, the cylinder may need to be:

A. Cooled below ambient to slow the charge

B. Warmed (safely, e.g., in warm water or with approved blankets) to maintain charging pressure

C. Inverted and vented to remove air

D. Filled to 95% to compensate for cold

102. The role of the condenser in the refrigeration cycle is to:

A. Absorb heat from the conditioned space

B. Meter the refrigerant into the evaporator

C. Lower the pressure of the refrigerant

D. Reject heat, desuperheating and condensing the high-pressure vapor to liquid

103. A technician measures high subcooling and low superheat with the compressor showing signs of floodback. The corrective action is:

A. Check for overcharge and TXV overfeeding, and correct the charge/valve setting

B. Add more refrigerant to raise the superheat

C. Lower the condenser airflow

D. Increase the crankcase heater wattage

104. Sensible heat is best described as heat that:

A. Changes the state of a substance without changing temperature

B. Is only present in superheated vapor

C. Changes the temperature of a substance without changing its state

D. Is equal to the latent heat of vaporization

105. A pump-down cycle terminates when:

A. The low-pressure control opens as the suction pressure falls after the liquid solenoid closes

B. The high-pressure control trips

C. The defrost timer initiates

D. The condenser fan cycles off

106. A system using a receiver and TXV is best charged by:

A. Suction superheat alone

B. Weighing in the manufacturer's specified charge or charging to target subcooling

C. Sight-glass clarity only with no other measurement

D. Filling until the relief valve lifts

107. A condenser operating with insufficient airflow will cause:

A. Low head pressure and excess subcooling

B. High head pressure, high compression ratio, and reduced capacity

C. A flooded evaporator with low superheat

D. Loss of refrigerant charge

108. The function of a check valve in a heat-pump reversing-valve circuit is to:

A. Meter refrigerant into the indoor coil only

B. Separate oil from the discharge gas

C. Direct refrigerant flow through the correct metering device for heating or cooling mode

D. Relieve overpressure at the receiver

109. A technician finds moisture has frozen at the metering device, causing intermittent blockage. The correct repair is to:

A. Add more refrigerant to push the ice through

B. Raise the head pressure to melt the ice

C. Recover, replace the filter-drier, evacuate properly, and recharge with dry refrigerant

D. Insulate the suction line more heavily

110. A scroll compressor offers which advantage over a reciprocating compressor?

A. Fewer moving parts, smoother operation, and tolerance to small amounts of liquid

B. The ability to be charged with any oil type

C. No need for any overload protection

D. Operation without electrical power

111. The primary reason a system uses a suction-line accumulator on a heat pump is to:

A. Increase the condenser subcooling

B. Protect the compressor from liquid floodback during defrost and mode changes

C. Meter refrigerant to the evaporator

D. Separate oil from the discharge gas

112. A technician notices the compressor cycles off on the internal overload only during the hottest part of the day. Pressures are normal at cooler times. The most likely cause is:

A. The crankcase heater is undersized

B. The suction line is over-insulated

C. The defrost timer is faulty

D. High head pressure under peak ambient overloading the motor

113. When silver brazing near a service valve with a Schrader core, the technician should:

A. Braze at maximum heat to finish quickly

B. Leave the core in place to act as a heat sink

C. Apply flux directly to the core

D. Remove the valve core (or protect it) and wrap/cool the valve body to prevent heat damage

114. A refrigerant cylinder's pressure reads higher than the saturation pressure for its temperature. This indicates:

A. The cylinder is undercharged

B. The refrigerant has fully condensed

C. Non-condensable gas (e.g., air) is present in the cylinder

D. The cylinder is too cold to charge

115. The COP (coefficient of performance) of a refrigeration system is:

A. The useful refrigerating effect divided by the work input

B. The discharge pressure divided by the suction pressure

C. The condenser capacity divided by the evaporator capacity

D. The latent heat divided by the sensible heat

116. A TXV-controlled system in heating mode (heat pump) reverses flow. The metering device for the outdoor coil during heating is typically:

A. The same TXV operating in reverse with no check valve

B. A separate metering device or TXV with a bypass check valve for each coil

C. The compressor's internal valve

D. The accumulator

117. A system charged with a zeotropic blend develops a leak and loses charge over time. The correct repair practice is to:

A. Top up with vapor from the cylinder to save refrigerant

B. Mix in a different refrigerant of similar pressure

C. Recover the remaining charge, repair the leak, evacuate, and recharge with virgin blend by weight

D. Add oil to compensate for the lost refrigerant

118. A high-side float metering device maintains:

A. A constant suction superheat

B. The evaporator liquid level directly

C. A liquid level in the high side, passing liquid to the low side as it condenses

D. The condenser fan speed

119. A compressor's RLA (rated load amps) is exceeded continuously. The risk to the motor is:

A. Excessive subcooling at the condenser

B. Overheating and insulation breakdown leading to winding failure

C. Loss of refrigerant charge

D. Reduced discharge temperature

120. The purpose of staging multiple compressors (or unloading a compressor) is to:

A. Eliminate the need for a metering device

B. Match capacity to load, improving efficiency and reducing short-cycling

C. Increase the system's subcooling only

D. Allow venting of refrigerant during low load

121. A walk-in freezer's evaporator drain line is freezing and backing up water. The corrective measure is to:

A. Increase the defrost frequency only

B. Lower the box temperature setpoint

C. Reduce the refrigerant charge

D. Install/repair a drain-line heater and ensure proper trap and slope

122. Refrigerant migration to the compressor crankcase during the off cycle is best prevented by:

A. Increasing the system charge

B. A crankcase heater and/or a pump-down cycle

C. Raising the head-pressure setpoint

D. Reducing the suction line size

123. The discharge temperature of a compressor is most directly influenced by:

A. The compression ratio and suction superheat

B. The condenser subcooling only

C. The color of the refrigerant

D. The size of the receiver

124. A technician must size replacement copper tubing for a suction line. Undersizing the suction line will cause:

A. Excessive subcooling at the condenser

B. Flooding of the evaporator

C. Loss of refrigerant charge

D. Excessive pressure drop, reduced capacity, and possible high superheat

125. When commissioning a new system, the final step before placing it in service is to:

A. Verify charge, superheat/subcooling, electrical readings, controls, and document the readings

B. Vent a small amount of refrigerant to confirm pressure

C. Run the compressor in reverse to seat the valves

D. Remove the filter-drier to reduce pressure drop

Practice Exam 9: Answer Key and Explanations

1. B — 15°F superheat is calculated as suction line temperature (50°F) minus saturation temperature (35°F). This value falls within the normal target range, confirming the metering device is feeding refrigerant correctly and the evaporator is neither starved nor flooded. Proper superheat protects the compressor while maximizing coil efficiency.

2. C — A machinery room detection and ventilation system senses rising refrigerant concentration and exhausts it before reaching levels dangerous to personnel. CSA B52 requires this because a leak in a confined room can displace oxygen or reach toxic/flammable thresholds. The system safeguards occupants who may be unaware a leak is occurring.

3. C — A halide torch burns green in the presence of chlorine-bearing refrigerants drawn into the flame. This colour change locates leaks of chlorinated refrigerants such as the older CFCs and HCFCs. The reaction is specific to halogenated compounds, making it a quick field indicator on legacy systems.

4. D — Purging dry nitrogen displaces oxygen inside the tubing so no copper oxide (scale) forms on the heated interior surfaces. Loose scale would otherwise circulate and plug metering devices and screens. A clean internal joint protects the whole system from contamination.

5. B — TXV hunting is most often caused by an incorrectly sized valve or a poorly located/contacted sensing bulb that reads erratic temperatures. The valve then overshoots and undershoots, surging refrigerant flow. Correct sizing and solid bulb placement on clean suction line stabilize control.

6. D — Subcooling means the liquid has cooled below its saturation temperature at the condenser outlet, confirming a solid liquid column to the metering device. Without subcooling, flash gas would form and starve the valve. The reading verifies the condenser is fully condensing and the charge is adequate.

7. D — High amperage with clean coils and good airflow points to high head pressure from overcharge or non-condensables loading the motor. Elevated discharge pressure forces the compressor to work harder, raising current draw until the overload trips. Verifying head pressure isolates the cause before condemning the compressor.

8. C — Glide is the temperature difference between the bubble point and dew point of a zeotropic blend at constant pressure. The components boil and condense over a range rather than a single point. Glide must be accounted for when reading superheat and subcooling on blends.

9. C — Cylinders are filled to a maximum of 80% to leave room for liquid expansion as temperature rises. Liquid is nearly incompressible, so a 100%-full cylinder can develop hydrostatic pressures high enough to rupture. The 20% vapor space absorbs that expansion safely.

10. B — A large temperature split between ambient air and condensing temperature indicates a dirty coil or restricted airflow reducing heat rejection. The condenser must run hotter to shed the same heat, raising head pressure. Cleaning the coil and restoring airflow corrects the split.

11. D — An accumulator is positioned in the suction line to trap liquid refrigerant and meter it back slowly, preventing slugging that damages compressor valves. It protects against floodback during heavy loads, defrost, and mode changes. Vapor passes through while liquid is held and boiled off gradually.

12. C — A P-T chart provides the saturation temperature corresponding to a measured pressure, which is essential for calculating superheat and subcooling. Technicians use it constantly during charging and diagnostics. Matching pressure to saturation temperature is the foundation of refrigerant-side troubleshooting.

13. C — When the micron gauge rises and stabilizes above target after isolating the pump, remaining moisture or a small leak is present. A truly dry, tight system holds a deep vacuum without rising. A rise that levels off typically signals moisture outgassing; a continuous rise signals a leak.

14. A — Overcharging a critically charged capillary-tube system raises head pressure and pushes excess liquid toward the compressor, risking floodback. Cap-tube systems have no receiver to absorb extra charge, so they are highly sensitive to overcharge. Precise charging is essential on these systems.

15. D — The oil-pressure safety (differential) control monitors net oil pressure and shuts the compressor down if lubrication is lost. Without adequate oil pressure, bearings and moving parts fail quickly. The control prevents catastrophic mechanical damage from oil starvation.

16. C — Whether refrigerant can be recovered as liquid or vapor depends on the recovery method, machine capability, and the size of the system charge. Liquid recovery is far faster on large charges but requires the right equipment and ports. Matching method to job protects the machine and speeds the work.

17. A — If the heaters test good but the coil ices fully between cycles, the defrost frequency or duration is set too short for the load. The heaters cannot clear all frost in the allotted time, so ice accumulates each cycle. Adjusting defrost timing to suit the load restores capacity.

18. B — A head-pressure control maintains adequate condensing pressure in low ambient so the TXV has enough pressure differential to feed the evaporator. Without it, head pressure falls too low and the valve starves the coil. The control floods condenser tubes or cycles fans to hold pressure.

19. B — R-454B and R-32 are lower-GWP refrigerants now used in new commercial and residential equipment. They replace higher-GWP HFCs such as R-410A in many applications. Both are A2L (mildly flammable), requiring updated handling and equipment standards.

20. C — The external equalizer connects to the suction line downstream of the coil so the TXV compensates for evaporator pressure drop. Without it, the valve would sense an inaccurate pressure and set incorrect superheat. The equalizer keeps superheat control accurate on coils with significant pressure drop.

21. A — Filler metal must suit the base metals being joined and be rated for the joint's service pressure and temperature. Selecting filler on these criteria ensures a sound, leak-tight joint under operating conditions. Arbitrary silver content or colour matching is not the correct basis for selection.

22. A — Repeated overload trips with running amps well above RLA indicate a mechanical or electrical fault causing excessive load, such as high head pressure or a failing winding. The motor draws excess current trying to overcome the problem. The root cause must be found rather than simply resetting the overload.

23. C — Charging a blend as vapor draws off the more volatile components first, causing fractionation that shifts the blend composition. The remaining mixture no longer performs as designed. Zeotropic blends must be charged as liquid to preserve the intended ratio.

24. C — Low superheat with low suction pressure signals a restriction, such as a partially plugged drier or metering device, starving the evaporator. Flow is choked, dropping suction pressure, while the limited refrigerant boils off near the inlet. Locating and clearing the restriction restores normal operation.

25. D — Intentional venting of most refrigerants is prohibited under Canadian environmental regulation; refrigerant must be recovered. Venting releases ozone-depleting and/or high-GWP substances to the atmosphere. Recovery into approved cylinders is mandatory regardless of charge size.

26. D — Continuous run, warm cabinet, low suction pressure, and frost only at the evaporator inlet point to a partial restriction in the capillary tube or drier. Flow is choked, so only the inlet sees cold refrigerant. Clearing or replacing the restricted component restores cooling.

27. C — Installing the drier with the arrow in the flow direction ensures correct filtration and prevents desiccant from migrating downstream into the system. Reversed flow can release particles and moisture into the circuit. Proper orientation keeps the desiccant and filter media doing their job.

28. C — Non-condensables raise head pressure above what the measured liquid temperature would predict, since the trapped gas adds partial pressure. Comparing condenser saturation temperature to actual liquid temperature reveals the discrepancy. This is the clearest field confirmation of air in the system.

29. A — In a pump-down scheme the liquid-line solenoid closes on the off cycle so the compressor pumps refrigerant into the condenser/receiver before stopping. This keeps liquid out of the crankcase during the off period. The compressor then starts against low suction pressure with the refrigerant safely stored.

30. B — Compression ratio equals absolute discharge pressure divided by absolute suction pressure. Using absolute (not gauge) values is essential for a correct ratio. A high ratio indicates the compressor is working harder, often signalling a restriction or pressure abnormality.

31. C — Proper burnout cleanup installs suction-line and liquid-line acid-removal driers and follows a defined cleanup procedure to remove acid and contaminants. Acid left in the system attacks the new compressor's windings. Acid testing and drier changes confirm the system is clean before return to service.

32. A — R-410A operates at much higher pressures than R-22, so its equipment and tubing must be rated for those higher working pressures. Using components designed for lower pressure risks rupture. This pressure difference is why R-22 and R-410A equipment are not interchangeable.

33. A — High superheat with low suction pressure and a starved evaporator, despite a good bulb, points to the valve underfeeding from a lost power-head charge or a stuck-closed condition. The coil receives too little refrigerant. Replacing or repairing the valve restores proper feed.

34. D — Liquid refrigerant causes severe frostbite on skin contact and can injure the eyes, so eye protection and gloves are essential when charging liquid. The rapid evaporation freezes tissue instantly. Proper PPE prevents serious cold-contact injury.

35. B — With a clean coil and running fan, cycling on the high-pressure control points to overcharge or non-condensables raising head pressure. Both conditions add pressure beyond normal condensing. Recovering excess charge or purging air corrects the trips.

36. B — A liquid-line sight glass shows flash gas as bubbles and, with a moisture indicator, reveals the moisture condition by colour. Bubbles warn of low charge or a restriction; colour warns of moisture. It is a quick visual check of liquid-line condition.

37. C — Holding steady at 500 microns for 10 minutes after isolation confirms the system is dry and tight to the standard required for charging. A rise would indicate moisture or a leak. A stable deep vacuum is the green light to introduce refrigerant.

38. D — HFC refrigerants are not miscible with mineral oil, so POE oil is required to carry oil back to the compressor. Without miscibility, oil would log in the evaporator and starve the compressor of lubrication. POE maintains oil circulation with HFCs.

39. B — Defrost should terminate on temperature (coil clear of ice) with a time backup as a fail-safe. Temperature termination ends defrost as soon as the coil is clear, saving energy, while the timer prevents an endless cycle if the sensor fails. This combination is both efficient and safe.

40. D — In a pump-down low-pressure control scheme, the cut-in and cut-out settings define the suction pressure points that in turn set the box temperature range. As the box warms, suction pressure rises to cut-in; as it cools, pressure falls to cut-out. The pressure band maps to the temperature band.

41. C — A rough, pitted internal surface after brazing indicates oxidation/scale from a lack of nitrogen purge during heating. The oxide forms on the hot interior and flakes loose. Purging with nitrogen prevents this contamination.

42. A — A receiver stores the variable refrigerant charge and ensures a solid liquid seal feeding the metering device. It accommodates charge changes between operating conditions and during pump-down. The liquid column it maintains keeps the valve fed without flash gas.

43. D — Zero superheat with liquid returning means liquid slugging, which can break compressor valves or cause mechanical damage. Liquid is incompressible, so it strikes the valves and pistons. Restoring proper superheat immediately protects the compressor.

44. A — Net refrigerating effect is the heat absorbed per unit mass of refrigerant in the evaporator. It represents the useful cooling each pound of refrigerant provides. This value underlies capacity and flow-rate calculations for the system.

45. D — On a TXV system with a receiver, the most accurate charge check is comparing measured subcooling at the condenser to the manufacturer's target. Subcooling reflects the liquid charge accurately on these systems, whereas superheat is set by the valve. Matching target subcooling confirms correct charge.

46. A — A reverse-rotating scroll makes loud noise, develops no pressure differential, and must have two of its three phases swapped to correct rotation. Scrolls only compress in the design direction. Swapping any two line leads restores correct rotation and pumping.

47. B — Recovery cylinders must be DOT/TC-approved and within their hydrostatic test date to safely contain refrigerant pressure without rupturing. An out-of-date or non-rated cylinder may fail under pressure. The requirement protects the technician and the public.

48. D — Afternoon capacity loss with rising head pressure, a clean coil, and high ambient points to condenser undersizing or restricted airflow under peak load. The condenser cannot reject heat fast enough as ambient climbs. Improving condenser performance resolves the peak-load loss.

49. C — In refrigerant-flow order the four main components are compressor, condenser, metering device, evaporator. The compressor raises pressure, the condenser rejects heat, the metering device drops pressure, and the evaporator absorbs heat. This loop repeats continuously.

50. D — Trapping liquid between two closed valves risks a hydrostatic pressure rise that can rupture the line or component as temperature increases. Liquid cannot compress, so even small warming spikes pressure dramatically. Technicians must never isolate a liquid-filled section.

51. B — Hot-gas defrost routes discharge gas to the evaporator to warm the coil and melt frost from the inside. This is faster and more efficient than electric defrost in many systems. The reclaimed heat clears the coil and returns to the cycle.

52. D — A running compressor with no cooling and pressures nearly equal indicates an internal compressor problem such as broken valves or a worn pump. The compressor cannot build a pressure differential. Confirming equal pressures while running diagnoses the failed pump.

53. A — Charging by superheat is preferred on fixed-orifice or capillary-tube systems, which have no receiver and depend on precise charge. Superheat reflects how well the fixed device is feeding the coil at the test conditions. The method targets correct charge on these systems.

54. C — A flooded chiller uses a low-side float (level control) to maintain the correct liquid level in the evaporator. The float meters liquid in as refrigerant boils off. This keeps the evaporator tubes flooded for maximum heat transfer.

55. A — Insulating the suction line prevents heat gain and condensation/sweating, preserving superheat and efficiency. Uninsulated lines pick up heat, raising suction superheat, and drip condensation that can cause damage. Insulation maintains designed performance and protects surroundings.

56. A — A2L refrigerants are mildly flammable, so ignition sources and ventilation must be managed during service. While low in flammability, they can ignite under the right concentration and spark. Updated handling practices address this risk.

57. D — The metering device drops the refrigerant's pressure, causing part of it to flash and lowering its temperature so it can absorb heat in the evaporator. This pressure drop is the heart of the cooling effect. The cold, low-pressure mixture then boils in the coil.

58. D — A TXV with a lost bulb charge closes (or fails to open), starving the evaporator and driving superheat up. The power head has no charge to push the valve open. Replacing the valve restores proper feed.

59. A — A crankcase heater warms the oil during the off cycle to drive refrigerant out of the oil, preventing foaming and slugging at start-up. Refrigerant dissolved in cold oil flashes violently when the compressor starts. The heater keeps the oil warm and refrigerant-free.

60. B — A manual-reset high-pressure control forces a technician to investigate the cause before the system can restart. This prevents repeated dangerous overpressure events from an unresolved fault. The deliberate lockout protects equipment and personnel.

61. C — Superheat is measured at the suction line near the evaporator outlet, at or near the bulb location. This is where the difference between actual vapor temperature and saturation temperature reflects coil feed. Measuring elsewhere gives a misleading reading.

62. D — R-12 was phased out because it contains chlorine that depletes stratospheric ozone. Chlorine atoms catalytically destroy ozone molecules high in the atmosphere. International agreements eliminated such ozone-depleting refrigerants.

63. C — Bubbles in the sight glass despite adequate charge indicate a restriction upstream causing a pressure drop and flash gas. The pressure loss lets liquid boil before the sight glass. Finding and clearing the restriction removes the bubbles.

64. A — The wet-bulb/dry-bulb difference across the evaporator reflects relative humidity and the coil's latent-load handling. A larger spread means more moisture removal. This air-side reading helps assess dehumidification performance.

65. D — Fan-cycling head-pressure control switches the condenser fan on and off to hold condensing pressure within a range during varying ambient. Cycling the fan modulates heat rejection. This keeps head pressure high enough for proper valve operation in cool weather.

66. B — Before opening a sealed system, refrigerant must be recovered into an approved recovery cylinder, never vented. Recovery is legally and environmentally required. It prevents atmospheric release of regulated refrigerants.

67. D — Normal subcooling but low superheat with a partly flooded evaporator means the TXV is overfeeding, from a misadjusted superheat setting or a stuck-open condition. Too much liquid reaches the coil and lowers superheat. Adjusting or replacing the valve corrects the overfeed.

68. B — Latent heat of vaporization is the heat required to change a liquid to a vapor at constant temperature. No temperature change occurs during the phase change. This large heat absorption is what makes refrigeration effective in the evaporator.

69. A — A leaking discharge valve causes high discharge temperature, reduced capacity, and elevated suction pressure as hot gas leaks back. The compressor re-compresses the same gas, raising temperature and lowering output. These symptoms point to internal valve failure.

70. B — An evaporator pressure regulator (EPR) holds evaporator pressure at or above a set point to prevent it dropping too low. It is used on multi-evaporator systems to maintain different temperatures. The valve throttles suction flow to hold the set pressure.

71. D — Leak-testing uses dry nitrogen, not oxygen, because oxygen under pressure combined with oil can ignite or explode. This is a serious safety hazard. Inert nitrogen pressurizes the system safely for testing.

72. D — R-410A is a near-azeotropic blend that should still be charged as liquid (metered) to maintain its composition. Charging as vapor risks slight fractionation and protects against compressor liquid only if metered properly. Liquid charging through the proper port preserves the blend.

73. B — An oil separator at the discharge returns oil to the compressor and keeps it out of the condenser and evaporator. Oil that escapes downstream reduces heat transfer and starves the compressor. The separator captures and returns it promptly.

74. C — Short-cycling on the low-pressure control with quickly dropping suction points to low charge or a restriction starving the evaporator. Insufficient refrigerant lets suction pressure fall fast to the cutout. Correcting charge or clearing the restriction stops the cycling.

75. B — Purging air from ports and gauges prevents introducing non-condensables and moisture into the system. Trapped air raises head pressure and moisture causes acid and freeze-ups. A quick purge keeps the charge clean.

76. C — A TXV with an MOP charge limits the maximum suction pressure during pull-down to protect the compressor motor from overload. The valve closes off above the set pressure. This caps the load on the motor until the box pulls down.

77. A — A moisture-saturated drier can allow acid formation and shows a moisture-indicator colour change toward "wet." Saturated desiccant no longer holds moisture, so free water and acid threaten the system. Replacing the drier restores protection.

78. A — The evaporator absorbs heat from the conditioned space, boiling the refrigerant from liquid to vapor. This phase change provides the cooling effect. The low-pressure refrigerant carries the absorbed heat to the compressor.

79. B — To verify burnout cleanup, take an oil acid test after a run-in period and change driers as needed. Residual acid will show in the oil if cleanup was incomplete. Confirming a clean acid test protects the replacement compressor.

80. A — A cross-charged TXV bulb provides more consistent superheat across a wide range of evaporator temperatures than a straight liquid charge. The cross charge tailors the valve's response to temperature. This stabilizes superheat over varying conditions.

81. D — A restriction or low suction pressure raises the compression ratio, reducing capacity and overheating the compressor despite correct charge and clean coils. The compressor must pull against an abnormally low suction. Finding the restriction corrects the high ratio and overheating.

82. A — Servicing controlled refrigerants in Canada generally requires an environmental/ozone-depletion handling certification, commonly a refrigerant-handling card. This ensures the technician knows recovery and handling rules. The requirement protects the environment and public safety.

83. C — Subcooling much higher than design indicates an overcharge, with excess liquid backing up in the condenser. The extra liquid occupies condenser surface, raising subcooling and head pressure. Removing the excess charge restores normal subcooling.

84. D — The push-pull method uses vapor pressure to push a liquid path from the system into the recovery cylinder, speeding recovery of large liquid charges. Vapor pressure on one side drives liquid out the other. This is far faster than vapor-only recovery on big systems.

85. C — An arc or "spit" with oily residue at a hermetic terminal signals a potential terminal fault or impending failure needing careful inspection. Terminal faults can lead to dangerous blow-out. The condition must be assessed cautiously before energizing.

86. B — A liquid-suction heat exchanger subcools the liquid and adds superheat to the suction vapor, improving efficiency and reducing floodback risk. The two streams trade heat to mutual benefit. The result is more capacity and better compressor protection.

87. A — Low evaporator airflow drops suction pressure and can ice the coil because the coil sees reduced load. Less heat reaches the refrigerant, so it boils at a lower pressure and the coil temperature falls below freezing. Restoring airflow corrects the icing.

88. A — Pressure-test pressure is based on the design working pressure and the applicable standards/manufacturer specifications, using an inert gas. Testing to the correct rated pressure confirms integrity without overstressing components. Inert gas keeps the test safe.

89. B — An electronic expansion valve controls superheat through a controller that adjusts valve position based on temperature and pressure sensor inputs. This allows precise, responsive superheat control across conditions. The electronics replace the mechanical bulb and spring of a TXV.

90. B — Off-cycle equalization in a capillary-tube system lets pressures equalize so the compressor can start against balanced pressures, permitting a low-starting-torque motor. With no liquid-line restriction holding pressure, the cap tube bleeds down during the off cycle. This reduces starting load.

91. A — High superheat with normal-to-high suction pressure usually means the valve is underfeeding or the charge is low, leaving the coil not fully fed. The vapor superheats because too little refrigerant boils. Correcting charge or valve feed restores normal superheat.

92. C — Sloped suction lines and P-traps on vertical risers ensure proper oil return to the compressor. Gravity and refrigerant velocity carry oil along and up the riser through the trap. Correct piping keeps oil from logging in the evaporator.

93. A — Critical temperature is the temperature above which a refrigerant cannot be condensed to a liquid no matter how much pressure is applied. Above this point the distinction between liquid and vapor disappears. Condensers must operate below this temperature to reject heat by condensation.

94. D — TXV hunting from poor bulb location is best corrected by relocating and properly insulating the bulb on a clean horizontal section of suction line. Good thermal contact gives a stable temperature signal. This steadies the valve's response and stops the surging.

95. C — A discharge muffler dampens gas pulsations and reduces noise from the compressor. The pressure pulses created by each compression stroke produce vibration and sound. The muffler smooths the flow without affecting cooling.

96. B — A flooded evaporator's capacity is controlled by a liquid level control maintaining the refrigerant level in the coil. Holding the level keeps the tubes flooded for maximum heat transfer. The control admits liquid as it boils off.

97. C — Oil logging in the evaporator with a starved compressor results from poor oil return due to low refrigerant velocity or improper piping. Without enough velocity, oil cannot be carried back. Correcting line sizing and piping restores oil circulation.

98. A — Two-stage compression reduces the compression ratio per stage, improving efficiency and limiting discharge temperature in low-temperature work. Splitting the lift between stages eases each compressor. This keeps discharge temperatures and loads within safe limits.

99. D — A receiver relief valve relieves at a pressure below the vessel's design limit to prevent rupture from overpressure. It protects the pressure vessel from dangerous overpressure events. The valve is a required safety device, not an operating control.

100. B — Mounting the TXV bulb on the bottom of the suction line gives poor contact and inaccurate sensing because the bulb may read pooled oil/liquid rather than vapor temperature. The reading no longer reflects true superheat. Correct placement is on the side of a horizontal line for accurate sensing.

101. B — In cold weather an HFC charging cylinder may need to be warmed safely to maintain enough pressure to charge. Warm water or approved blankets raise cylinder pressure without overheating. This keeps refrigerant flowing into the system during charging.

102. D — The condenser rejects heat, desuperheating and condensing the high-pressure vapor to liquid. Heat absorbed in the evaporator plus the heat of compression is released here. The resulting liquid then feeds the metering device.

103. A — High subcooling with low superheat and floodback signs call for checking overcharge and TXV overfeeding and correcting the charge or valve setting. Excess liquid is reaching the compressor. Removing the cause protects the compressor from liquid damage.

104. C — Sensible heat changes the temperature of a substance without changing its state. It is the heat you can measure with a thermometer as a temperature rise or fall. This contrasts with latent heat, which drives phase change at constant temperature.

105. A — A pump-down cycle ends when the low-pressure control opens as suction pressure falls after the liquid solenoid closes. The compressor pulls the low side down, stores refrigerant in the condenser/receiver, and shuts off on the LP control. This sequence protects the compressor on the off cycle.

106. B — A TXV system with a receiver is best charged by weighing in the specified charge or charging to target subcooling. The receiver makes sight-glass and superheat methods unreliable for charge. Weight or subcooling gives an accurate result.

107. B — Insufficient condenser airflow causes high head pressure, a high compression ratio, and reduced capacity. The condenser cannot reject heat, so pressure and temperature climb. Restoring airflow brings head pressure and capacity back to normal.

108. C — A check valve in a heat-pump reversing circuit directs refrigerant through the correct metering device for the active heating or cooling mode. It bypasses one device and forces flow through the other depending on direction. This lets each coil use the proper metering in each mode.

109. C — Moisture freezing at the metering device is corrected by recovering, replacing the filter-drier, evacuating properly, and recharging with dry refrigerant. The fix removes the water rather than masking it. Proper evacuation prevents the freeze-up from returning.

110. A — A scroll compressor has fewer moving parts, runs smoothly, and tolerates small amounts of liquid better than a reciprocating compressor. The orbiting scrolls compress gas continuously without valves. These traits improve reliability and liquid tolerance.

111. B — A suction-line accumulator on a heat pump protects the compressor from liquid floodback during defrost and mode changes. Reversing flow can send liquid toward the compressor suddenly. The accumulator holds liquid and meters it back as vapor.

112. D — Overload trips only during the hottest part of the day point to high head pressure under peak ambient overloading the motor. Cooler periods keep head pressure and current within limits. Improving condenser performance addresses the peak-load trips.

113. D — When brazing near a Schrader valve, remove the core (or protect it) and wrap/cool the valve body to prevent heat damage. The soft core seals melt easily under brazing heat. Protecting it preserves the valve's sealing ability.

114. C — A cylinder reading higher than saturation pressure for its temperature indicates non-condensable gas such as air is present. The extra partial pressure adds to the refrigerant's saturation pressure. Pure refrigerant would read exactly its saturation pressure.

115. A — COP is the useful refrigerating effect divided by the work input. It measures how efficiently the system converts input energy into cooling. A higher COP means more cooling per unit of energy consumed.

116. B — In a heat pump, each coil typically uses a separate metering device or TXV with a bypass check valve so the proper device meters flow in each mode. The check valve routes flow around the inactive device. This provides correct metering in both heating and cooling.

117. C — A leaking zeotropic-blend system must have the remaining charge recovered, the leak repaired, the system evacuated, and recharged with virgin blend by weight. Topping up risks an off-spec composition. Full recharge by weight restores the correct blend.

118. C — A high-side float maintains a liquid level in the high side, passing liquid to the low side as vapor condenses. As condensation raises the level, the float opens to feed the evaporator. It meters based on the rate of condensing.

119. B — Continuously exceeding RLA risks motor overheating and insulation breakdown leading to winding failure. Excess current generates heat the motor cannot shed. Sustained overcurrent eventually destroys the windings.

120. B — Staging or unloading compressors matches capacity to load, improving efficiency and reducing short-cycling. Running only the capacity needed avoids wasteful cycling. This steadies operation and saves energy at part load.

121. D — A freezing, backing-up freezer drain is corrected by installing/repairing a drain-line heater and ensuring a proper trap and slope. The heater keeps meltwater from refreezing in the line. Correct slope and trap let water drain freely.

122. B — Refrigerant migration to the crankcase on the off cycle is best prevented by a crankcase heater and/or a pump-down cycle. The heater keeps refrigerant out of the oil; pump-down removes refrigerant from the low side. Either method protects against a flooded start.

123. A — Discharge temperature is most directly influenced by the compression ratio and the suction superheat. A higher ratio and higher entering superheat both raise discharge temperature. Monitoring these helps prevent overheating the compressor.

124. D — Undersizing the suction line causes excessive pressure drop, reduced capacity, and possible high superheat. The added friction lowers suction pressure reaching the compressor. Correct line sizing maintains capacity and proper return conditions.

125. A — The final commissioning step is to verify charge, superheat/subcooling, electrical readings, and controls, then document the readings. This confirms the system meets specification and creates a baseline record. Thorough documentation supports future service.