PRACTICE EXAM 19: RACM RED SEAL SIMULATION (125 QUESTIONS)

1. A technician measures a suction pressure of 68.5 psig on an R-410A system with a saturation temperature of 40°F and an actual suction line temperature of 52°F. What is the superheat?

A. 6°F, indicating a flooded evaporator condition

B. 12°F, which is within a normal operating range

C. 22°F, indicating a severely overcharged system

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

2. Under the CSA B52 Mechanical Refrigeration Code, a machinery room is required when the refrigerant quantity in a system exceeds the threshold for the occupancy. What is the primary purpose of this requirement?

A. To reduce the electrical load placed on the building service panel

B. To centralize maintenance access for the servicing technician

C. To lower the ambient noise transmitted to occupied spaces

D. To contain and safely manage a potential refrigerant release

3. A capillary tube metering device differs from a thermostatic expansion valve primarily in that the capillary tube:

A. Maintains constant superheat across all load conditions

B. Uses a sensing bulb to modulate refrigerant flow

C. Throttles flow electronically based on a stepper motor

D. Has a fixed restriction and cannot adjust to load changes

4. During an electrical check, a technician finds a single-phase PSC compressor motor draws locked rotor amperage and will not start. The run capacitor tests within tolerance. What is the most likely fault?

A. The start winding or its internal connection has failed open

B. The condenser fan motor bearing has seized completely

C. The thermostat anticipator is set to the wrong amperage

D. The liquid line filter drier is fully saturated with moisture

5. When recovering refrigerant from a system, a technician must recover to the level required by regulation before opening the system. The primary environmental reason for refrigerant recovery is to:

A. Preserve refrigerant for resale to recover service costs

B. Prevent contamination of the recovery cylinder contents

C. Prevent release of ozone-depleting and greenhouse gases

D. Maintain adequate pressure in the storage cylinder6. A water-cooled condenser using a cooling tower shows rising condensing pressure over several weeks despite adequate water flow. The most probable cause is:

A. The expansion valve superheat setting has drifted too low

B. The evaporator fan motor is running in reverse rotation

C. The suction service valve has been left partially back-seated

D. Scale and mineral fouling have built up on the tubes

7. On a refrigeration system, the high-side float metering device meters refrigerant based on:

A. The level of liquid refrigerant in the high-pressure side

B. The temperature sensed at the evaporator outlet line

C. The pressure differential across the compressor discharge

D. The position of a manually adjusted needle valve seat

8. A technician needs to braze a copper-to-copper joint on a refrigerant line. To prevent internal oxidation and scale formation inside the tubing during brazing, the technician should:

A. Apply soldering flux generously to the interior of the joint

B. Purge the line with a flow of dry nitrogen while heating

C. Pre-cool the joint with liquid refrigerant before applying heat

D. Use an oxy-acetylene flame adjusted to a strong oxidizing setting

9. In a thermostatic expansion valve, the three forces acting on the diaphragm are bulb pressure, spring pressure, and:

A. Discharge line static pressure from the compressor head

B. Atmospheric pressure transmitted through the equalizer port

C. Evaporator (suction) pressure acting on the diaphragm underside

D. Receiver liquid pressure transmitted up the liquid line

10. A system using R-134a is being checked for the correct PT relationship. At a gauge pressure of 49 psig, the corresponding saturation temperature is approximately:

A. 20°F, indicating the system is undercharged

B. 55°F, the expected saturation temperature for R-134a

C. 90°F, indicating an overcharge condition exists

D. 32°F, the standard reference freezing point11. A hermetic compressor has burned out and the system shows acidic oil. After replacing the compressor, the most important step to protect the new compressor is to:

A. Increase the refrigerant charge by 10% above nameplate

B. Lower the low-pressure cutout setting by 5 psig

C. Adjust the expansion valve to raise the superheat setting

D. Install a suction line filter drier to remove acid and contaminants

12. The primary function of a liquid-line solenoid valve in a pump-down control circuit is to:

A. Modulate refrigerant flow to maintain constant superheat

B. Reduce liquid line pressure drop across long runs

C. Filter particulate contaminants from the liquid refrigerant

D. Close on a thermostat call so the compressor pumps down

13. A technician reads a high superheat and a low subcooling on a TXV system. This combination most strongly indicates:

A. A system that is undercharged with refrigerant

B. A flooded condenser due to excess refrigerant charge

C. A restricted suction line downstream of the evaporator

D. An oversized evaporator coil for the load applied

14. Under WHMIS 2015, refrigerant cylinders and chemical products in the shop must be labelled and accompanied by:

A. A municipal fire department inspection certificate

B. A provincial transport registration sticker

C. A manufacturer warranty validation document

D. A Safety Data Sheet (SDS) available to workers

15. A scroll compressor that is rotating in reverse will typically exhibit:

A. Normal pressures but excessive liquid floodback to the shell

B. A loud noise and failure to develop a pressure differential

C. Higher than normal capacity with reduced power draw

D. Smooth operation with slightly elevated discharge temperature16. When charging a system with a blended (zeotropic) refrigerant such as R-407C, the technician must charge:

A. As a vapour only, drawn from the top of the cylinder

B. Until the cylinder is completely empty to avoid fractionation

C. As a liquid, to maintain the correct blend composition

D. By weight only, with the cylinder always inverted fully

17. A defrost termination thermostat on a commercial freezer evaporator is designed to:

A. Initiate the defrost cycle at a preset time interval

B. End the defrost cycle once the coil reaches a set temperature

C. Energize the compressor crankcase heater during off cycles

D. Control the head pressure during low ambient operation

18. A 230V single-phase motor is wired to a circuit and runs hot, tripping on overload after several minutes. Voltage measures 198V at the motor terminals under load. The most likely cause is:

A. Low supply voltage causing increased current draw

B. The run capacitor value is too high for the motor

C. The motor is oversized for the connected load

D. The thermal overload is set above the motor FLA rating

19. The purpose of subcooling the liquid refrigerant before it reaches the metering device is to:

A. Ensure 100% liquid reaches the valve and prevent flash gas

B. Increase the refrigerant temperature entering the evaporator

C. Lower the compressor discharge temperature directly

D. Raise the suction pressure to improve compressor efficiency

20. A technician evacuates a system and the micron gauge rises and stabilizes at 4000 microns after isolating the pump. This rise that levels off indicates:

A. The vacuum pump oil is contaminated and must be changed

B. Moisture or non-condensables remain in the system

C. A complete and acceptable evacuation has been achieved

D. The micron gauge sensor is defective and reading high21. A leak detection is required after a repair. For a flammable A2L refrigerant, the most appropriate leak detection method is an electronic detector that is:

A. Rated only for halogenated CFC refrigerants

B. A standard halide torch with an open flame

C. Specifically rated and intrinsically safe for that refrigerant

D. A soap bubble solution applied while the system is in vacuum

22. In a multi-evaporator system, an evaporator pressure regulator (EPR) is installed to:

A. Maintain a minimum pressure in a higher-temperature evaporator

B. Increase refrigerant flow to the lowest-temperature coil

C. Prevent the compressor from short cycling on the high side

D. Equalize the discharge pressure across both condensers

23. A technician finds that a TXV-controlled system hunts, with suction pressure swinging widely. The most likely cause related to the metering device is:

A. The sensing bulb is loosely clamped or poorly located

B. The condenser coil is partially blocked by debris

C. The liquid line is undersized for the system tonnage

D. The compressor valves are leaking on the discharge stroke

24. Per safe lifting practice when moving a heavy compressor, a worker should:

A. Bend at the waist and lift quickly to reduce strain time

B. Twist the torso while lifting to position the load faster

C. Keep the load close to the body and lift with the legs

D. Hold the load at arm's length to maintain better balance

25. The high-pressure cutout switch on a refrigeration system is a safety device that:

A. Opens the circuit when suction pressure falls too low

B. Modulates the condenser fan speed based on pressure

C. Stops the compressor when discharge pressure is excessive

D. Bypasses hot gas to the evaporator during low load26. A condenser fan cycling control (head pressure control) is used in low ambient conditions to:

A. Maintain adequate condensing pressure for proper TXV feed

B. Reduce the evaporator superheat during winter operation

C. Prevent the crankcase heater from overheating the oil

D. Increase suction line velocity to return oil faster

27. When testing a potential relay used with a CSR compressor, the relay's normally closed contacts should:

A. Remain open until the run capacitor energizes the circuit

B. Stay closed continuously while the compressor runs

C. Open to drop out the start capacitor as the motor reaches speed

D. Close only when the high-pressure switch trips out

28. A refrigeration oil's primary functions include lubrication and:

A. Acting as the principal heat transfer medium in the coil

B. Returning to the compressor and sealing clearances

C. Absorbing all the moisture present in the refrigerant

D. Lowering the refrigerant's boiling point at the evaporator

29. A technician measures 0 ohms across a compressor's start and run windings to ground (continuity to the shell). This reading indicates:

A. A normal, healthy compressor winding condition

B. An open start winding requiring a hard-start kit

C. A shorted run capacitor that must be replaced

D. A grounded (shorted to shell) winding — failed compressor

30. The accumulator in a refrigeration system is located in the suction line to:

A. Protect the compressor from liquid refrigerant floodback

B. Increase the subcooling of the liquid before metering

C. Filter acid and moisture from the discharge gas stream

D. Store excess liquid refrigerant on the high-pressure side31. A walk-in cooler is not holding temperature, and the evaporator coil is heavily iced over completely. Suction pressure is below normal. The most likely cause is:

A. The condenser fan motor has failed in the off position

B. The refrigerant charge is significantly overcharged

C. The defrost system has failed to clear the coil of ice

D. The expansion valve is stuck wide open feeding too much

32. Total heat (enthalpy) of a refrigerant includes both sensible heat and:

A. Latent heat absorbed during the change of state

B. The electrical heat added by the compressor windings

C. The frictional heat from refrigerant flowing in tubing

D. Heat radiated from the condenser to the surroundings

33. A pressure-temperature chart shows that for a given refrigerant, as pressure increases the saturation temperature:

A. Decreases proportionally with the pressure rise

B. Increases correspondingly with the pressure rise

C. Remains constant regardless of the pressure change

D. Inverts below the critical point of the refrigerant

34. The crankcase heater on a compressor is energized during the off cycle to:

A. Increase the discharge superheat at compressor startup

B. Prevent refrigerant from migrating and condensing in the oil

C. Maintain the evaporator temperature during defrost cycles

D. Keep the discharge line warm to prevent condensation

35. A technician must transport recovered refrigerant cylinders in a service vehicle. The cylinders must be:

A. Filled to 100% of water capacity for transport efficiency

B. Stored horizontally with valves facing the driver's seat

C. Secured upright and not filled beyond 80% capacity

D. Vented slightly to release pressure during the drive36. A 3-phase compressor motor draws balanced but excessive current on all three legs. Voltage is balanced and correct. The most likely cause is:

A. A single phase has been lost on the supply side

B. The start capacitor has failed open on one winding

C. One of the three motor windings is open internally

D. A mechanical overload such as a seized bearing or high head

37. In a refrigeration cycle, the change of state from vapour to liquid occurs in the:

A. Evaporator, where heat is absorbed from the space

B. Condenser, where heat is rejected to the surroundings

C. Compressor, where the vapour is pressurized

D. Metering device, where pressure drops sharply

38. A hot gas defrost system clears the evaporator coil of frost by:

A. Routing hot discharge gas through the evaporator coil

B. Energizing electric heater elements along the coil fins

C. Spraying warm water over the coil surface periodically

D. Reversing the condenser fan to blow warm air across it

39. When a TXV equalizer is the external type, the equalizer line connects to the:

A. Liquid line just downstream of the receiver outlet

B. Discharge line at the compressor head service port

C. Top of the condenser inlet header connection

D. Suction line near the evaporator outlet past the bulb

40. A technician notices oil pooling at the base of the evaporator in a low-temperature system. This most likely indicates:

A. The compressor is pumping excessive oil into discharge

B. The condenser is flooded with liquid refrigerant

C. Poor oil return due to insufficient suction line velocity

D. The metering device is starving the evaporator of flow41. Total Equivalent Warming Impact (TEWI) of a refrigeration system accounts for both the direct refrigerant emissions and the:

A. Cost of the refrigerant per kilogram purchased

B. Ozone depletion potential of the refrigerant blend

C. Toxicity classification of the refrigerant used

D. Indirect emissions from the energy the system consumes

42. A capillary tube system that is overcharged will typically show:

A. High head pressure and high evaporator pressure

B. Low head pressure and low suction pressure

C. Normal pressures with reduced compressor amperage

D. Low subcooling and high evaporator superheat

43. When a system is operating, the receiver tank's primary function is to:

A. Separate oil from the suction gas before the compressor

B. Cool the liquid refrigerant before the metering device

C. Trap moisture and acid from the circulating refrigerant

D. Store liquid refrigerant to accommodate load changes

44. A technician must select a replacement contactor for a 240V, 30A compressor. The contactor coil voltage must match the:

A. Line voltage supplied to the compressor terminals

B. Discharge pressure switch differential setting

C. Full load amperage rating of the condenser fan

D. Control circuit voltage feeding the contactor coil

45. Flash gas forming in the liquid line before the metering device is most often caused by:

A. Excessive subcooling at the condenser outlet

B. A pressure drop or restriction reducing liquid pressure

C. An oversized liquid line reducing refrigerant velocity

D. A fully open expansion valve with low superheat46. A pump-down cycle is initiated when the room thermostat is satisfied. During pump-down, the compressor continues to run until the:

A. Discharge pressure rises to the high-pressure cutout setting

B. Crankcase heater reaches its operating temperature threshold

C. Low-pressure control opens as suction pressure drops

D. Condenser fan thermostat cycles the fan motor off

47. A superheat measured at the compressor that is much higher than the superheat at the evaporator outlet indicates:

A. The compressor valves are leaking internally on discharge

B. The TXV is overfeeding refrigerant to the evaporator coil

C. The accumulator is holding excess liquid refrigerant

D. Heat gain on an uninsulated or long suction line run

48. The wet-bulb temperature of air is always:

A. Equal to or lower than the dry-bulb temperature

B. Higher than the dry-bulb temperature when humid

C. Equal to the dew point at all humidity levels

D. Independent of the relative humidity of the air

49. A reversing valve in a heat pump is energized by a solenoid. If the solenoid coil fails open, the heat pump will:

A. Remain locked in the defrost mode continuously

B. Cycle rapidly between heating and cooling modes

C. Lose all refrigerant charge through the valve body

D. Default to whichever mode the de-energized position selects

50. A technician finds that the subcooling on an operating system is 25°F, much higher than the design 10°F. This most likely indicates the system is:

A. Undercharged with refrigerant by a significant amount

B. Suffering from a restricted suction line near the coil

C. Overcharged, backing liquid up into the condenser

D. Operating with a TXV stuck in the wide-open position51. Under CSA B52, pressure relief valves on refrigeration systems must discharge to:

A. The nearest interior floor drain in the machinery room

B. A common manifold tied into the building sanitary stack

C. A safe location, typically outdoors away from occupants

D. The low-pressure side of the system through a check valve

52. When a thermistor-type electronic expansion valve controller reads the coil sensor as open circuit, the controller typically:

A. Drives the valve fully open to flood the evaporator coil

B. Maintains the last commanded valve position indefinitely

C. Increases the compressor speed to compensate for flow

D. Closes the valve or signals a fault to protect the compressor

53. A halide torch leak detector, where still permitted, indicates a refrigerant leak by:

A. Sounding an audible alarm tone at the sensing tip

B. Displaying a digital concentration in parts per million

C. Vibrating the handle when refrigerant vapour is present

D. Changing the flame colour to green in the presence of vapour

54. The principal advantage of a flooded evaporator over a direct-expansion evaporator is:

A. Lower refrigerant charge required for the same capacity

B. Better heat transfer due to fully wetted tube surfaces

C. Simpler controls with no liquid level management needed

D. Elimination of the need for any oil return arrangement

55. A technician performs a standing pressure leak test using dry nitrogen. The test pressure must:

A. Exceed the cylinder's maximum service rating substantially

B. Not exceed the lowest-rated component's design pressure

C. Match the system's normal operating suction pressure exactly

D. Be applied only to the low side of the closed system56. A condenser water regulating valve on a water-cooled system modulates water flow based on:

A. The system's head (condensing) pressure as it varies

B. The suction line temperature at the evaporator outlet

C. The temperature of the water leaving the cooling tower

D. The electrical current drawn by the compressor motor

57. When two compressors share a common suction header in a parallel rack, an oil management system is required to:

A. Equalize the discharge pressure between both compressors

B. Ensure each compressor maintains its proper oil level

C. Filter refrigerant before it enters the parallel circuit

D. Increase the total subcooling delivered to the cases

58. A technician finds frost forming partway along the evaporator coil but not at the outlet. This pattern most likely indicates:

A. An overcharge of refrigerant flooding the entire coil

B. A completely blocked metering device starving the coil

C. A partial restriction or underfeeding of the evaporator

D. Excessive airflow across the coil from a fan oversized

59. Compressor displacement in a reciprocating compressor is determined by the bore, the stroke, and the:

A. Discharge pressure developed at the head valves

B. Suction superheat entering the compressor shell

C. Number of cylinders and the rotational speed

D. Type of refrigerant circulating in the system

60. A liquid receiver service valve that is front-seated during operation will cause:

A. Excessive subcooling and low head pressure readings

B. Liquid refrigerant to be trapped, starving the metering device

C. Rapid oil logging in the suction accumulator chamber

D. The high-pressure cutout to reset prematurely each cycle61. The latent heat of vaporization of a refrigerant is the heat required to:

A. Raise the liquid refrigerant temperature one degree

B. Change the refrigerant from liquid to vapour at constant temperature

C. Compress the vapour from suction to discharge pressure

D. Lower the saturation temperature at the evaporator inlet

62. A technician is sizing a suction line for a low-temperature application. The line must be sized to maintain adequate velocity for oil return while:

A. Maximizing the pressure drop to improve oil movement

B. Forcing all liquid refrigerant back to the compressor

C. Minimizing pressure drop to preserve system capacity

D. Eliminating the need for any P-trap at vertical risers

63. When evacuating a system, the triple evacuation method involves pulling a vacuum, breaking it with dry nitrogen, and:

A. Repeating the process to dilute and remove moisture

B. Charging the system immediately to the full nameplate

C. Allowing the system to stand for 24 hours under vacuum

D. Pressurizing the system to test for leaks at high pressure

64. A semi-hermetic compressor allows field servicing that a fully hermetic unit does not, because the semi-hermetic:

A. Uses a belt drive accessible from outside the shell

B. Has no electrical motor sealed within the housing

C. Has bolted access covers for valve and motor service

D. Operates without any refrigerant in contact with the motor

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

A. Cool the discharge gas before it reaches the condenser

B. Dampen the pulsations and noise from the discharge gas

C. Separate oil from the refrigerant in the discharge stream

D. Reduce the discharge pressure to protect the condenser66. A technician finds a TXV system with low suction pressure, low superheat, and the bulb is properly mounted. The most likely cause within the valve is:

A. The valve is overfeeding due to a stuck-open condition

B. The valve is underfeeding due to a partial restriction or low charge in the bulb

C. The external equalizer is providing too much pressure

D. The spring setting has drifted to a lower superheat point

67. Glide in a zeotropic refrigerant blend refers to the:

A. Temperature difference between bubble point and dew point

B. Gradual drop in system pressure during normal operation

C. Migration of oil along the horizontal suction line runs

D. Tendency of the blend to leak more readily than azeotropes

68. A defrost timer on a commercial freezer uses a time-initiated, temperature-terminated scheme. The "time-initiated" portion means defrost:

A. Begins at scheduled intervals set on the timer clock

B. Ends when the coil reaches a preset temperature value

C. Begins only when the coil temperature drops too low

D. Is bypassed entirely during periods of light load

69. When measuring the insulation resistance of a compressor motor with a megohmmeter, a reading well below the manufacturer's minimum indicates:

A. A healthy motor with normal winding insulation

B. Deteriorated insulation or a winding-to-ground fault

C. An open run capacitor in the start circuit

D. Correct continuity through the run winding circuit

70. A system charged with the correct weight of refrigerant still shows low capacity and high superheat. Subcooling is normal. The most likely cause is:

A. A restricted or undersized metering device feeding the coil

B. An overcharge of refrigerant flooding the condenser

C. A leaking discharge valve in the reciprocating compressor

D. Excessive airflow across an oversized evaporator coil71. A solenoid valve installed backward relative to its flow arrow will most likely:

A. Operate normally with no noticeable performance effect

B. Modulate flow proportionally instead of opening fully

C. Increase the system subcooling at the condenser outlet

D. Fail to seat or open properly, causing erratic operation

72. The COP (coefficient of performance) of a refrigeration system is the ratio of:

A. Useful refrigerating effect to the work input required

B. Condenser heat rejection to the evaporator heat absorbed

C. Discharge pressure to the suction pressure measured

D. Compressor displacement to the actual refrigerant flow

73. When a compressor is replaced after a severe burnout, the recommended cleanup procedure includes installing a suction filter drier and:

A. Adding extra refrigerant to flush the condenser tubes

B. Disabling the high-pressure safety to allow operation

C. Monitoring and changing the drier based on acid tests

D. Raising the low-pressure cutout to prevent short cycling

74. A heat pump in heating mode that is not producing adequate heat and shows a low suction pressure with frost on the outdoor coil indicates:

A. An overcharge of refrigerant in the system circuit

B. The reversing valve has failed in the cooling position

C. The indoor blower is moving excessive airflow volume

D. A defrost cycle failure leaving the outdoor coil iced

75. The bubble point of a zeotropic blend is the temperature at which:

A. The refrigerant is entirely in the vapour phase

B. The blend reaches its critical pressure and temperature

C. The refrigerant fully condenses to subcooled liquid

D. The first bubble of vapour forms as liquid begins to boil76. A technician measures discharge superheat at the compressor that is extremely high (over 100°F above condensing). This most likely indicates:

A. Liquid floodback returning to the compressor suction

B. Low refrigerant charge or high compression ratio operation

C. An overcharge backing liquid into the condenser

D. The crankcase heater is stuck in the energized state

77. A water-cooled condenser's approach is the difference between the:

A. Suction and discharge pressures during operation

B. Condensing temperature and leaving water temperature

C. Entering and leaving air temperatures across the coil

D. Evaporator and condenser saturation temperatures

78. Per electrical safety practice, before working on a compressor circuit a technician must lock out and tag out the disconnect, then:

A. Reconnect the meter leads to test for proper rotation

B. Energize the circuit briefly to confirm the lockout works

C. Verify zero energy with a meter before touching conductors

D. Remove the run capacitor without discharging it first

79. A liquid-line sight glass that shows bubbles during steady operation most commonly indicates:

A. A low refrigerant charge or a restriction causing flash gas

B. An overcharge of refrigerant in the high-pressure side

C. Excessive subcooling at the condenser outlet line

D. Normal operation with proper refrigerant flow rate

80. The function of an oil separator located in the discharge line is to:

A. Cool the discharge gas before it enters the condenser

B. Add fresh oil to the refrigerant during each cycle

C. Trap moisture and acid before the condenser inlet

D. Return oil to the compressor crankcase from discharge gas81. A technician must recover refrigerant from a system into a recovery cylinder. The recovery machine should be connected to recover from:

A. Both the high and low side for the fastest recovery

B. The low side only to protect the recovery compressor

C. The high side only to avoid drawing in compressor oil

D. The receiver outlet exclusively for liquid recovery

82. A TXV with a cross-charged bulb is designed to:

A. Limit maximum operating pressure during high-load pulldown

B. Increase the bulb's sensitivity to small temperature changes

C. Prevent the valve from ever fully closing during operation

D. Eliminate the requirement for an external equalizer line

83. The most common cause of a compressor that runs continuously but the space never reaches set point is:

A. The thermostat differential is set too narrow

B. The condenser fan is running at excessive speed

C. An undersized system or a loss of refrigerant capacity

D. The crankcase heater is consuming too much power

84. A non-condensable gas such as air in a refrigeration system will cause:

A. Higher than normal head pressure for the condensing temperature

B. Lower than normal discharge pressure during operation

C. Reduced compressor amperage and lower discharge temperature

D. An immediate loss of all subcooling at the condenser

85. Under refrigerant handling regulations in Canada, a technician servicing systems must hold:

A. A provincial gas fitter licence only for the work

B. A municipal trade business operating permit

C. A manufacturer-specific equipment training certificate

D. An ozone depletion prevention / refrigerant handling certification86. A capacity control method using cylinder unloading on a reciprocating compressor reduces capacity by:

A. Lowering the speed of the compressor crankshaft directly

B. Bypassing hot discharge gas back to the suction line

C. Holding suction valves open so cylinders do not pump

D. Reducing the refrigerant charge during low-load periods

87. A technician finds the liquid line warm and the suction line warm, with low capacity. Subcooling is low and superheat is high. The system is most likely:

A. Overcharged with refrigerant flooding the condenser

B. Suffering a stuck-open metering device condition

C. Low on refrigerant charge due to a leak

D. Operating with a seized condenser fan motor

88. The purpose of the equalizer port on an external-equalized TXV is to:

A. Compensate for evaporator pressure drop across the coil

B. Bleed high-side pressure to the low side at shutdown

C. Provide a path for oil to return to the compressor

D. Allow the bulb charge to vent during overpressure

89. A brazed joint that appears grainy and weak after cooling most likely resulted from:

A. Using too little filler rod for the joint clearance

B. Overheating the base metal beyond the filler's range

C. Applying nitrogen pressure during the brazing operation

D. Cooling the joint too slowly after the braze was made

90. A pressure-enthalpy (Mollier) diagram plots the refrigeration cycle with pressure on the vertical axis and enthalpy on the horizontal. The compression process appears as a line moving:

A. Horizontally to the left at constant pressure

B. Vertically downward along the saturated liquid curve

C. Upward and to the right, raising pressure and enthalpy

D. Diagonally down into the subcooled liquid region91. A condenser fan motor on a small unit runs but the blade turns slowly and the motor overheats. The most likely cause is:

A. A weak or failing run capacitor on the fan motor

B. The high-pressure switch is cycling the fan rapidly

C. The refrigerant charge is too low for the condenser

D. The defrost timer is energizing the fan continuously

92. When charging an R-410A system, the technician should charge by weight or use a manufacturer's superheat/subcooling chart because R-410A:

A. Is a single-component refrigerant that charges as a vapour

B. Operates at higher pressures and requires precise charging

C. Has no glide and tolerates rough charging methods well

D. Can be vented safely if slightly overcharged at startup

93. A liquid slugging event in a reciprocating compressor causes damage primarily because:

A. The oil viscosity drops too low to lubricate properly

B. Liquid is incompressible and stresses valves and rods

C. The discharge temperature rises beyond safe limits

D. The motor windings overheat from excess current draw

94. The defrost drain line on a low-temperature evaporator should be:

A. Routed uphill to prevent debris from entering the coil

B. Connected directly to the suction line for heat

C. Left uninsulated to allow rapid heat absorption

D. Trapped and heated where it passes through freezing zones

95. A technician suspects a restricted filter drier. A diagnostic sign of a restricted liquid-line drier is:

A. Higher than normal suction pressure at the compressor

B. Equal temperature on both sides of the drier body

C. A temperature drop and possible frost across the drier

D. Elevated discharge pressure with normal subcooling

96. In a secondary refrigeration (brine) system, the secondary fluid is used to:

A. Replace the primary refrigerant in the compressor entirely

B. Increase the system's overall ozone depletion potential

C. Transport cooling from the chiller to remote loads

D. Eliminate the need for any primary refrigerant charge

97. A scroll compressor's tip seals and orbiting scroll provide compression by:

A. Progressively reducing gas pocket volume toward the center

B. Reciprocating pistons within machined cylinder bores

C. Rotating vanes sliding within an eccentric rotor housing

D. Spinning an impeller to accelerate the refrigerant vapour

98. A technician measures correct charge, correct airflow, but the evaporator still freezes during a long run cycle. The most likely cause is:

A. The condenser is rejecting too much heat to the air

B. The metering device is overfeeding the evaporator coil

C. The thermostat differential is set excessively wide

D. A low load or low airflow allowing the coil to drop below freezing99. The discharge line temperature on a healthy reciprocating compressor is typically:

A. Lower than the suction line temperature at the inlet

B. Equal to the condensing saturation temperature exactly

C. The hottest point in the system, above condensing temperature

D. The same as the ambient air temperature around the unit

100. A pressure relief device on a refrigerant receiver is sized and set according to:

A. The maximum allowable working pressure of the vessel

B. The normal operating suction pressure of the system

C. The discharge superheat measured at full load

D. The municipal water pressure feeding the condenser

101. A technician encounters a TXV system where the suction pressure is normal but the superheat is far too high and the bulb charge has been lost. The valve will:

A. Drive fully open, flooding the evaporator with liquid

B. Close down, starving the evaporator of refrigerant

C. Modulate normally using the equalizer pressure alone

D. Maintain its last position regardless of the load

102. An air-cooled condenser with bent and dirty fins will most likely cause:

A. A drop in head pressure below normal operating values

B. Higher head pressure due to reduced heat rejection

C. Excessive subcooling at the condenser outlet line

D. A loss of refrigerant charge through the fin surface

103. When recovering from a system with a known compressor burnout, the recovered refrigerant must be:

A. Sent for reclamation to restore it to purity standards

B. Recharged directly back into the repaired system

C. Vented after filtering through a suction line drier

D. Mixed with virgin refrigerant to dilute the acid

104. A low-temperature display case maintaining −18°C uses a defrost method that adds the least heat to the case. The preferred method is:

A. Electric resistance heaters embedded in the coil fins

B. Hot gas routed through the evaporator from discharge

C. Continuous warm-air circulation over the coil face

D. Off-cycle (air) defrost where store conditions permit

105. A technician must verify rotation on a 3-phase scroll compressor before extended operation because reverse rotation:

A. Improves the compressor's volumetric efficiency slightly

B. Has no effect on a scroll compressor's performance

C. Causes the crankcase heater to draw excessive current

D. Will not pump and can damage the compressor quickly106. The primary reason for installing a P-trap at the base of a suction riser is to:

A. Prevent liquid refrigerant from draining into the case

B. Reduce the pressure drop along the vertical riser run

C. Collect oil so it can be carried up by gas velocity

D. Allow condensate from the coil to drain away freely

107. A system using a thermostatic expansion valve shows correct superheat but inadequate cooling on hot days only. The most likely cause is:

A. The TXV bulb has lost its charge entirely

B. The crankcase heater is failing during peak load

C. An undersized condenser unable to reject heat at high ambient

D. The suction accumulator is flooding the compressor

108. In a refrigeration system, sensible heat is best defined as heat that:

A. Causes a change of state without changing temperature

B. Changes the temperature of a substance without a state change

C. Is rejected only at the condenser during the cycle

D. Is added only by the compressor during compression

109. A technician notices the compressor short cycling on the low-pressure control. The most likely cause is:

A. The high-pressure cutout is set too low to function

B. The condenser fan is running at excessive speed

C. The crankcase heater is keeping the oil too warm

D. A low refrigerant charge or a restricted metering device

110. The purpose of a check valve installed in the discharge line of one compressor in a parallel system is to:

A. Reduce the discharge pressure during peak load conditions

B. Prevent reverse flow from operating compressors into an idle one

C. Filter oil from the discharge gas before the condenser

D. Equalize the suction pressure between the compressors

111. A refrigerant that is classified A1 under the safety classification system is:

A. Higher toxicity and higher flammability than A2L

B. Lower toxicity and no flame propagation (nonflammable)

C. Higher toxicity but with no flame propagation rating

D. Lower toxicity but with high flammability characteristics

112. A liquid-suction heat exchanger improves system performance by:

A. Reducing the condenser's heat rejection requirement directly

B. Increasing the compressor displacement at constant speed

C. Lowering the discharge temperature at the compressor head

D. Subcooling liquid while superheating suction vapour

113. A technician finds an evaporator coil with uneven frosting and a TXV that responds sluggishly to load changes. After confirming charge and airflow, the next check should be the:

A. TXV sensing bulb mounting, contact, and insulation

B. Compressor discharge valve plate for leakage

C. Condenser fan motor capacitor for correct value

D. High-pressure safety control reset setting

114. When a system is operating at a 4:1 compression ratio versus a 10:1 ratio, the higher compression ratio results in:

A. Higher volumetric efficiency and greater capacity

B. Lower discharge temperature and longer compressor life

C. No measurable effect on the compressor performance

D. Lower volumetric efficiency and higher discharge temperature

115. A technician must add refrigerant to a system charged with a zeotropic blend that has lost some charge through a slow leak. The correct procedure is to:

A. Top off with vapour from the cylinder to the low side

B. Add any compatible single-component refrigerant to make up

C. Estimate the loss and add liquid without recovering first

D. Recover the remaining charge and recharge by weight with liquid116. The function of a hot gas bypass valve in a refrigeration system is to:

A. Maintain minimum evaporator pressure during low-load operation

B. Increase the condenser's heat rejection during peak load

C. Raise the system's subcooling at the receiver outlet

D. Reduce the discharge pressure when head pressure climbs

117. A megohmmeter test should never be performed on a compressor while it is:

A. Disconnected from all external electrical wiring

B. At ambient temperature in a de-energized state

C. Under a vacuum, as it can cause winding flashover damage

D. Isolated from the run and start capacitors fully

118. A technician observes oil foaming in the compressor sight glass at startup. This is most commonly caused by:

A. An overcharge of oil added during the last service

B. The crankcase heater failing to keep the oil warm

C. Refrigerant that migrated into the oil boiling off rapidly

D. A blocked oil return line from the suction accumulator

119. The wet-bulb depression of an air sample is the difference between the:

A. Dew point temperature and the wet-bulb temperature

B. Dry-bulb temperature and the wet-bulb temperature

C. Saturation temperature and the dry-bulb temperature

D. Indoor and outdoor dry-bulb temperatures measured

120. A reversing valve that fails to shift fully, leaving the heat pump partially in both modes, will typically show:

A. Excessive subcooling and very high head pressure

B. A complete loss of refrigerant charge through the valve

C. Equalized or abnormal suction and discharge pressures

D. Normal operation with slightly improved efficiency

121. When silver brazing a joint near a service valve with a non-metallic seat, the technician should:

A. Apply maximum heat quickly to finish before damage occurs

B. Remove the valve cap only and braze at full temperature

C. Pack the valve with extra flux to absorb the heat

D. Remove the valve internals or wrap with a wet heat sink

122. A capillary tube system has no receiver because:

A. The charge is critical and metered to match the system exactly

B. The capillary stores all excess liquid during the off cycle

C. A receiver would cause the capillary to freeze up rapidly

D. The evaporator acts as the liquid storage during operation

123. A technician measuring across an open thermal overload protector on a single-phase compressor will read:

A. Zero ohms, indicating a closed and healthy circuit

B. Line voltage with the compressor running normally

C. A low resistance equal to the run winding value

D. Infinite resistance (open circuit) across the protector

124. The principal purpose of a suction-line accumulator in a heat pump is to:

A. Increase the subcooling of liquid before the metering device

B. Filter acid and moisture from the suction gas continuously

C. Store excess oil drained from the compressor crankcase

D. Prevent liquid floodback to the compressor during defrost and mode changes

125. A technician completes a repair and must document the refrigerant added to the system. Under refrigerant management requirements, this record-keeping is important because it:

A. Reduces the time required for the next service visit

B. Tracks refrigerant use and helps identify chronic leaks

C. Is needed to validate the equipment manufacturer's warranty

D. Determines the electrical permit fee for the installationAll 125 questions complete, each crafted so the correct answer matches its pre-assigned key letter.

Practice Exam 19: Answer Key and Explanations

1. B — 12°F superheat is calculated as actual suction line temp (52°F) minus saturation temp (40°F), which falls within a normal operating range. Healthy superheat typically runs 8–15°F, confirming the evaporator is fully active without liquid floodback or starvation. This protects the compressor while maximizing coil utilization.

2. D — Machinery rooms contain and safely manage a potential refrigerant release. When refrigerant quantity exceeds the occupancy threshold, CSA B52 requires the dedicated room with ventilation and detection so a leak cannot accumulate in occupied space. This is fundamentally a life-safety and asphyxiation/toxicity control measure.

3. D — A capillary tube has a fixed restriction and cannot adjust to load changes. Unlike a TXV, it has no moving parts or sensing element, so it meters by bore and length alone. This makes it cheap and reliable but only suitable for systems with stable, predictable loads.

4. A — A failed-open start winding prevents the motor from developing starting torque, so it draws locked rotor amperage and stalls. With the run capacitor proven good, the open start circuit is the remaining cause of a no-start at LRA. Confirm with a winding resistance/continuity check at the terminals.

5. C — Recovery prevents release of ozone-depleting and greenhouse gases. The core environmental driver behind recovery regulations is keeping refrigerants out of the atmosphere where they damage the ozone layer and contribute to global warming. Resale value is incidental, not the regulatory purpose.

6. D — Scale and mineral fouling on the tubes insulate the heat-transfer surface, raising condensing pressure despite good water flow. Fouling builds gradually, matching the multi-week trend described. Tube cleaning or water treatment restores normal head pressure.

7. A — A high-side float meters refrigerant based on the level of liquid in the high-pressure side. As liquid accumulates, the float opens to pass refrigerant to the low side, maintaining the high-side level. It essentially keeps almost all charge in the evaporator, making it a flooded-system control.

8. B — Purging with dry nitrogen displaces oxygen so no copper oxide scale forms inside the tubing during brazing. The flowing inert gas prevents the internal flaking that would otherwise circulate and plug metering devices and driers. Nitrogen purge is standard practice on all refrigerant-line brazing.

9. C — The third force is evaporator (suction) pressure acting on the underside of the diaphragm. Bulb pressure opens the valve, while spring pressure and evaporator pressure act to close it; their balance sets superheat. On an externally equalized valve this closing pressure is sensed through the equalizer line.

10. B — R-134a at about 49 psig corresponds to roughly 55°F saturation temperature, the expected PT relationship for that refrigerant. Reading the gauge against the PT chart confirms the system is operating in its normal range. This pairing is a baseline check before diagnosing charge faults.

11. D — Installing a suction line filter drier removes the acid and contaminants released by a burnout before they reach the new compressor. The acidic oil signals system-wide contamination, so cleanup—not just a part swap—is essential. The drier is monitored and changed based on follow-up acid testing.

12. D — The liquid-line solenoid closes on a satisfied thermostat so the compressor pumps the low side down. With the liquid feed shut, the compressor evacuates refrigerant from the evaporator into the high side until the low-pressure control stops it. This keeps refrigerant from migrating to the compressor during the off cycle.

13. A — High superheat with low subcooling is the classic signature of an undercharged system. Too little refrigerant leaves the evaporator starved (high superheat) and the condenser with little stored liquid (low subcooling). Confirm by leak-checking and weighing in charge.

14. D — WHMIS 2015 requires a Safety Data Sheet (SDS) be available to workers for hazardous products including refrigerants. The SDS communicates hazards, handling, and first-aid information at the point of use. Supplier labels plus SDS access are core worker right-to-know requirements.

15. B — A scroll compressor running in reverse makes a loud noise and fails to build a pressure differential because the scrolls cannot compress in that direction. This commonly follows a phase-reversal on a 3-phase unit. Correct the rotation by swapping any two supply legs.

16. C — Zeotropic blends like R-407C must be charged as a liquid to preserve the correct blend composition. Charging vapour allows the more volatile components to leave the cylinder first (fractionation), shifting the blend. Liquid charging through a metering/throttling device keeps all components in proportion.

17. B — The defrost termination thermostat ends the defrost cycle once the coil reaches a set temperature. It ensures defrost stops as soon as ice is cleared rather than overheating the coil and the space. Time initiates defrost; temperature (or backup time) terminates it.

18. A — Low supply voltage (198V on a 230V motor) causes the motor to draw higher current to maintain torque, overheating it and tripping the overload. Voltage roughly 14% low is well outside the ±10% tolerance. The fix lies upstream in the supply, not the motor.

19. A — Subcooling ensures 100% liquid reaches the metering device and prevents flash gas in the liquid line. If the refrigerant flashes to vapour before the valve, capacity drops and feeding becomes erratic. Adequate subcooling guarantees a solid liquid column to the valve inlet.

20. B — A micron reading that rises and then stabilizes after isolating the pump indicates moisture or non-condensables remaining in the system. A pressure rise that levels off points to outgassing/moisture rather than a leak (which would rise continuously). Continue evacuation, often with nitrogen sweeps.

21. C — For an A2L flammable refrigerant, the detector must be specifically rated and intrinsically safe for that refrigerant. An ignition-capable or wrong-gas detector is unsafe and unreliable around mildly flammable refrigerants. Open-flame methods are prohibited with flammable refrigerants.

22. A — An evaporator pressure regulator maintains a minimum pressure (temperature) in a higher-temperature evaporator on a shared system. It throttles the outlet so that coil stays warmer than the lowest-temperature load on the same compressor. This allows multiple case temperatures off one suction main.

23. A — A loosely clamped or poorly located sensing bulb gives the TXV erratic temperature readings, causing it to hunt. Poor bulb contact lets the valve over- and under-react, swinging suction pressure. Re-clamp the bulb firmly at the proper clock position on a clean line.

24. C — Keep the load close to the body and lift with the legs to protect the back. This keeps the spine neutral and uses the strong leg muscles rather than the lumbar region. It is the foundation of safe manual material handling.

25. C — The high-pressure cutout stops the compressor when discharge pressure becomes excessive. It protects against dangerous overpressure from causes like a blocked condenser or non-condensables. It is a safety control, distinct from operating pressure controls.

26. A — Condenser fan cycling maintains adequate condensing pressure so the metering device feeds properly in low ambient. Without head pressure control, winter operation drops high-side pressure and the TXV starves the evaporator. Cycling (or modulating) the fan holds pressure up.

27. C — The potential relay's normally closed contacts open to drop out the start capacitor as the motor reaches speed. The relay senses the rising back-EMF (potential) of the start winding and de-energizes the start capacitor at the right moment. Failure to open keeps the start cap in circuit and damages it.

28. B — Beyond lubrication, refrigeration oil returns to the compressor and seals running clearances. Proper oil circulation maintains the seal between high and low sides inside the compressor and lubricates bearings. Oil that does not return causes both lubrication failure and capacity loss.

29. D — Zero ohms (continuity) from a winding to the shell indicates a grounded (shorted-to-shell) winding—a failed compressor. A healthy motor reads effectively infinite resistance to ground. This insulation breakdown condemns the compressor.

30. A — A suction-line accumulator protects the compressor from liquid refrigerant floodback. It traps returning liquid and meters it back as vapour, with controlled oil return through a small bleed. This is critical on systems prone to flooding, such as heat pumps.

31. C — A heavily iced coil with low suction pressure points to a defrost system failure. Once ice insulates the coil, heat transfer collapses, suction pressure drops, and the box loses temperature. Verify the defrost timer, heater/hot-gas, and termination control.

32. A — Total heat (enthalpy) is the sum of sensible heat and latent heat absorbed during the change of state. Sensible heat changes temperature; latent heat drives the liquid-to-vapour change at constant temperature. Both together define the refrigerant's heat content used in cycle calculations.

33. B — As pressure increases, the saturation temperature increases correspondingly. This direct PT relationship underlies all gauge-based diagnosis: raising pressure raises the boiling/condensing point. It is why high-side pressure tracks condensing temperature.

34. B — The crankcase heater prevents refrigerant from migrating and condensing in the oil during the off cycle. Keeping the oil warm drives refrigerant out of solution, preventing dilution and dangerous foaming/slugging at startup. It is especially important in cold ambient locations.

35. C — Recovery cylinders must be secured upright and not filled beyond 80% capacity to allow for liquid expansion. Overfilling risks hydrostatic rupture as temperature rises. Proper restraint and fill limits are core transport-safety rules.

36. D — Balanced but excessive current on all three legs, with good voltage, points to a mechanical overload such as a seized bearing or high head pressure. Electrical-supply faults would show imbalance; uniform high amps indicate the motor is working against excess mechanical load. Investigate mechanical drag and discharge conditions.

37. B — Vapour changes to liquid in the condenser, where heat is rejected to the surroundings. The high-pressure superheated gas cools, condenses, and may subcool before leaving. This is the high-side heat-rejection step of the cycle.

38. A — Hot gas defrost routes hot discharge gas through the evaporator to melt frost from the inside out. It is fast and efficient because it uses heat already in the system. Controls divert discharge gas to the coil during the defrost period.

39. D — An external equalizer connects to the suction line just downstream of the bulb at the evaporator outlet. This lets the valve compensate for pressure drop across the coil and distributor. It senses true outlet pressure for accurate superheat control.

40. C — Oil pooling at the evaporator base in a low-temp system indicates poor oil return from insufficient suction-line velocity. Cold, low-density vapour and undersized or improperly trapped lines fail to carry oil back. Correct line sizing and risers/traps restore return.

41. D — TEWI accounts for direct refrigerant emissions plus the indirect emissions from the energy the system consumes. It captures the full climate impact, recognizing that an inefficient system burns more (often fossil) energy over its life. It guides both refrigerant choice and efficiency design.

42. A — An overcharged capillary tube system shows high head pressure and high evaporator pressure. The fixed restriction passes excess liquid, raising low-side pressure, while the extra charge raises the high side. Capillary systems are charge-critical, so overcharge symptoms appear quickly.

43. D — The receiver stores liquid refrigerant to accommodate changing load and charge requirements. It provides a reservoir so the metering device always sees solid liquid as operating conditions shift. It is typical on TXV systems with variable load.

44. D — The contactor coil voltage must match the control circuit voltage feeding the coil, not the line/load voltage. A 24V control circuit needs a 24V coil even on a 240V load. Mismatching coil voltage causes failure to pull in or coil burnout.

45. B — Flash gas before the metering device is most often caused by a pressure drop or restriction reducing liquid pressure below saturation. A plugged drier, undersized line, or vertical lift can drop pressure enough to boil the liquid. Restoring subcooling and removing the restriction cures it.

46. C — During pump-down the compressor runs until the low-pressure control opens as suction pressure drops. With the liquid solenoid closed, the compressor evacuates the low side and shuts off on the LP control. This stores refrigerant in the high side for a clean restart.

47. D — Much higher superheat at the compressor than at the evaporator outlet indicates heat gain on a long or uninsulated suction line. The vapour picks up sensible heat between the coil and compressor. Insulating the suction line corrects excessive compressor-inlet superheat.

48. A — The wet-bulb temperature is always equal to or lower than the dry-bulb temperature. Evaporative cooling at the wet bulb lowers its reading; only at 100% relative humidity do the two readings match. This relationship is fundamental to psychrometrics.

49. D — If the reversing-valve solenoid coil fails open, the valve defaults to whichever mode its de-energized position selects. The valve simply stays in the mechanically biased position, so the heat pump is stuck in one mode. Most are piped so de-energized equals heating.

50. C — Subcooling far above design (25°F vs 10°F) indicates an overcharge backing liquid up into the condenser. Excess liquid floods condenser tubes, increasing subcooling and head pressure. Recover refrigerant to the correct charge.

51. C — Pressure relief valves must discharge to a safe location, typically outdoors away from occupants. CSA B52 prohibits relieving into occupied spaces where refrigerant could harm people. Termination point and clearances are code-specified.

52. D — On an open coil-sensor circuit, an electronic expansion valve controller closes the valve or signals a fault to protect the compressor. Losing the temperature input makes safe metering impossible, so the controller fails to a protective state. This prevents flooding or starving the compressor blindly.

53. D — A halide torch indicates a leak by changing the flame colour to green in the presence of halogenated refrigerant. The sample air drawn over a heated copper element turns the flame green/blue. It is an older method, unsuitable for flammable refrigerants and largely superseded by electronic detectors.

54. B — A flooded evaporator gives better heat transfer because the tube surfaces are fully wetted with boiling liquid. Complete wetting maximizes the boiling heat-transfer coefficient versus a partially dry DX coil. The trade-off is more charge and liquid-level controls.

55. B — A nitrogen pressure test must not exceed the lowest-rated component's design pressure. The weakest component sets the safe ceiling for the entire test. Exceeding it risks rupturing a low-pressure-side component.

56. A — A condenser water regulating valve modulates water flow based on head (condensing) pressure. As head pressure rises, the valve opens to admit more cooling water, holding condensing pressure steady. It saves water and stabilizes operation across load swings.

57. B — A parallel-rack oil management system ensures each compressor maintains its proper oil level. Shared suction and uneven oil distribution otherwise starve one compressor while logging another. Oil separators, reservoirs, and level regulators balance the system.

58. C — Frost partway along the coil but not at the outlet indicates a partial restriction or underfeeding of the evaporator. The refrigerant boils off before reaching the outlet, leaving the last passes dry and warm. Check the metering device and liquid feed.

59. C — Reciprocating compressor displacement depends on bore, stroke, and the number of cylinders and rotational speed. These geometric and speed factors set the swept volume per unit time. Discharge pressure and refrigerant type do not change displacement itself.

60. B — A front-seated receiver service valve traps liquid in the receiver, starving the metering device. Front-seating isolates the outlet, so no liquid reaches the liquid line. The result is low capacity and a starved evaporator until the valve is back-seated/cracked.

61. B — Latent heat of vaporization is the heat required to change refrigerant from liquid to vapour at constant temperature. This phase-change heat absorption in the evaporator is what produces useful refrigeration. No temperature change occurs during this latent process.

62. C — Suction lines are sized to maintain oil-return velocity while minimizing pressure drop to preserve capacity. Excess pressure drop lowers suction density and compressor capacity. The balance—enough velocity, not too much drop—governs proper sizing.

63. A — Triple evacuation repeats the vacuum-and-nitrogen-break process to dilute and remove moisture. Each nitrogen sweep absorbs and carries off water vapour, and successive evacuations reduce moisture to acceptable levels. It is effective on systems that held moisture or had a burnout.

64. C — A semi-hermetic compressor has bolted access covers allowing field service of valves and motor. Unlike a welded hermetic shell, its head and end bells unbolt for repair. This makes it serviceable in place rather than a throwaway unit.

65. B — A discharge muffler dampens the pulsations and noise from the discharge gas. Reciprocating compressors create pressure pulses that the muffler smooths to reduce noise and vibration. It does not meaningfully cool gas or separate oil.

66. B — Low suction pressure with low superheat (bulb properly mounted) points to the valve underfeeding from a partial restriction or low bulb charge. A weak bulb charge cannot push the valve open enough, starving the coil at low pressure. Inspect the valve inlet screen and bulb charge integrity.

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

68. A — "Time-initiated" means defrost begins at scheduled intervals set on the timer clock. The timer starts defrost on a fixed schedule, while temperature (with backup time) ends it. This is the common time-initiated, temperature-terminated arrangement.

69. B — A megohmmeter reading well below the minimum indicates deteriorated insulation or a winding-to-ground fault. Low insulation resistance means current can leak to ground through degraded insulation. This warns of imminent or existing motor failure.

70. A — Correct charge with low capacity, high superheat, and normal subcooling points to a restricted or undersized metering device. The condenser holds normal liquid (good subcooling) but the valve cannot feed the coil enough, starving it (high superheat). Replace or clear the metering device/screen.

71. D — A backward-installed solenoid valve fails to seat or open properly, causing erratic operation. The valve relies on differential pressure and a designed flow direction to seat and lift correctly. Reversed flow defeats that mechanism.

72. A — COP is the ratio of useful refrigerating effect to the work input required. It expresses efficiency: how much cooling is obtained per unit of energy supplied to the compressor. A higher COP means a more efficient cycle.

73. C — After a severe burnout, install a suction filter drier and monitor and change it based on acid tests. Repeated acid testing confirms when the system is clean, guiding drier changes. This staged cleanup protects the replacement compressor.

74. D — A heat pump in heating with low suction pressure and a frosted outdoor coil indicates a defrost cycle failure leaving the coil iced. Ice blocks airflow and heat absorption, dropping suction pressure and heat output. Check the defrost initiation/termination controls.

75. D — The bubble point is the temperature at which the first bubble of vapour forms as the liquid begins to boil. It marks the start of vaporization for a zeotropic blend, with the dew point marking full vaporization. Subcooling on blends is referenced to the bubble point.

76. B — Extremely high discharge superheat usually indicates low refrigerant charge or a high compression ratio. Starved suction vapour and high compression both drive discharge temperature up sharply. Verify charge and check for high-side restrictions raising the compression ratio.

77. B — Condenser approach is the difference between condensing temperature and leaving water temperature. A small approach indicates effective heat transfer; a widening approach signals fouling or flow problems. It is a key water-cooled condenser performance metric.

78. C — After lockout/tagout, verify zero energy with a meter before touching conductors. Confirming the absence of voltage proves the isolation is effective. This "test before touch" step is essential electrical safety practice.

79. A — Steady bubbles in the sight glass usually indicate a low charge or a restriction producing flash gas. Vapour in the liquid line appears as bubbles, signalling the liquid column is not solid. Confirm charge and check the drier/liquid line for restriction.

80. D — A discharge-line oil separator returns oil to the compressor crankcase from the discharge gas. It captures entrained oil before it travels through the system and feeds it back via a float-controlled return. This protects compressor lubrication, especially on long-line or low-temp systems.

81. A — Recovering from both the high and low side gives the fastest recovery. Opening both ports lets refrigerant evacuate from the whole system simultaneously, shortening recovery time. Liquid/vapour management on the recovery machine handles the mixed draw.

82. A — A cross-charged bulb limits maximum operating pressure during high-load pulldown (MOP). Its special charge causes the valve to throttle and cap suction pressure as the load is high, protecting the compressor motor from overload. Pressure stays under the design ceiling during pulldown.

83. C — Continuous running without reaching set point usually means an undersized system or a loss of refrigerant capacity. The system simply cannot match the load, so it never satisfies. Check capacity, charge, and load conditions.

84. A — Non-condensable gas like air raises head pressure above what the condensing temperature alone would produce. The air's partial pressure adds to refrigerant pressure in the condenser. Recover, evacuate, and recharge to remove non-condensables.

85. D — A technician must hold an ozone depletion prevention / refrigerant handling certification to service systems. This certification authorizes purchase and handling of controlled refrigerants under Canadian environmental regulations. It is the baseline credential for refrigerant work.

86. C — Cylinder unloading reduces capacity by holding suction valves open so those cylinders do not pump. The unloaded cylinders move gas back and forth without compressing it, lowering output without stopping the compressor. It is a stepped capacity-control method.

87. C — Warm liquid and suction lines, low capacity, low subcooling, and high superheat together indicate a low charge from a leak. Too little refrigerant starves both the condenser (low subcooling) and evaporator (high superheat). Leak-find, repair, and recharge by weight.

88. A — The external equalizer port compensates for evaporator pressure drop across the coil. By sensing outlet pressure rather than inlet, the valve maintains accurate superheat despite the coil/distributor pressure loss. It is essential on coils with significant pressure drop.

89. B — A grainy, weak brazed joint usually results from overheating the base metal beyond the filler's range. Excess heat oxidizes the metal and degrades the alloy bond. Controlled heat and proper technique produce a smooth, strong fillet.

90. C — On a pressure-enthalpy diagram, compression appears as a line moving upward and to the right, raising both pressure and enthalpy. The compressor adds work, increasing pressure and adding heat of compression to the vapour. This is the cycle's energy-input leg.

91. A — A fan motor that turns slowly and overheats typically has a weak or failing run capacitor. Insufficient capacitance reduces torque and causes excess current and heat. Test and replace the capacitor to restore proper speed.

92. B — R-410A must be charged precisely (by weight or superheat/subcooling chart) because it operates at higher pressures. Its near-azeotropic behaviour and high pressures demand accurate charging for safe, efficient operation. Rough charging risks both performance and component limits.

93. B — Liquid slugging damages a reciprocating compressor because liquid is incompressible and stresses valves and connecting rods. The compressor cannot compress liquid, so the sudden hydraulic load breaks valves and bends rods. Accumulators and proper superheat prevent it.

94. D — A low-temp defrost drain must be trapped and heated where it passes through freezing zones. Otherwise meltwater refreezes in the line and blocks drainage, causing ice buildup. Heat tape and a proper trap keep the drain clear.

95. C — A restricted liquid-line drier shows a temperature drop and possible frost across the drier body. The pressure drop across the restriction causes localized cooling and flashing. A noticeable temperature differential across the drier confirms the restriction.

96. C — In a secondary (brine) system, the secondary fluid transports cooling from the chiller to remote loads. Keeping refrigerant centralized and circulating a safe secondary fluid reduces charge and leak risk in occupied areas. The brine carries the cooling effect to the spaces.

97. A — A scroll compressor compresses by progressively reducing gas pocket volume toward the center. The orbiting scroll traps vapour at the periphery and squeezes it inward to the central discharge port. This gives smooth, efficient, near-continuous compression.

98. D — Correct charge and airflow with persistent coil freezing usually means low load or low airflow lets the coil drop below freezing. On long run cycles at light load, coil temperature falls below 32°F and condensate freezes. Address load matching, airflow, and run-time controls.

99. C — Discharge line temperature is the hottest point in the system, above the condensing temperature. Compression adds heat of compression, so discharge gas is superheated well above the saturated condensing temperature. Excessive discharge temperature signals trouble such as low charge or high compression ratio.

100. A — A relief device is sized and set according to the vessel's maximum allowable working pressure. It must relieve before pressure exceeds the receiver's MAWP to prevent rupture. The setting and capacity are matched to the protected vessel.

101. B — With the bulb charge lost, the TXV loses its opening force and closes down, starving the evaporator. No bulb pressure means spring and evaporator pressure hold the valve nearly shut. The fix is to replace the valve or its power head.

102. B — Bent, dirty condenser fins reduce heat rejection, raising head pressure. Restricted airflow and fouled surfaces impair condensing, driving up discharge pressure and reducing capacity. Clean and comb the fins to restore performance.

103. A — Refrigerant recovered from a burnout must be sent for reclamation to restore it to purity standards. Burnout contaminates the refrigerant with acid and byproducts, making it unfit for direct reuse. Reclamation processes it back to AHRI purity or it is destroyed.

104. D — Off-cycle (air) defrost adds the least heat to the case where conditions permit. Using only the off-cycle to let coil frost melt avoids adding heater or hot-gas energy to the box. It is energy-favourable but limited to applications where coil temperature rises enough during off cycles.

105. D — A scroll compressor in reverse will not pump and can be damaged quickly, so rotation must be verified. Reverse running overheats the scroll set and offers no compression. Confirm phase sequence and correct rotation before extended operation.

106. C — A suction-riser P-trap collects oil so gas velocity can carry it up the riser. The trapped oil forms a slug that the rising vapour pushes up in stages. This maintains oil return on vertical lifts.

107. C — Inadequate cooling on hot days only, with correct superheat, points to an undersized condenser that cannot reject heat at high ambient. As ambient rises, condensing pressure and temperature climb and capacity falls. The condenser is the limiting component at peak conditions.

108. B — Sensible heat changes the temperature of a substance without a change of state. It is the heat you can measure with a thermometer as temperature rises or falls. Latent heat, by contrast, drives phase change at constant temperature.

109. D — Short cycling on the low-pressure control usually stems from a low refrigerant charge or a restricted metering device. Suction pressure drops quickly to the cutout, the compressor stops, pressure recovers, and it restarts. Find the charge loss or restriction to stop the cycling.

110. B — A discharge check valve prevents reverse flow from operating compressors into an idle one. Without it, high-side gas would back-feed and could spin or flood the off compressor. The check valve isolates each compressor's discharge in a parallel system.

111. B — An A1 refrigerant has lower toxicity and no flame propagation (nonflammable). The "A" denotes lower toxicity and the "1" denotes no flammability, making A1 the safest classification group. A2L, by contrast, is mildly flammable.

112. D — A liquid-suction heat exchanger subcools the liquid while superheating the suction vapour. This added subcooling boosts capacity and helps ensure dry suction gas. The trade-off is higher suction superheat and discharge temperature.

113. A — With charge and airflow confirmed, sluggish TXV response and uneven frost point to checking the bulb's mounting, contact, and insulation. Poor bulb contact or missing insulation delays and distorts the valve's response. Proper, insulated bulb contact restores stable control.

114. D — A higher compression ratio (10:1 vs 4:1) produces lower volumetric efficiency and higher discharge temperature. More re-expansion of clearance gas reduces pumped volume, and greater compression work raises discharge heat. High ratios reduce capacity and stress the compressor.

115. D — A leaking zeotropic blend must be recovered and recharged by weight with liquid. Topping off can leave the blend off-composition because components leak and fractionate unequally. Full recovery and a fresh weighed liquid charge restore correct composition.

116. A — A hot gas bypass valve maintains minimum evaporator pressure during low-load operation. It feeds discharge gas into the low side to prevent the suction pressure from dropping too low and freezing or short-cycling. It provides artificial load at light demand.

117. C — A megohmmeter test should never be done on a compressor under vacuum, as it can cause winding flashover. Low pressure lowers the dielectric strength of any gas in the shell, so the high test voltage can arc. Test only at normal pressure.

118. C — Oil foaming at startup is most commonly caused by refrigerant that migrated into the oil boiling off rapidly. The dissolved refrigerant flashes when pressure drops at start, whipping the oil into foam. A working crankcase heater prevents this migration.

119. B — Wet-bulb depression is the difference between the dry-bulb and wet-bulb temperatures. A larger depression means drier air (more evaporative cooling at the wet bulb). It is used with psychrometric charts to find humidity.

120. C — A reversing valve that fails to shift fully shows equalized or abnormal suction and discharge pressures. Internal bypass between high and low sides bleeds pressure across the valve. Listen/feel for the bypass and confirm with abnormal readings.

121. D — When brazing near a valve with a non-metallic seat, remove the valve internals or wrap it with a wet heat sink. This protects the seat from heat damage during brazing. Excess heat would destroy the soft seat material.

122. A — A capillary-tube system needs no receiver because the charge is critical and metered to match the system exactly. The fixed restriction and precise charge leave no surplus liquid to store. Overcharging such a system quickly causes problems.

123. D — A meter across an open thermal overload reads infinite resistance (open circuit). The tripped/open protector breaks continuity, so the ohmmeter shows open. A closed, healthy protector would read near zero ohms.

124. D — A heat-pump suction-line accumulator prevents liquid floodback to the compressor during defrost and mode changes. Reversing-valve operation and defrost can dump liquid toward the compressor, which the accumulator catches and meters back. This protects the compressor through transient flooding events.

125. B — Refrigerant records track usage and help identify chronic leaks. Logging added refrigerant reveals systems that repeatedly need topping up, flagging leaks for repair. This supports both environmental compliance and good service practice.