PRACTICE EXAM 29: RACM RED SEAL SIMULATION (125 QUESTIONS)

1. A technician finds a walk-in cooler running warm with a fully frosted evaporator coil and the defrost timer advancing normally. The defrost heaters test open on a meter. What is the most likely cause?

A. The TXV is overfeeding the evaporator

B. The condenser fan motor has failed

C. The defrost heater elements have burned out

D. The system is overcharged with refrigerant

2. On an R-410A system, a technician records a suction pressure of 118 psig. Using the P-T relationship, the saturated suction temperature is closest to:

A. 20°F

B. 40°F

C. 65°F

D. 90°F

3. A reach-in freezer compressor runs continuously but cannot pull the box below 10°F. Suction pressure is higher than normal and superheat is very low. What does this indicate?

A. A severe liquid-line restriction

B. An undercharged system

C. An overfeeding metering device flooding the evaporator

D. A dirty condenser coil

4. Why must a technician avoid mixing POE oil with mineral oil in a system?

A. Mineral oil increases the system's cooling capacity

B. POE oil is non-hygroscopic and repels moisture

C. The two oils improve compressor lubrication when blended

D. The mixture reduces oil return and can cause lubrication failure

5. A three-phase compressor draws balanced current on two legs but zero on the third. The most likely cause is:

A. An open winding or blown fuse on that phase

B. A correctly operating compressor under light load

C. An overcharged refrigerant condition

D. A plugged liquid-line filter drier

6. What is the primary purpose of a receiver in a system using a thermostatic expansion valve?

A. To superheat the suction vapour before the compressor

B. To separate oil from the discharge gas stream

C. To store liquid refrigerant and accommodate charge variations

D. To meter refrigerant flow into the evaporator coil

7. A supermarket rack system loses oil pressure on one compressor while others run normally. The oil-level control for that compressor reads empty. The first check should be:

A. The discharge pressure of the entire rack

B. The oil supply line and float valve to that compressor

C. The ambient temperature at the condenser

D. The defrost schedule on the connected cases

8. Under TSSA/provincial mechanical codes, a pressure-relief device on a refrigerant receiver must be:

A. Sized smaller than the inlet connection

B. Set to relieve at or below the vessel's rated pressure

C. Capped permanently to prevent any release

D. Installed only on water-cooled systems

9. A heat pump in heating mode shows frost building heavily on the outdoor coil and never initiates defrost. The defrost control is a demand-type using a coil sensor. The likely fault is:

A. The reversing valve is stuck in cooling

B. The indoor blower has failed

C. A failed or out-of-calibration coil temperature sensor

D. An overcharge of refrigerant in the system

10. What does an excessively high temperature split (return air minus supply air) across an evaporator coil typically indicate?

A. Excessive airflow across the coil

B. Low airflow or a restricted/dirty filter

C. An overcharged refrigerant condition

D. A flooded evaporator coil

11. A technician must braze a suction line near a thermostatic expansion valve's sensing bulb. To protect the bulb, the technician should:

A. Increase the torch flame to braze faster

B. Remove or shield the bulb and use a wet rag heat sink

C. Spray water directly on the valve body

D. Leave the system fully charged during brazing

12. The main advantage of an electronic expansion valve over a thermostatic expansion valve in a low-temperature rack is:

A. It eliminates the need for any liquid refrigerant

B. It operates without electrical power

C. It requires no superheat measurement

D. Faster, more precise superheat control across a wide load range

13. A condensing unit short-cycles on the high-pressure control during hot weather. The condenser coil is clean and fans run. The most probable cause is:

A. A low refrigerant charge

B. An overcharge or non-condensables raising head pressure

C. An open low-pressure control

D. Excessive evaporator superheat

14. When recovering refrigerant from a system with a large liquid charge, the push-pull method is preferred because it:

A. Eliminates the need for a recovery cylinder

B. Allows venting of vapour to atmosphere safely

C. Transfers liquid quickly using a pressure differential

D. Removes oil from the refrigerant automatically

15. A reciprocating compressor has high discharge temperature, normal suction and discharge pressures, and high measured superheat. The most likely cause is:

A. A flooded evaporator coil

B. An overcharged system condition

C. Insufficient refrigerant feed raising return-gas superheat

D. A failed condenser fan motor

16. Why is nitrogen, not oxygen or compressed air, used to pressure-test refrigerant piping?

A. Nitrogen is inert and will not form an explosive mixture with oil

B. Nitrogen adds moisture to help locate leaks

C. Oxygen provides a more accurate pressure reading

D. Compressed air increases the system's cooling capacity

17. A flooded chiller's low-pressure cutout trips repeatedly. The chilled-water flow has stopped due to a closed valve. What is happening?

A. The condenser is rejecting too much heat

B. The evaporator loses its heat source, suction pressure drops, and the control cuts out

C. The compressor is overcharged with oil

D. The expansion device has failed wide open

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

A. Increase the condensing pressure in cooling mode

B. Meter refrigerant into the indoor coil

C. Separate oil from the discharge gas

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

19. A technician measures 250°F discharge-line temperature on an operating compressor. This reading is:

A. Normal and requires no further action

B. An indication of a flooded compressor

C. Excessive, indicating high compression ratio or high superheat

D. Caused by an overcharge of refrigerant

20. Under WHMIS 2015, a refrigerant cylinder displaying a "gas cylinder" pictogram and a "flame" pictogram indicates the product is:

A. Non-hazardous and exempt from labelling

B. A simple asphyxiant only

C. Corrosive to skin and eyes

D. A compressed gas that is also flammable

21. A capillary-tube household refrigerator runs with low suction pressure, high superheat, and frost only at the evaporator inlet. The most likely cause is:

A. An overcharge of refrigerant

B. A partial restriction at the capillary tube or drier

C. A flooded evaporator coil

D. A failed defrost heater element

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

A. To raise the condensing temperature

B. To increase the refrigerant's latent heat value

C. To prevent heat gain and stop condensation forming on the cold line

D. To eliminate the need for a metering device

23. A technician needs to confirm the actual subcooling on a TXV/receiver system. The correct method is to:

A. Measure suction-line temperature against suction saturation

B. Compare liquid-line temperature to the condensing saturation temperature

C. Read the sight glass for bubbles only

D. Measure the discharge-line temperature directly

24. A scroll compressor on a rooftop unit makes a loud noise at startup and develops no pressure differential after a recent service. The most likely cause is:

A. The TXV is set with too much superheat

B. The condenser coil is partially blocked

C. The supply phases were reversed, rotating the scroll backward

D. The crankcase heater has failed open

25. The function of a crankcase pressure regulator (CPR) is to:

A. Limit suction pressure to the compressor during high-load pull-down

B. Increase the discharge pressure for better heat rejection

C. Eliminate the need for an accumulator

D. Meter liquid refrigerant into multiple evaporators

26. A walk-in freezer's evaporator fans continue running during defrost, blowing warm air into the box. The fault is in the:

A. Low-pressure control setting

B. Compressor internal overload

C. Defrost fan-delay control or relay

D. Liquid-line solenoid valve

27. Why must non-condensable gases be removed from a refrigeration system before charging?

A. They lower the head pressure below normal

B. They improve the heat transfer in the condenser

C. They raise head pressure and reduce capacity and efficiency

D. They increase the refrigerant's net refrigerating effect

28. A technician finds 0.05 megohms insulation resistance from a hermetic compressor winding to ground. This indicates:

A. Excellent winding insulation, safe to operate

B. A grounded or failing winding requiring compressor replacement

C. An open run capacitor only

D. A correctly charged refrigerant system

29. On a parallel rack, floating the suction pressure upward in low-load periods improves efficiency because:

A. It increases the compression ratio for each compressor

B. It forces all cases to overcool simultaneously

C. A higher saturated suction temperature reduces compressor work per unit of cooling

D. It eliminates the need for individual case TXVs

30. A liquid-line solenoid valve buzzes loudly but liquid does not flow when energized. The most probable cause is:

A. The valve is correctly modulating superheat

B. The system is overcharged with refrigerant

C. The condenser fan has failed

D. A stuck or damaged valve plunger/seat

31. The purpose of a discharge-line oil separator is to:

A. Return entrained oil to the compressor crankcase

B. Subcool the liquid refrigerant before the metering device

C. Meter refrigerant into the evaporator coil

D. Remove non-condensable gases from the suction line

32. A technician evacuates a system to 450 microns, isolates the pump, and the reading rises to 3,000 microns then stabilizes. This indicates:

A. Remaining moisture or a small leak releasing into the system

B. A perfect vacuum with no contaminants

C. The compressor windings are grounded

D. An overcharge of refrigerant remains

33. A water-cooled condenser shows rising condensing pressure and a widening approach temperature over several months. The most likely cause is:

A. The refrigerant charge is too low

B. Scale or fouling building up on the water-side tubes

C. An oversized expansion valve

D. Excessive suction superheat

34. Why is the oil-return slope of a horizontal suction line important?

A. A level line increases the refrigerating effect

B. A downward pitch toward the compressor helps oil drain back

C. An upward pitch toward the compressor speeds oil return

D. The slope has no effect on oil movement

35. A heat-reclaim coil installed in the supply ductwork of an air handler recovers:

A. Suction-line cooling for dehumidification

B. Cooling tower water for irrigation use

C. Rejected condenser heat for space heating

D. Compressor noise energy for the building

36. A technician must replace a hermetic compressor after a motor burnout. To protect the new compressor, the system must be:

A. Flushed or cleaned with burnout driers and checked until acid is removed

B. Charged immediately without further treatment

C. Operated at elevated head pressure to clear contaminants

D. Filled with extra mineral oil in the crankcase

37. On an R-404A walk-in freezer, the technician must charge after a complete recovery. The correct procedure is to:

A. Add vapour from the top of the cylinder to save refrigerant

B. Add any compatible single-component refrigerant

C. Charge as liquid by weight to preserve the blend composition

D. Top up with vapour until pressures appear normal

37 note: (continuing)

38. A TXV with a maximum-operating-pressure (MOP) charge protects the system by:

A. Limiting suction pressure during pull-down to prevent motor overload

B. Eliminating the need for superheat measurement

C. Raising condensing pressure in cold weather

D. Increasing the evaporator load at startup

39. A technician observes a steady stream of bubbles in the liquid-line sight glass on a fully running system with correct subcooling readings. The most likely explanation is:

A. The system is correctly charged and operating normally

B. The evaporator is flooded with liquid

C. The compressor is short-cycling on low pressure

D. A loose fitting allowing flash gas, or a low charge despite the reading

40. The primary reason to subcool liquid refrigerant before the metering device is to:

A. Raise the suction superheat at the compressor inlet

B. Increase the discharge-line temperature

C. Prevent flash gas in the liquid line and ensure solid liquid feed

D. Reduce the condenser fan motor amperage

41. A potential relay in a CSCR motor circuit fails to open after startup. The result is:

A. The start capacitor stays in circuit and may overheat and fail

B. The motor will not start at all

C. The run capacitor is removed from the circuit

D. The compressor operates at improved efficiency

42. Why is a liquid-suction heat exchanger used on some systems?

A. It subcools the liquid while superheating the suction gas

B. It increases the condensing pressure for better heat rejection

C. It removes oil from the discharge line

D. It meters refrigerant flow into the evaporator

43. A technician finds a contactor coil energized at 24V but the contacts will not close. The most likely cause is:

A. The refrigerant system is overcharged

B. The metering device is plugged with debris

C. Burned, pitted, or mechanically stuck main contacts

D. The low-pressure control is open

44. Two-stage compression with an intercooler is used in low-temperature applications because it:

A. Eliminates the need for a condenser

B. Lowers the system COP intentionally

C. Increases the evaporator superheat

D. Reduces discharge temperature at high compression ratios

45. A technician must determine if a compressor's run capacitor is good. Using a capacitance meter, a reading well below the rated microfarads means the capacitor is:

A. In perfect operating condition

B. Causing the system to overcharge

C. Weak or failed and should be replaced

D. Providing excessive starting torque

46. The function of a head-pressure control (flooding) valve in cold weather is to:

A. Back liquid up in the condenser to maintain adequate head pressure

B. Lower the condensing temperature below ambient

C. Eliminate the need for the receiver

D. Increase the suction superheat permanently

47. A reach-in cooler with a fixed-orifice metering device performs poorly when slightly overcharged. The orifice cannot compensate because it:

A. Modulates flow automatically with load

B. Maintains constant superheat regardless of charge

C. Is a fixed-bore device with no moving parts

D. Eliminates the need for a filter drier

48. A hot-gas bypass valve is installed on a system to:

A. Increase the system COP at full load

B. Maintain a minimum evaporator load and prevent low-suction cutout

C. Replace the metering device entirely

D. Eliminate the condenser from the circuit

49. A technician measuring superheat needs both a suction-line temperature and a saturation temperature. The saturation temperature is obtained by:

A. Reading the discharge-line thermometer directly

B. Measuring the ambient dry-bulb temperature

C. Converting the suction pressure using a P-T chart for that refrigerant

D. Checking the receiver liquid level

50. A scroll compressor offers an advantage over a reciprocating compressor in that it:

A. Tolerates limited liquid floodback with fewer moving parts

B. Operates entirely without lubricating oil

C. Requires no electrical connection

D. Cannot pump vapour refrigerant at all

51. A technician notes a low-temperature rack where one circuit's EPR (evaporator pressure regulator) sticks closed. That case will:

A. Overcool well below its setpoint

B. Have no change in its operation

C. Receive excess refrigerant and flood

D. Warm up because flow out of its evaporator is blocked

52. Why must recovery cylinders never be filled beyond 80% of their volume with liquid?

A. To allow space for the recovery machine oil

B. To leave room for liquid thermal expansion and prevent rupture

C. To improve the recovery machine's speed

D. To keep the cylinder pressure at atmospheric

53. A condensing unit operates with low suction pressure, low head pressure, and high superheat. The most consistent diagnosis is:

A. An overcharge of refrigerant

B. An undercharge or a liquid-line restriction

C. Non-condensables in the condenser

D. A flooded evaporator coil

54. The purpose of a thermistor or RTD in an electronic refrigeration controller is to:

A. Provide accurate temperature input to the controller

B. Meter refrigerant flow mechanically

C. Replace the compressor contactor function

D. Store liquid refrigerant during pump-down

55. A technician finds a TXV hunting, with superheat swinging between 2°F and 25°F. A common cause is:

A. A perfectly sized valve operating normally

B. Excessive condenser subcooling only

C. A fully closed liquid-line solenoid

D. An oversized valve or poor sensing-bulb contact

56. When silver-brazing a copper joint, the filler metal is drawn into the gap primarily by:

A. Capillary action once the base metal reaches temperature

B. Gravity feeding from above the joint

C. Nitrogen pressure pushing it in

D. Magnetic attraction to the copper

57. A liquid-line filter drier is installed primarily to:

A. Act as a secondary metering device

B. Increase the liquid-line subcooling value

C. Reduce the compressor discharge temperature

D. Remove moisture and filter particulate contaminants

58. A technician finds an air-cooled condenser fan cycling control failed, leaving fans running in 20°F ambient. The likely result is:

A. Excessive head pressure and high amperage

B. Low head pressure causing poor TXV feed

C. A flooded evaporator coil

D. An overcharge of refrigerant

59. Why should a vacuum pump be isolated from the system before it is switched off?

A. To prevent the loss of the system refrigerant charge

B. To stop the compressor from starting prematurely

C. To increase the system superheat

D. To prevent pump oil from being drawn back into the system

60. A multimeter set to capacitance is the preferred method to test a run capacitor because it:

A. Measures the winding insulation resistance

B. Confirms the actual microfarad value against the rating

C. Checks the refrigerant charge level

D. Verifies the compressor's discharge pressure

61. A defrost system that initiates too frequently on a fixed timer will cause:

A. Heavy ice accumulation on the coil

B. Improved overall energy efficiency

C. Reduced refrigeration capacity and wasted energy

D. Permanently elevated evaporator superheat

62. The king valve on a receiver is closed during a pump-down to:

A. Meter refrigerant into the evaporator

B. Relieve excess pressure to atmosphere

C. Separate oil from the liquid refrigerant

D. Trap the refrigerant charge in the receiver

63. A technician measures unequal current draw on the three legs of a three-phase compressor. This condition:

A. Indicates a correctly balanced motor load

B. Improves the motor's running efficiency

C. Suggests voltage imbalance or a winding/connection fault

D. Is caused by an overcharge of refrigerant

64. Why is a balanced-port TXV used on systems with wide head-pressure swings?

A. It eliminates the need for a sensing bulb

B. It reduces the effect of fluctuating liquid-line pressure on the valve

C. It removes the requirement for any superheat

D. It increases the orifice size automatically with load

65. A flooded evaporator differs from a dry-expansion evaporator in that it:

A. Uses only a capillary tube metering device

B. Is kept mostly full of liquid using a level control

C. Operates with very high superheat at the outlet

D. Requires no compressor in the circuit

66. A technician finds the discharge temperature normal but the compressor body unusually cold and sweating. This suggests:

A. Liquid floodback returning to the compressor

B. An undercharge of refrigerant

C. A dirty condenser coil

D. Non-condensables in the system

67. The latent heat of vaporization of a refrigerant decreases as the:

A. Suction superheat increases at the compressor

B. Saturation temperature rises toward the critical point

C. Subcooling increases in the liquid line

D. Oil concentration decreases in the refrigerant

68. A technician sees frost on the suction line all the way back to the compressor on a TXV system. This indicates:

A. The system is undercharged

B. The metering device is starving the coil

C. Low superheat with possible liquid floodback

D. A dirty condenser coil

69. Why must a technician recover refrigerant rather than vent it during service?

A. Venting is prohibited by environmental regulations

B. Venting improves the compressor's efficiency

C. Venting increases the system's refrigerating effect

D. Venting lowers the discharge temperature

70. A technician finds the COP of a system has dropped significantly. The COP is defined as:

A. Discharge pressure divided by suction pressure

B. Condenser capacity divided by evaporator capacity

C. Latent heat divided by sensible heat

D. Refrigerating effect divided by the work input

71. A reversing valve on a heat pump fails to shift from cooling to heating. The pilot solenoid clicks but the valve does not move. The most likely cause is:

A. The indoor blower motor has failed

B. The refrigerant charge is too high

C. Insufficient pressure differential or a stuck slide in the valve

D. The crankcase heater is open

72. Why must the suction header pressure on a parallel rack match the highest evaporating temperature required?

A. To maximize the compressor discharge temperature

B. To eliminate the need for individual case TXVs

C. To satisfy the warmest case without overcooling colder loads inefficiently

D. To increase oil retention in the cases

73. A technician measures a compression ratio of 12:1 on a low-temperature system. This high ratio will:

A. Improve volumetric efficiency significantly

B. Lower the discharge temperature substantially

C. Have no effect on compressor performance

D. Reduce volumetric efficiency and raise discharge temperature

74. A condenser flooding valve maintains head pressure in cold weather by:

A. Increasing the suction superheat permanently

B. Backing liquid up in the condenser to reduce active surface

C. Eliminating the metering device function

D. Lowering condensing temperature below ambient air

75. The purpose of a suction accumulator is to:

A. Increase the discharge pressure during operation

B. Meter refrigerant into the evaporator coil

C. Store the entire system charge during pump-down

D. Hold liquid refrigerant and meter it back slowly to protect the compressor

76. A technician must size replacement refrigerant piping. Undersized suction line will cause:

A. Excessive pressure drop and reduced compressor capacity

B. Improved oil return at all loads

C. Lower discharge temperature than normal

D. Increased subcooling in the liquid line

77. Why is a moisture-indicating sight glass useful after a system repair?

A. It shows the moisture content via a colour-changing element

B. It measures the compressor discharge temperature

C. It indicates the exact refrigerant charge weight

D. It replaces the need for a filter drier

78. A technician finds a defrost heater stuck energized after defrost should have terminated. The case temperature climbs above setpoint. The fault is in the:

A. Liquid-line solenoid valve

B. Low-pressure cutout control

C. Defrost termination thermostat or timer

D. Compressor crankcase heater

79. Why does liquid slugging damage a reciprocating compressor?

A. It improves the volumetric efficiency briefly

B. It lowers the discharge temperature safely

C. It increases the oil pressure within limits

D. Liquid is incompressible and can break valves or rods

80. A technician must verify the operating superheat on a fixed-orifice air conditioner. The target superheat is determined by:

A. The compressor nameplate amperage

B. The receiver liquid level reading

C. A charging chart using indoor wet-bulb and outdoor dry-bulb

D. The discharge pressure value alone

81. The function of an evaporator pressure regulator (EPR) is to:

A. Lower the suction pressure to the coldest case on the rack

B. Increase the compressor discharge pressure

C. Replace the metering device on a single circuit

D. Maintain a minimum pressure/temperature in a higher-temp evaporator

82. A technician finds non-condensables suspected in a condenser. The classic confirmation is:

A. The suction pressure reads lower than normal

B. The condensing pressure is higher than the P-T chart predicts for the liquid temperature

C. The evaporator superheat is unusually low

D. The compressor amperage drops below nameplate

83. Why is POE oil used with HFC refrigerants instead of mineral oil?

A. POE oil lowers the refrigerant's condensing pressure

B. POE oil is miscible with HFCs, ensuring proper oil return

C. POE oil eliminates the need for an oil separator

D. POE oil repels moisture and never needs a drier

84. A technician finds the high-pressure control on a system is a manual-reset (lockout) type. This is designed to:

A. Force technician inspection after a serious high-pressure trip

B. Automatically restart after each high-pressure event

C. Increase the system head pressure

D. Bypass the safety circuit entirely

85. A reciprocating compressor's volumetric efficiency is reduced primarily by:

A. A high compression ratio re-expanding the clearance gas

B. A low compression ratio reducing clearance volume

C. Excessive subcooling in the liquid line

D. A low ambient temperature at the condenser

86. A technician applies an electronic leak detector and gets no reading at a suspected joint, but soap bubbles confirm a leak. The likely reason the detector missed it is:

A. The system was overcharged with refrigerant

B. The leak detector improves with higher head pressure

C. The probe was moved too fast or above the leak instead of below it

D. Refrigerant is lighter than air and rose away from the probe

87. Why is a desuperheater (heat-reclaim) coil placed in the discharge line rather than the suction line?

A. The suction line carries the highest temperature gas

B. The liquid line has more heat available than the discharge

C. The evaporator outlet is the hottest point in the cycle

D. The discharge gas is the hottest point and carries the most reclaimable heat

88. A technician finds 5°F superheat and a cold, sweating suction line on a TXV system. The valve is most likely:

A. Starving the evaporator with high superheat

B. Operating with correct superheat and normal feed

C. Overfeeding the evaporator with too little superheat

D. Closed due to a lost bulb charge

89. The advantage of a brazed-plate heat exchanger in a chiller is its:

A. Requirement for a very large refrigerant charge

B. Lower heat-transfer efficiency than shell-and-tube

C. Inability to handle water-side flow

D. Compact size and high heat-transfer with a low charge

90. A technician must determine why a TXV bulb has lost its sensing charge. With no bulb pressure, the valve will:

A. Close and starve the evaporator due to no opening force

B. Open fully and flood the compressor

C. Modulate normally with no change

D. Increase the condensing pressure significantly

91. A water-cooled condenser using a cooling tower rejects heat primarily through:

A. Evaporation of a fraction of the circulating water

B. Conduction into the tower frame structure

C. Radiation to the surrounding air

D. Compression of the entering air stream

92. A technician finds an oil separator failing to return oil to a single compressor. The result over time is:

A. Increased subcooling in the liquid line

B. Lower discharge temperature than normal

C. Oil starvation and possible compressor bearing failure

D. A reduction in the system's head pressure

93. Why is the wet-bulb temperature always equal to or lower than the dry-bulb temperature?

A. Wet-bulb readings ignore humidity entirely

B. Evaporative cooling at the wet wick lowers the reading below dry-bulb

C. The wet-bulb measures only the refrigerant temperature

D. Dry-bulb readings include latent heat that wet-bulb excludes

94. A technician finds a compressor drawing locked-rotor amperage and not turning. The most likely cause is:

A. The compressor is running normally under light load

B. The system is correctly charged and operating

C. A seized compressor or a stuck contactor holding it

D. An open low-pressure control only

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

A. Increase the discharge pressure for heat rejection

B. Subcool the liquid refrigerant after the condenser

C. Filter moisture from the returning suction gas

D. Reduce gas pulsation noise from the compressor

96. A technician finds the net refrigerating effect of a system has dropped. Net refrigerating effect is:

A. The total heat rejected at the condenser per pound

B. The compressor work input per pound circulated

C. The latent heat available at the critical point

D. The heat absorbed in the evaporator per pound of refrigerant

97. A technician must protect a system during off-cycles in a humid climate where refrigerant migrates to the compressor. The correct device is a:

A. Liquid-line filter drier

B. Crankcase heater to keep oil warm and drive off refrigerant

C. Hot-gas bypass valve

D. Discharge-line oil separator

98. Why is a pump-down cycle used before shutting a compressor off?

A. It increases the system charge before shutdown

B. It draws refrigerant into the receiver/condenser, keeping liquid off the compressor

C. It removes all oil from the crankcase

D. It reverses the cycle to heat the conditioned space

99. A technician finds an undersized expansion valve cannot pass enough refrigerant at full load. The evaporator will be:

A. Flooded with liquid at low superheat

B. Overcharged with excess refrigerant

C. Operating with excessive subcooling

D. Underfed, running high superheat at peak demand

100. The purpose of an external equalizer line on a TXV is to:

A. Increase the condensing pressure during operation

B. Meter additional refrigerant into the receiver

C. Separate oil from the suction gas stream

D. Sense evaporator outlet pressure for accurate superheat control

101. A technician finds the liquid-line solenoid failed closed on a system. The compressor will:

A. Flood the evaporator with excess liquid refrigerant

B. Pump down and cut out on the low-pressure control

C. Short-cycle continuously on high pressure

D. Increase the condenser subcooling only

102. Why does subcooling increase the system's refrigerating effect?

A. Colder liquid entering the evaporator absorbs more heat per pound

B. It raises the suction superheat at the compressor

C. It increases the discharge temperature for heat rejection

D. It reduces the compressor amperage to zero

103. A technician must terminate a defrost cycle based on actual coil condition rather than a clock. This requires:

A. A demand/adaptive defrost control with a coil sensor

B. A larger fixed-timer interval setting

C. A manual-reset high-pressure control

D. An oversized liquid-line filter drier

104. A scroll compressor running in reverse after a phase swap produces:

A. Improved efficiency and smoother operation

B. Excessive condenser subcooling

C. Loud noise with little or no pressure differential

D. A rapid rise in both suction and discharge pressures

105. The maximum allowable working pressure (MAWP) stamped on a vessel indicates:

A. The recommended operating suction pressure value

B. The compressor discharge superheat target

C. The required evacuation micron level

D. The pressure the vessel is rated to safely contain

106. A technician finds heavy frost on an evaporator with normal airflow and a properly cycling defrost timer, but ice persists. The defrost heaters test good. The next check should be the:

A. Compressor run capacitor value

B. Condenser fan motor rotation direction

C. Liquid-line subcooling reading

D. Defrost termination thermostat that ends the cycle early

107. Why must dry nitrogen be flowed through tubing during brazing?

A. It increases the joint temperature for faster work

B. It prevents internal copper-oxide scale from forming

C. It adds moisture for later leak detection

D. It pressurizes the system to operating conditions

108. A technician finds a refrigerant blend has fractionated after a vapour leak. The required action is to:

A. Top up with vapour from the cylinder

B. Add a single-component refrigerant to compensate

C. Continue operating if pressures seem acceptable

D. Recover the charge and recharge with virgin blend by weight

109. A heat pump's liquid-line check valves are installed to:

A. Meter refrigerant continuously in both modes

B. Increase the suction superheat in heating mode

C. Separate oil from the discharge gas

D. Direct flow through the correct metering device for each mode

110. A technician finds high head pressure and high amperage with a clean, well-ventilated condenser. The most likely cause is:

A. An overcharge or non-condensables in the condenser

B. A low refrigerant charge starving the system

C. Excessive evaporator superheat from a restriction

D. An open run capacitor on the compressor

111. Why is a low-ambient (winter) head-pressure control needed on outdoor air-cooled systems?

A. To increase the suction superheat in summer

B. To maintain enough head pressure for proper TXV liquid feed in cold weather

C. To lower the condensing temperature below the ambient air

D. To eliminate the receiver from the circuit

112. A technician must select a metering device that modulates with load and maintains superheat. The correct choice is a:

A. Thermostatic or electronic expansion valve

B. Fixed-orifice capillary tube

C. Hand expansion valve set manually

D. Liquid-line solenoid valve

113. The function of an oil-pressure safety switch is to:

A. Increase the compression ratio at startup

B. Stop the compressor when net oil pressure falls too low

C. Warm the suction gas entering the cylinders

D. Defrost the evaporator coil during the cycle

114. A technician finds a system with flash gas in the liquid line despite adequate charge. The most likely cause is:

A. A pressure drop or insufficient subcooling boiling the liquid

B. Excessive subcooling at the condenser outlet

C. An oversized liquid receiver

D. Too much superheat at the evaporator outlet

115. Why is a two-stage compression system more efficient than single-stage at very low evaporating temperatures?

A. It eliminates the need for any lubricating oil

B. It removes the requirement for a metering device

C. It increases the evaporator superheat substantially

D. It reduces the per-stage compression ratio and discharge temperature

116. A technician must determine condenser approach temperature. Approach is defined as the difference between:

A. Condensing temperature and the entering cooling-medium temperature

B. Suction saturation temperature and the ambient air

C. Discharge-line temperature and the liquid-line temperature

D. Evaporator superheat and the suction saturation temperature

117. A technician finds an overcharged TXV system. The classic symptoms are:

A. Low head pressure and low liquid subcooling

B. High evaporator superheat and a starved coil

C. Reduced condenser subcooling with bubbles

D. High head pressure and high liquid subcooling

118. Why must a technician keep refrigerant lines capped during installation?

A. To prevent moisture and contaminants from entering the tubing

B. To increase the system's refrigerating effect

C. To lower the latent heat of the refrigerant

D. To raise the compression ratio at startup

119. A technician finds a compressor cycling on the low-pressure control with a clean coil and normal load. The most likely cause is:

A. Excessive condenser subcooling

B. A low refrigerant charge or liquid-line restriction

C. A flooded evaporator coil

D. An oversized metering device

120. The purpose of staging compressors on a parallel rack is to:

A. Increase the discharge superheat at all times

B. Maintain a single fixed suction pressure regardless of load

C. Eliminate the need for any oil management

D. Match system capacity to the actual load for better efficiency

121. A technician finds a TXV underfeeding the evaporator with high superheat after a plugged external equalizer. The valve underfeeds because:

A. It senses a false high pressure reference and throttles closed

B. The bulb charge has migrated to the equalizer line

C. The condenser subcooling has increased too much

D. The receiver liquid level has dropped below the king valve

122. Why must a flammable refrigerant (A2L) installation follow specific charge-limit and ventilation rules?

A. A2L refrigerants have no ozone-depletion potential

B. A2L refrigerants improve compressor lubrication

C. A2L refrigerants raise the system's condensing pressure

D. A2L refrigerants can ignite, so charge size and ventilation limit risk

123. A technician must protect a TXV sensing bulb during a brazing repair near the suction line. The bulb is heat-sensitive because:

A. It contains liquid refrigerant for the evaporator feed

B. Its internal charge pressure controls valve opening and excess heat alters it

C. It stores oil for compressor lubrication

D. It meters refrigerant directly into the coil

124. A technician finds the suction line sweating heavily and superheat near zero on a fixed-orifice system. The system is most likely:

A. Overcharged, flooding the evaporator

B. Undercharged with high superheat

C. Operating with a dirty condenser coil

D. Restricted at the liquid-line filter drier

125. Why is recovering liquid first (push-pull) faster than vapour recovery on a large system?

A. Moving liquid directly transfers far more refrigerant mass per minute

B. Vapour recovery removes oil more effectively

C. Liquid recovery vents non-condensables to atmosphere

D. Vapour recovery requires no recovery cylinder

Practice Exam 29: Answer Key and Explanations

1. C — Burned-out (open) defrost heater elements cannot melt frost, so the coil stays iced over even though the timer advances on schedule. With airflow blocked by frost, the coil cannot absorb heat and the box runs warm; replacing the open elements restores defrost.

2 B — On a standard R-410A P-T chart, 118 psig corresponds to a saturation temperature of approximately 40°F. Converting suction pressure to saturation temperature establishes the actual evaporating condition, which is the foundation for calculating superheat and diagnosing system performance.

3. C — High suction pressure with very low superheat means liquid is reaching the evaporator outlet, the classic sign of an overfeeding metering device. The flooded coil cannot fully boil the refrigerant, so capacity drops and the box won't reach temperature.

4. D — Mineral oil and POE do not blend predictably, and the mixture impairs oil circulation and return to the compressor. Poor oil return starves the bearings and can cause lubrication failure, so the oils must never be intermixed.

5. A — Zero current on one leg of a three-phase compressor indicates an open circuit on that phase, such as an open winding or a blown fuse. The motor cannot run properly on two phases and will draw high current or trip on the remaining legs.

6. C — A receiver stores liquid refrigerant and absorbs charge fluctuations between varying load conditions and pump-down. This ensures a steady, solid liquid supply to the TXV regardless of operating swings.

7. B — An empty oil-level control on one rack compressor while others run normally points to a fault in that compressor's oil supply line or float valve. Restoring oil flow to the float reservoir corrects the low-oil trip before bearing damage occurs.

8. B — A pressure-relief device must be set to relieve at or below the vessel's rated pressure to protect against overpressure rupture. Relieving before the vessel limit is reached prevents catastrophic failure, which is why the setting is code-mandated.

9. C — A demand-defrost control relies on the coil temperature sensor to call for defrost; a failed or miscalibrated sensor never signals frost, so defrost never starts. The coil ices up and heating capacity collapses until the sensor is replaced.

10. B — A high temperature split means the small amount of air passing the coil over-cools, which signals low airflow from a dirty filter or restriction. Reduced airflow lowers capacity and can cause coil icing if not corrected.

11. B — Brazing heat can alter or destroy the TXV bulb's internal charge, so the bulb should be removed or shielded and protected with a wet-rag heat sink. Protecting the bulb preserves accurate superheat sensing after the repair.

12. D — An electronic expansion valve uses a controller and stepper motor for faster, more precise superheat control across a wide load range. This tighter regulation improves part-load performance on low-temperature racks compared with a mechanical TXV.

13. B — With a clean condenser and working fans, high-side short-cycling points to an overcharge or non-condensables raising head pressure. Excess liquid or trapped gas elevates condensing pressure until the high-pressure control trips.

14. C — The push-pull method uses a pressure differential to move liquid refrigerant directly, which is far faster than vapour recovery on large charges. Transferring liquid in bulk dramatically shortens recovery time on big systems.

15. C — High discharge temperature with high superheat and normal pressures shows the evaporator is underfed, returning hot, highly superheated gas. The compressor compresses already-hot vapour, driving discharge temperature up and stressing the oil.

16. A — Nitrogen is inert and will not react with refrigerant oil, whereas oxygen or compressed air can form an explosive mixture under pressure. Using dry nitrogen makes pressure testing and brazing purges safe.

17. B — When chilled-water flow stops, the evaporator loses its heat source, so refrigerant stops boiling and suction pressure falls until the low-pressure control trips. The cutout protects the chiller from running without load and freezing the tubes.

18. D — A suction accumulator catches liquid refrigerant and meters it back slowly so it cannot slug the compressor. This protection is critical in heat pumps during defrost and reversing-valve mode changes when liquid floodback is common.

19. C — A 250°F discharge-line temperature is excessive and indicates a high compression ratio or high return-gas superheat. Sustained high discharge temperature breaks down oil and damages valves, so the root cause must be found.

20. D — The gas-cylinder pictogram identifies a compressed gas, and the flame pictogram identifies a flammable hazard, so together they mark a flammable compressed gas. Recognizing both pictograms tells the technician to control ignition sources and ventilation.

21. B — Low suction, high superheat, and frost only at the evaporator inlet indicate a partial restriction at the capillary tube or drier. The restriction starves the coil downstream, so only the inlet gets cold while the rest stays warm.

22. C — Insulating the suction line prevents heat gain into the cold vapour and stops condensation from forming and dripping off the line. This preserves capacity and protects against water damage and corrosion.

23. B — Subcooling is found by comparing liquid-line temperature to the saturation temperature corresponding to condensing pressure. On a TXV/receiver system, subcooling is the reliable charging indicator because the receiver masks superheat.

24. C — A scroll that makes loud noise and develops no pressure differential after service was almost certainly wired with reversed phases, rotating it backward. Swapping two supply legs restores correct rotation before the compressor overheats.

25. A — A crankcase pressure regulator limits suction pressure entering the compressor during high-load pull-down to prevent motor overload. By capping suction pressure, it protects the motor when the box is warm and the load is heavy.

26. C — Evaporator fans running during defrost and blowing warm air indicate a failed fan-delay control or relay. The fan delay should keep fans off until the coil re-cools, so a fault here spreads heat into the box.

27. C — Non-condensable gases add their partial pressure and blanket condenser surface, raising head pressure and cutting capacity and efficiency. Removing them by proper evacuation restores normal high-side operation.

28. B — An insulation resistance of 0.05 megohms is far below acceptable and indicates a grounded or failing winding. Such a low reading warns the hermetic motor is breaking down and the compressor needs replacement.

29. C — Floating suction pressure upward raises the saturated suction temperature, which reduces the compression ratio and the work needed per unit of cooling. This lowers compressor energy use during low-load periods while still meeting demand.

30. D — A solenoid that buzzes but passes no liquid has a stuck or damaged plunger/seat preventing the valve from opening. The coil is energized, but the mechanical valve element fails to lift, blocking liquid feed.

31. A — A discharge-line oil separator captures entrained oil and returns it to the crankcase, keeping circulating oil low. This protects the compressor from oil loss and prevents oil logging in the evaporator.

32. A — A vacuum that rises and then stabilizes after isolating the pump indicates remaining moisture boiling off or off-gassing, not a through leak (which would rise continuously). The stabilized rise signals the system needs further dehydration.

33. B — A rising condensing pressure with a widening approach over time signals scale or fouling insulating the water-side tubes. Poor heat transfer forces condensing temperature and pressure up until the tubes are cleaned.

34. B — Horizontal suction lines should pitch downward toward the compressor so oil drains back with the returning vapour. Proper slope prevents oil from pooling and keeps the compressor lubricated.

35. C — A heat-reclaim coil in the supply duct captures rejected condenser heat and uses it for space heating. This recovers energy that would otherwise be wasted at the condenser, improving overall efficiency.

36. A — After a motor burnout, the system must be cleaned with burnout (suction- and liquid-line) driers and checked until acid is removed before the new compressor runs. Residual acid will quickly destroy the replacement, so acid removal is essential.

37. C — R-404A is a zeotropic blend, so it must be charged as liquid by weight to preserve the proportions of its components. Charging as vapour would fractionate the blend and degrade performance.

38. A — A TXV with an MOP charge limits suction pressure during pull-down so the compressor motor is not overloaded by high-density return gas. The valve throttles to cap the load until the box temperature drops.

39. D — A steady bubble stream in the sight glass usually means flash gas from a loose fitting or low charge, even if a single subcooling reading looks acceptable. Continuous bubbles indicate the liquid line is not fully solid and warrants investigation.

40. C — Subcooling keeps the liquid below saturation so it stays fully liquid despite line pressure drops, preventing flash gas before the metering device. Solid liquid feed ensures the metering device delivers full rated capacity.

41. A — If the potential relay fails to open, the start capacitor stays energized after startup and overheats, eventually failing. The relay must drop the start capacitor out once the motor reaches speed to protect it.

42. A — A liquid-suction heat exchanger subcools the liquid line while superheating the suction gas. This raises refrigerating effect and helps ensure dry vapour returns to the compressor.

43. C — A contactor coil energized at 24V with contacts that won't close points to burned, pitted, or mechanically stuck main contacts. Damaged contacts interrupt power to the load despite a healthy coil.

44. D — Two-stage compression with an intercooler reduces discharge temperature at the high compression ratios of low-temperature work. Lower discharge temperatures protect the oil and improve efficiency.

45. C — A capacitance reading well below the rated microfarads means the run capacitor is weak or failed and should be replaced. A degraded capacitor reduces motor torque and running efficiency.

46. A — A head-pressure flooding valve backs liquid up in the condenser during cold weather to maintain adequate head pressure. Sufficient head pressure preserves the differential the TXV needs to feed liquid.

47. C — A fixed-orifice device is a fixed-bore component with no moving parts, so it cannot compensate for an overcharge. The system depends entirely on a precise charge for correct operation.

48. B — A hot-gas bypass valve adds artificial load to the evaporator to maintain a minimum suction pressure at light load. This prevents nuisance low-suction cutouts when actual demand drops very low.

49. C — Saturation temperature for superheat is obtained by converting the measured suction pressure using a P-T chart for that specific refrigerant. The difference between actual line temperature and saturation temperature is the operating superheat.

50. A — Scroll compressors have fewer moving parts and tolerate limited liquid floodback better than reciprocating units. This makes them quieter and more durable in many applications.

51. D — If an EPR sticks closed, refrigerant cannot leave that evaporator, so the case warms up despite the system running. The blocked outlet stops heat removal from that circuit until the regulator is freed.

52. B — Recovery cylinders must not exceed 80% liquid fill to leave room for thermal expansion of the liquid. Overfilling risks hydrostatic rupture as temperature rises, a serious safety hazard.

53. B — Low suction, low head, and high superheat together indicate an undercharge or a liquid-line restriction. Too little refrigerant reaches the evaporator, so all pressures fall and superheat climbs.

54. A — A thermistor or RTD provides an accurate temperature input to the electronic controller. Precise sensing enables tight control of superheat, defrost, and case temperatures.

55. D — Hunting superheat that swings widely is commonly caused by an oversized valve or poor sensing-bulb contact. The valve over- and under-feeds because it cannot stabilize, degrading evaporator control.

56. A — Brazing filler is drawn into the joint gap by capillary action once the base metal reaches proper temperature. A correctly sized gap and clean surfaces are essential for full penetration.

57. D — A liquid-line filter drier removes moisture and filters particulate contaminants. Keeping the system dry and clean prevents acid formation and protects the metering device from plugging.

58. B — Condenser fans running in cold ambient drive head pressure too low, so the TXV loses the differential needed to feed liquid. Low-ambient head-pressure control is required to maintain proper feed in winter.

59. D — If the pump is shut off while still connected under vacuum, its oil can be drawn backward into the evacuated system. Isolating the pump first prevents oil contamination of the clean system.

60. B — A capacitance meter confirms the run capacitor's actual microfarad value against its rating. This directly identifies a weak or failed capacitor that would reduce motor performance.

61. C — Defrosting too often adds heat to the case and reduces net refrigeration time, wasting energy. Excess defrost cycles cut effective capacity without improving frost control.

62. D — Closing the king valve during pump-down traps the refrigerant charge in the receiver while downstream work proceeds. This isolates the liquid so the system can be opened safely.

63. C — Unequal current draw on a three-phase compressor suggests a voltage imbalance or a winding/connection fault. Current imbalance causes overheating and shortens motor life, so it must be diagnosed.

64. B — A balanced-port TXV reduces the influence of fluctuating liquid-line pressure on valve position, giving steadier control. This improves performance on systems with wide head-pressure swings.

65. B — A flooded evaporator is kept mostly full of liquid using a level-control device, unlike a dry-expansion coil that maintains superheat. Flooded designs offer high heat-transfer efficiency in large chillers.

66. A — A cold, sweating compressor body with otherwise normal readings indicates liquid floodback returning to the compressor. Liquid entering the crankcase dilutes oil and can mechanically damage the compressor.

67. B — Latent heat of vaporization decreases as saturation temperature rises toward the critical point, where it reaches zero. Operating closer to the critical point reduces refrigerating effect per pound.

68. C — Frost on the suction line all the way to the compressor indicates low superheat and possible liquid floodback. Liquid leaving the evaporator threatens the compressor, so the overfeeding condition must be corrected.

69. A — Venting refrigerant is prohibited by environmental regulations, so it must be recovered during service. Recovery prevents atmospheric release that harms the ozone layer and climate.

70. D — COP is the ratio of useful refrigerating effect to the work input required to produce it. A higher COP means more cooling delivered per unit of energy consumed.

71. C — A reversing valve whose pilot clicks but won't shift usually lacks sufficient pressure differential or has a stuck internal slide. Without adequate differential or a free slide, the valve cannot complete the changeover.

72. C — Suction header pressure is set to satisfy the warmest case so colder loads are not overcooled inefficiently. Matching to the highest required evaporating temperature balances demand with energy use.

73. D — A 12:1 compression ratio reduces volumetric efficiency by re-expanding more clearance gas and raises discharge temperature. High ratios cut capacity and stress the compressor and oil.

74. B — A condenser flooding valve backs liquid up in the condenser, reducing active heat-transfer surface to hold head pressure in cold weather. Adequate head pressure preserves the differential the TXV needs.

75. D — A suction accumulator holds liquid refrigerant and meters it back slowly to protect the compressor from slugging. This is vital during defrost recovery and rapid load changes.

76. A — An undersized suction line creates excessive pressure drop, reducing the density of returning gas and the compressor's pumping capacity. Lost capacity and poor performance result from the added line losses.

77. B — A moisture-indicating sight glass uses a colour-changing element to show the system's moisture content after repair. The colour confirms whether the system is dry enough to operate safely.

78. C — A defrost heater stuck energized past termination points to a failed defrost termination thermostat or timer. The continued heat drives case temperature above setpoint and can spoil product.

79. D — Liquid is incompressible, so slugging forces it into the cylinders and can break valves or connecting rods. The sudden hydraulic load damages compressor components instantly.

80. C — Fixed-orifice charging uses a charging chart based on indoor wet-bulb and outdoor dry-bulb conditions to set target superheat. These conditions determine the correct charge because the orifice cannot self-adjust.

81. D — An evaporator pressure regulator maintains a minimum pressure (and temperature) in a higher-temperature evaporator on a shared suction. This keeps that case from overcooling while colder loads pull suction down.

82. B — Non-condensables are confirmed when condensing pressure reads higher than the P-T chart predicts for the measured liquid temperature. The extra partial pressure of trapped gas accounts for the discrepancy.

83. B — POE oil is miscible with HFC refrigerants, so it travels with the suction vapour and returns to the compressor. Proper oil return protects the compressor, which mineral oil cannot ensure with HFCs.

84. A — A manual-reset high-pressure lockout forces a technician to inspect the system after a serious high-pressure trip. Requiring manual reset prevents dangerous repeated cycling and ensures the fault is investigated.

85. A — Volumetric efficiency falls as compression ratio rises because more re-expanding clearance gas reduces the cylinder's effective intake. Higher ratios mean less fresh vapour pumped per stroke and lower capacity.

86. C — Because refrigerant is heavier than air, a detector probe moved too fast or held above the leak misses the gas settling below. Moving slowly along the underside of joints is required for reliable detection.

87. D — The discharge gas is the hottest point in the cycle, so a desuperheater coil placed there captures the most reclaimable heat. Locating it on the discharge line maximizes recovered energy.

88. C — Low superheat (5°F) with a cold, sweating suction line indicates the TXV is overfeeding the evaporator. Excess liquid leaving the coil threatens floodback and compressor damage.

89. D — Brazed-plate heat exchangers are compact and highly efficient and operate with a low refrigerant charge. Their high surface-area-to-volume ratio makes them effective in modern chillers.

90. A — A TXV bulb that loses its charge has no opening force, so the valve closes and starves the evaporator. Without bulb pressure, the spring holds the valve shut and refrigerant feed stops.

91. A — A cooling tower rejects heat primarily by evaporating a fraction of the circulating water, carrying away large amounts of latent heat. This evaporative cooling lets the water-cooled condenser run at lower temperatures than dry air-cooled designs.

92. C — A failing oil separator that won't return oil to a compressor leads to oil starvation and bearing failure over time. Loss of lubrication is the leading cause of compressor mechanical failure.

93. B — The wet-bulb temperature is lower than dry-bulb because evaporation at the wet wick removes heat and lowers the reading. They are equal only at 100% relative humidity when no evaporation can occur.

94. C — A compressor drawing locked-rotor amperage without turning is mechanically seized or held by a stuck contactor. The motor cannot rotate, so it draws full inrush current without starting.

95. D — A discharge muffler dampens the pressure pulsations created by the compressor's pumping action. Reducing these pulsations lowers noise and vibration in the discharge line.

96. D — Net refrigerating effect is the heat absorbed in the evaporator per pound of refrigerant circulated. It directly determines the refrigerant flow needed to meet a given cooling load.

97. B — A crankcase heater keeps the oil warm during off-cycles so migrating refrigerant does not condense into and dilute the oil. This prevents foaming and slugging at startup in humid climates.

98. B — A pump-down draws refrigerant into the receiver/condenser by closing the liquid solenoid while the compressor runs, keeping liquid off the compressor. Storing the charge on the high side protects the compressor during the off-cycle.

99. D — An undersized expansion valve cannot pass enough refrigerant at full load, so the evaporator is underfed and runs high superheat. Capacity falls at peak demand because the valve restricts flow below the load.

100. D — An external equalizer senses evaporator outlet pressure so the TXV controls superheat accurately despite coil pressure drop. This corrects for pressure loss across the evaporator that would otherwise skew superheat.

101. B — If the liquid-line solenoid fails closed, no refrigerant reaches the evaporator and the low side falls until the compressor cuts out on low pressure. The blocked feed mimics a pump-down condition.

102. A — Subcooling delivers colder liquid to the evaporator, so each pound absorbs more heat, raising the refrigerating effect. More heat absorbed per unit mass increases system capacity.

103. A — Terminating defrost on actual coil condition rather than a clock requires a demand/adaptive defrost control with a coil sensor. This avoids unnecessary defrosts and improves efficiency.

104. C — A scroll running in reverse after a phase swap produces loud noise with little or no pressure differential. Reverse rotation cannot pump properly and must be corrected by swapping two supply legs.

105. D — The maximum allowable working pressure is the pressure the vessel is rated to safely contain. Exceeding it risks rupture, so it sets a hard safety limit for the component.

106. D — With good heaters, normal airflow, and a cycling timer but persistent ice, the defrost termination thermostat may be ending the cycle too early before the coil clears. Checking the termination control identifies why defrost is cut short.

107. B — Flowing dry nitrogen during brazing prevents oxygen from forming internal copper-oxide scale. This scale would otherwise flake off and plug metering devices and driers.

108. D — A fractionated blend must be recovered and recharged with virgin blend by weight to restore the correct composition. Topping up with vapour or a single component would not correct the blend proportions.

109. D — Heat-pump liquid-line check valves direct refrigerant through the correct metering device for each mode. They ensure proper flow direction as the system switches between heating and cooling.

110. A — High head pressure and high amperage with a clean, ventilated condenser point to an overcharge or non-condensables. Excess liquid or trapped gas elevates condensing pressure and compressor current.

111. B — Low-ambient head-pressure control maintains enough head pressure for proper TXV liquid feed in cold weather. Without it, head pressure falls too low and the valve cannot feed the evaporator.

112. A — A thermostatic or electronic expansion valve modulates flow with load while maintaining superheat. These devices adjust to changing conditions, unlike fixed-orifice or manual valves.

113. B — An oil-pressure safety switch stops the compressor when net oil pressure falls too low to lubricate. Loss of lubrication causes rapid bearing damage, so this control is essential protection.

114. A — Flash gas with adequate charge is caused by a pressure drop or insufficient subcooling boiling the liquid in the line. The vapour bubbles reduce metering-device feed and starve the evaporator.

115. D — Two-stage compression reduces the per-stage compression ratio and discharge temperature at very low evaporating temperatures. Lower ratios and temperatures improve efficiency and protect the compressor and oil.

116. A — Condenser approach is the difference between condensing temperature and the entering cooling-medium temperature. A widening approach signals fouling or reduced heat-transfer performance.

117. D — An overcharged TXV system shows high head pressure and high liquid subcooling as excess refrigerant backs up in the condenser. The flooded condenser raises both readings together.

118. A — Capping refrigerant lines during installation keeps moisture and contaminants out of the tubing. A clean, dry interior prevents acid formation, restrictions, and metering-device fouling.

119. B — Low-pressure cycling with a clean coil and normal load indicates a low charge or a liquid-line restriction. Reduced refrigerant feed drops suction pressure until the control cuts out.

120. D — Staging compressors on a parallel rack matches system capacity to the actual load, improving part-load efficiency. Running only the compressors needed avoids wasteful cycling.

121. A — A plugged external equalizer makes the TXV sense a false high pressure reference, so it reads excess superheat and throttles closed. The starved evaporator runs high superheat until the equalizer is cleared.

122. D — A2L refrigerants are mildly flammable, so charge-limit and ventilation rules limit the risk of an ignitable concentration. Following these rules keeps any potential leak below flammable limits.

123. B — The TXV bulb's internal charge pressure controls valve opening, and excess brazing heat alters that charge and the valve's calibration. Protecting the bulb preserves accurate superheat control after the repair.

124. A — A heavily sweating suction line with near-zero superheat on a fixed-orifice system indicates an overcharge flooding the evaporator. Excess refrigerant cannot be stored, so it backs into the low side toward the compressor.

125. A — Recovering liquid first with the push-pull method transfers far more refrigerant mass per minute than vapour recovery. Moving liquid in bulk dramatically shortens recovery time on large systems.