PRACTICE EXAM 32: RACM RED SEAL SIMULATION (125 QUESTIONS)

1. A technician smells a sharp, pungent odour in a machinery room housing an ammonia system. What is the correct first action?

A. Continue working while monitoring the odour level closely

B. Open the refrigerant cylinder valve to compare the smell

C. Evacuate the area and activate the room ventilation system

D. Apply soap solution to the nearest fitting to find the leak

2. Two slings share a load at unequal angles. The leg at the steeper angle to horizontal carries:

A. Less tension because it is more vertical

B. More tension because it is more vertical

C. Equal tension regardless of the angle

D. No tension until the other leg fails first

3. Before energizing a circuit after lockout removal, the technician must ensure:

A. The lock colour matches the company colour code

B. The nameplate voltage is recorded on the work order

C. All guards are replaced and personnel are clear

D. The breaker is labelled with the installation date

4. A neutral oxy-acetylene flame is identified by:

A. A long feathery secondary cone with soot

B. A sharp blue inner cone and a small flame

C. A loud hissing flame with excess oxygen

D. A well-defined inner cone with no acetylene feather

5. A WHMIS workplace label is required when a product is:

A. Received in the original supplier container unopened

B. Decanted into a different container in the workplace

C. Stored on a shelf in its sealed original package

D. Used immediately and fully within the same hour

6. A technician must communicate a hazard found mid-job to other trades on site. The most effective method is to:

A. Note it privately and address it at the end of the shift

B. Inform the affected workers and supervisor promptly

C. Assume the next shift will discover the hazard

D. Leave a written note in the site office mailbox

7. A micron gauge is used during evacuation because it can measure:

A. The mass of refrigerant in the low side

B. The superheat at the evaporator outlet

C. The winding resistance of the compressor

D. Deep vacuum levels in microns of mercury

8. When grinding metal, the most appropriate eye and face protection is:

A. Tinted welding goggles shade 10 only

B. A dust mask with standard safety glasses

C. A face shield worn over safety glasses

D. Clear glasses alone with no face shield

9. A technician organizes parts and tools before a service call primarily to:

A. Reduce wasted trips and improve job efficiency

B. Increase the refrigerant charge for the system

C. Set the colour coding of the control wiring

D. Determine the equipment's resale value later

10. A cylinder of acetylene must always be used and stored:

A. Lying horizontally to maximize gas withdrawal

B. Upright to prevent liquid acetone withdrawal

C. Inverted to draw liquid for faster brazing

D. At any angle since pressure is self-regulating

11. A technician mentoring an apprentice on recovery should first:

A. Demonstrate the correct procedure, then supervise practice

B. Have the apprentice work alone from a manual

C. Complete the task quickly to stay on schedule

D. Show a video and assume the skill is learned

12. The primary reason to consult a refrigerant SDS before handling an unfamiliar product is to learn its:

A. Resale value and market availability

B. Hazards, PPE, and safe handling requirements

C. Colour code for the storage cylinder

D. Compatibility with the building's paint finish

13. A torch flashback arrestor is installed to:

A. Increase the fuel gas flow to the torch tip

B. Regulate the oxygen pressure to the torch

C. Prevent flame from traveling back into the hoses

D. Cool the brazed joint after the work is finished

14. A brazed joint fails a leak test and shows a pinhole at the fitting edge. The most likely cause during brazing was:

A. Insufficient heat preventing full filler penetration

B. Too much nitrogen flow cooling the joint

C. Excessive flux applied to the inside of the tube

D. The tube was reamed before the joint was made

15. When brazing a horizontal joint, the technician heats the fitting and tube evenly because uneven heating causes:

A. The flux to harden faster and seal the gap

B. The nitrogen purge to reverse direction

C. The filler to bond more strongly to one side

D. The filler to flow toward the hotter side only

16. A swaged joint is to be brazed. The depth of the swage should approximately equal:

A. One-quarter of the tube diameter for clearance

B. The tube wall thickness, just enough to seat

C. Three tube diameters for maximum strength

D. One tube diameter for adequate overlap

17. A technician deburrs a freshly cut tube before assembly to:

A. Remove the burr that would restrict flow and trap oil

B. Increase the outside diameter for a tighter fit

C. Work-harden the tube end before flaring

D. Clean the outer surface for flux adhesion

18. When purging tubing with nitrogen during brazing, the purpose is to:

A. Increase the internal pressure for a stronger joint

B. Cool the joint quickly to speed the cycle

C. Prevent copper oxide scale from forming inside

D. Test the joint for leaks during the braze

19. A flare appears cracked after forming. The most likely cause is:

A. The tube was cut with a sharp cutter wheel

B. The flaring block was lightly oiled before forming

C. The tube was annealed before the flare was made

D. The tube was over-flared or not deburred first

20. A gas-line thread is sealed using:

A. Refrigeration oil applied to the male threads

B. Silver brazing flux on the threaded joint

C. Anti-seize rated only for high temperature

D. An approved pipe-thread sealant for the gas service

21. A soft-soldered 50/50 joint is not acceptable on a high-pressure liquid line because it:

A. Reacts chemically with the refrigerant oil

B. Cannot be inspected after installation

C. Lacks the strength and temperature rating needed

D. Requires too much flux to complete properly

22. A technician bends soft copper tubing with a spring bender to:

A. Increase the tube's outside diameter at the bend

B. Anneal the tube while forming the radius

C. Prevent the tube from kinking during the bend

D. Reduce the refrigerant charge in the line

23. Excess internal flux residue left in a refrigerant line is a concern because it:

A. Strengthens the brazed joint against vibration

B. Can react with refrigerant and oil, contaminating the system

C. Improves corrosion resistance inside the tube

D. Seals micro-cracks and prevents future leaks

24. A phos-copper (BCuP) filler is self-fluxing when joining:

A. Copper to copper directly without separate flux

B. Copper to steel without any flux needed

C. Brass to brass with no surface preparation

D. Aluminum to copper at low temperature

25. A nitrogen pressure test is preferred over shop air because nitrogen:

A. Contains moisture useful for testing the joints

B. Reacts with copper to reveal weak joints

C. Is heavier than air and settles in low points

D. Is dry and inert, adding no moisture or reaction risk

26. When supporting horizontal copper lines, hanger spacing must account for:

A. The colour of the building's interior finish

B. The resale value of the installed system

C. Sag prevention and thermal movement allowance

D. The refrigerant cylinder size used to charge

27. A drip leg (sediment trap) at a gas appliance is installed to:

A. Capture debris and condensate before the gas valve

B. Regulate the gas pressure to the burner manifold

C. Act as the primary shutoff for the appliance

D. Increase the gas flow rate into the burner

28. Before brazing on a section of an operating system, the correct sequence is to:

A. Braze first, then recover the trapped refrigerant

B. Open the section to atmosphere and braze immediately

C. Isolate or recover refrigerant, then purge with nitrogen

D. Pressurize with refrigerant during the brazing repair

29. A condensate drain line is sloped about 1% (≈1/8 in per foot) to:

A. Increase the airflow across the cooling coil

B. Reduce the refrigerant charge in the system

C. Drain by gravity without standing water

D. Create an air lock that prevents sewer gas

30. A galvanic corrosion cell forms when copper directly contacts:

A. A dissimilar metal such as bare steel with moisture present

B. Closed-cell foam insulation rated for the service

C. Another brazed copper fitting at the same joint

D. A plastic isolation clip designed for the tube

31. A technician reams a cut tube and notices the bore looks restricted before reaming. This restriction is caused by:

A. The annealing process expanding the tube wall

B. The flux hardening inside the tube end

C. The inward burr rolled by the cutting wheel

D. The work-hardening of the copper after cutting

32. When fabricating ductwork, a long-radius elbow is preferred over a sharp elbow because it:

A. Increases the static pressure delivered to the space

B. Reduces the cross-sectional area of the duct

C. Lowers turbulence and friction loss in the airflow

D. Filters particulates from the supply airstream

33. A suction line is being sized. The primary trade-off the designer balances is:

A. Pipe cost against the colour of the insulation

B. Charge weight against the cylinder size used

C. Ambient temperature against the building height

D. Adequate oil-return velocity against acceptable pressure drop

34. A liquid line rising 15 m vertically must be analyzed because the static lift can:

A. Cause oil to accumulate at the top of the riser

B. Require a larger diameter than the suction line

C. Drop pressure enough to flash refrigerant at the TXV

D. Increase subcooling as the refrigerant rises

35. When planning duct sizing with the equal-friction method, the constant maintained is:

A. The air velocity in every duct section

B. The friction loss per unit length of duct

C. The cross-sectional area throughout the run

D. The air volume in each branch regardless of load

36. A cold-storage heat load must include a unique source not present in comfort cooling:

A. Product respiration and door-infiltration loads

B. Solar gain through large glazed windows

C. Heat from incandescent office lighting

D. Rejected heat from a nearby rooftop unit

37. A TXV is selected to match the:

A. Evaporator load and pressure drop across the valve

B. Colour of the suction line insulation jacket

C. Length of the liquid line from the receiver

D. Voltage supplied to the control circuit

38. When planning a condensing unit location, the most important factor is:

A. Proximity to the building's electrical panel

B. Adequate clearance for airflow and heat rejection

C. The unit's appearance from the street view

D. The shortest possible condensate drain run

39. A control plan interlocks the supply fan with the cooling stage to:

A. Increase cooling capacity during peak demand

B. Reverse refrigerant flow during the defrost cycle

C. Bypass the thermostat during occupied hours

D. Prevent cooling unless airflow is proven first

40. Low-voltage thermostat wiring is specified as:

A. Single-conductor armoured line-voltage cable

B. Mineral-insulated high-temperature heating cable

C. Multi-conductor, colour-coded thermostat cable

D. Bare solid copper grounding conductor only

41. When sizing a disconnect for a condensing unit, the primary basis is the nameplate:

A. Minimum circuit ampacity and maximum fuse size

B. Net refrigeration capacity expressed in tons

C. Refrigerant type and total charge weight

D. Physical cabinet dimensions of the unit

42. A receiver is included in a system design primarily to:

A. Superheat the vapour before the compressor inlet

B. Store liquid refrigerant and accommodate charge variation

C. Remove non-condensable gases from the high side

D. Meter refrigerant flow into the evaporator coil

43. A vapour barrier is required on cold suction-line insulation to:

A. Improve the appearance of the finished line

B. Add structural support to the pipe run

C. Allow easy access for future leak checks

D. Prevent moisture migration and internal condensation

44. When planning refrigerant selection for a new system, a leading regulatory consideration today is the refrigerant's:

A. Global warming potential (GWP)

B. Colour in the liquid phase

C. Boiling point at standard pressure

D. Viscosity at operating temperature

45. A draw-through coil's condensate trap must be deep enough to:

A. Increase the airflow across the cooling coil

B. Overcome the negative pressure and allow drainage

C. Reduce the refrigerant charge in the system

D. Prevent oil from entering the drain line

46. When planning a piping run, equivalent length adds to the straight pipe the friction-equivalent of:

A. The building's vertical height only

B. Fittings, valves, and bends in the run

C. The total refrigerant charge weight

D. The ambient temperature around the pipe

47. An evaporator pressure regulator (EPR) is planned for a multi-temperature system to:

A. Maintain a higher pressure on a warmer evaporator

B. Increase suction pressure equally to all coils

C. Meter liquid refrigerant into each evaporator

D. Lower the head pressure at the condenser

48. A low-ambient head-pressure control is planned for an air-cooled condenser to:

A. Maintain enough head pressure for TXV operation in cold weather

B. Hold a constant suction pressure regardless of load

C. Set the supply-air temperature at the diffuser

D. Maintain the correct charge during summer

49. When sizing conductors for a 40 A continuous load, code generally requires at least:

A. 80% of the load, about 32 A

B. 125% of the load, about 50 A

C. 100% of the load, exactly 40 A

D. 50% of the load, about 20 A

50. A glide-blend refrigerant must be referenced in design using:

A. The appropriate dew or bubble temperature for the blend

B. A single fixed saturation temperature like an azeotrope

C. The critical temperature of the blend only

D. The cylinder colour code for the refrigerant

51. A TXV external equalizer is connected to the:

A. Suction line just downstream of the sensing bulb

B. Liquid line ahead of the valve inlet

C. Discharge line at the compressor outlet

D. Receiver outlet on the high-pressure side

52. A TXV sensing bulb on a 1-1/8-inch horizontal suction line is clamped at the:

A. 6 o'clock bottom position for accuracy

B. Upper-side 10 or 2 o'clock position

C. 12 o'clock top with no insulation

D. Any position if firmly taped on

53. A liquid-line filter drier is installed with its arrow pointing toward the:

A. Compressor suction inlet for protection

B. Condenser inlet to trap discharge debris

C. Receiver to filter stored liquid

D. Metering device, matching liquid flow

54. A three-phase scroll compressor is wired and must be checked for rotation because reverse rotation:

A. Improves the compressor pumping efficiency

B. Produces no pumping and risks compressor damage

C. Has no effect on a scroll-type compressor

D. Reverses the condensate drain flow direction

55. A long line set requires the technician to:

A. Reduce the factory charge for the extra tubing

B. Add refrigerant per the manufacturer's length chart

C. Leave the factory charge unchanged for any length

D. Replace the refrigerant with a higher-pressure type

56. A condensate pump installed below a coil must be interlocked with a:

A. High-pressure refrigerant cutout in series

B. Time-delay relay delaying compressor start

C. Float switch that disables cooling on high water

D. Current relay monitoring the supply fan

57. Wiring passing through a sheet-metal panel must be protected with a bushing to:

A. Increase the conductor current-carrying capacity

B. Prevent the sharp edge from abrading the insulation

C. Reduce the voltage drop along the conductor

D. Shield the wiring from refrigerant exposure

58. An accumulator installed in a heat pump's suction line functions to:

A. Prevent liquid slugging from reaching the compressor

B. Increase the suction pressure to the compressor

C. Meter refrigerant into the indoor coil

D. Store excess oil away from the circuit

59. A crankcase heater is wired to energize during:

A. Only the cooling cycle of the system

B. Only the heat-pump defrost cycle

C. Off-cycles to prevent refrigerant migration

D. Compressor running periods only

60. A flexible duct connector at the air handler is installed to:

A. Isolate fan vibration from the duct system

B. Increase the supply-air static pressure

C. Filter particulates from the supply air

D. Reduce the duct cross-sectional area

61. A refrigerant line penetrating a fire-rated wall requires:

A. The line left uninsulated through the wall

B. The penetration left open for air circulation

C. The line doubled in diameter at the wall

D. An approved firestop maintaining the fire rating

62. A 410-type blend is charged into the system as:

A. Vapour drawn from the top of the cylinder

B. Either phase, since the blend is azeotropic

C. Liquid, to preserve the blend composition

D. A shaken mixture poured into the suction port

63. A horizontal evaporator drain pan must slope toward the drain or:

A. Standing water will accumulate and overflow

B. The refrigerant charge will become incorrect

C. The cooling capacity will increase sharply

D. The airflow will reverse across the coil

64. An oil separator on a low-temperature system is installed in the:

A. Suction line to trap returning liquid

B. Liquid line ahead of the metering device

C. Equalizer line of the expansion valve

D. Discharge line to return oil to the compressor

65. Line-voltage conductors are sized to ampacity because undersized conductors:

A. Reduce the system's refrigeration capacity

B. Lower the control circuit voltage supplied

C. Increase refrigerant flow through the line

D. Overheat under load and create a fire hazard

66. A condensing-unit nameplate lists MCA 22 A and MOCP 35 A. The conductor must carry at least:

A. 22 A, the minimum circuit ampacity

B. 35 A, the maximum protective rating

C. 11 A, half the minimum ampacity

D. 70 A, double the protection rating

67. A hard-start kit installed on a single-phase compressor serves to:

A. Boost starting torque for a hard-starting compressor

B. Reduce running amperage during normal operation

C. Lower the head pressure at the condenser

D. Meter additional refrigerant during startup

68. A reversing valve installed on a heat pump functions to:

A. Meter refrigerant into the indoor coil

B. Switch the system between heating and cooling

C. Separate oil from the discharge gas

D. Regulate the condenser fan motor speed

69. A liquid-line sight glass with a moisture indicator is installed:

A. In the suction line near the compressor

B. In the discharge line after the compressor

C. In the equalizer line of the TXV

D. In the liquid line downstream of the drier

70. A 24 V control transformer is protected from a secondary short by:

A. The high-pressure refrigerant cutout opening

B. An inline fuse or built-in thermal protection

C. The compressor contactor dropping out

D. The thermostat opening on a cooling call

71. A tall suction riser from a basement unit requires an oil-return feature because:

A. The liquid line needs additional subcooling

B. The condenser requires more airflow at height

C. The discharge line must be insulated for the rise

D. Oil must be carried up the vertical riser to the compressor

72. Flare connections must be torqued to manufacturer spec because:

A. More torque always produces a tighter seal

B. Torque only matters for electrical terminals

C. Hand-tight is sufficient for any flare joint

D. Over-torque cracks the flare; under-torque leaks

73. Outdoor pipe insulation is jacketed with UV-resistant material because:

A. UV light raises the refrigerant pressure in the line

B. UV exposure improves the insulation appearance

C. UV degrades unprotected insulation over time

D. UV light increases the insulation R-value

74. A vibration isolator under a rooftop unit that is fully compressed (bottomed out) will:

A. Improve vibration isolation from the structure

B. Lower the compressor amperage in operation

C. Transmit vibration directly into the building

D. Increase refrigerant subcooling at the coil

75. A packaged gas/electric unit's heating section requires for safe operation:

A. A completely sealed cabinet with no openings

B. Gas pressure reduced below the manifold rating

C. Insulation packed around the burner assembly

D. Adequate combustion air and proper flue venting

76. When installing refrigerant tubing, the suction line is insulated in a cooling-only split system because:

A. The liquid line is too hot for any insulation

B. Insulation on the suction line blocks refrigerant flow

C. The cold suction line would otherwise sweat and lose capacity

D. The suction line carries high-pressure liquid that must stay warm

77. During commissioning, a technician finds high head pressure, high subcooling, and low superheat. After ruling out a dirty condenser, the most likely cause is:

A. A low refrigerant charge in the system

B. An overcharge of refrigerant in the system

C. A restricted suction line at the compressor

D. A failed indoor blower motor capacitor

78. A condensing temperature of 45°C and liquid-line temperature of 39°C give a subcooling of:

A. 45°C, the condensing temperature itself

B. 84°C, the sum of both values

C. 39°C, the liquid-line temperature alone

D. 6°C, the difference between the two values

79. A suction saturation of 4°C and suction-line temperature of 11°C at the bulb give a superheat of:

A. 4°C, the saturation temperature alone

B. 15°C, the sum of both values

C. 11°C, the suction-line temperature alone

D. 7°C, the difference between the two values

80. During evacuation commissioning, the micron gauge is isolated and the reading climbs continuously without stabilizing. This indicates:

A. A leak admitting atmosphere into the system

B. The system is dry and completely leak-free

C. Moisture off-gassing that will soon stabilize

D. The vacuum pump oil needs replacement

81. A commissioning check shows 1°C of superheat on a TXV system with the bulb correctly mounted. The valve is:

A. Starving the evaporator of refrigerant

B. Overfeeding, risking liquid floodback

C. Operating correctly within target range

D. Restricted by a clogged liquid-line drier

82. Voltage across three legs reads 600 V, 594 V, and 582 V. Using the maximum-deviation method from the 592 V average, the imbalance is closest to:

A. About 0.2%, well within limits

B. About 10%, a severe single-phase fault

C. About 1.7%, near the typical 2% limit

D. About 0%, since all legs are equal

83. During airflow commissioning, measured external static pressure is well above design. The likely cause is:

A. Oversized ductwork throughout the system

B. All supply registers fully open and clear

C. The fan running below its rated speed

D. A dirty filter or closed dampers restricting flow

84. A heat pump commissioned in heating builds frost on the outdoor coil. This is managed by:

A. The crankcase heater melting the frost

B. The liquid-line drier absorbing the moisture

C. The defrost control initiating a defrost cycle

D. The accumulator vaporizing the frost layer

85. Compressor amperage of 30 A against a 22 A RLA during commissioning indicates:

A. The charge is precisely at design level

B. Overload, possibly high head or mechanical issue

C. The condensate drain slope is incorrect

D. The suction line insulation is missing

86. A fixed-orifice system is commissioned using the manufacturer's chart, with the primary reading being:

A. Subcooling at the condenser outlet only

B. Discharge line temperature at the compressor

C. The condensate temperature at the drain pan

D. Superheat referenced to indoor and outdoor conditions

87. A high-pressure cutout is verified during commissioning by:

A. Reducing the charge until the control trips

B. Disconnecting the control wiring during a run

C. Inducing high pressure to confirm the trip point

D. Lowering suction pressure with a service valve

88. Recording baseline pressures, temperatures, and amperages at commissioning provides:

A. A reference for diagnosing future performance changes

B. The warranty colour-coding scheme for the unit

C. The brazing temperature needed for future repairs

D. The equipment's resale value estimate

89. A multi-stage cooling system is commissioned and staging is confirmed correct when:

A. All stages energize at once on the first call

B. Stages alternate randomly during operation

C. Only the final stage operates at any load

D. Each stage energizes in sequence as load rises

90. A balancing damper setting is confirmed during commissioning by measuring:

A. The subcooling at the condenser outlet

B. The airflow in CFM at the diffuser

C. The line voltage at the air handler

D. The discharge pressure of the compressor

91. A glide-blend system is commissioned, and readings are interpreted using:

A. The dew or bubble point appropriate to the blend

B. A single saturation temperature like an azeotrope

C. The critical pressure of the blend components

D. The cylinder colour code on the label

92. During commissioning, pouring water into the condensate pan confirms:

A. The refrigerant charge level in the system

B. The trap and drain carry water away without backup

C. The supply-air temperature at the diffuser

D. The thermostat differential for the cooling stage

93. A walk-in freezer's defrost cycle is verified during commissioning. Its purpose is to:

A. Increase refrigeration capacity at startup

B. Recover refrigerant from the evaporator

C. Lower the suction pressure for a colder box

D. Remove ice accumulation from the evaporator coil

94. A TXV system is charged by weighing in rather than by pressure because:

A. Weighing to spec gives the precise correct charge

B. Pressure charging is always more accurate

C. Weighing removes the need for gauges entirely

D. The TXV must be removed before charging

95. During commissioning, a technician verifies the low-pressure control, which protects against:

A. Excessive condensing temperature at the coil

B. Overvoltage in the control transformer circuit

C. Reverse rotation of the compressor motor

D. Operation at unsafely low suction pressures

96. A dry-bulb temperature drop of 13°C is measured across an evaporator during commissioning. For comfort cooling, this value is:

A. Far too low, indicating a severe overcharge

B. Impossible on any refrigeration system

C. Within the normal expected operating range

D. A clear sign of a failed compressor

97. During commissioning, three-leg voltage imbalance beyond the allowable limit risks:

A. The refrigerant overcharging automatically

B. Excessive motor heating and winding damage

C. The condensate drain reversing its flow

D. The superheat reading becoming fixed

98. A system shows normal subcooling, high superheat, and low suction pressure. After confirming the charge is correct, the technician should next suspect:

A. An overcharge of refrigerant in the system

B. A failed condenser fan motor causing high head

C. Excessive oil circulating in the system

D. A restriction such as a clogged drier or starved TXV

99. A megohmmeter reads very low resistance from a winding to the compressor shell. This indicates:

A. The windings are in perfect condition

B. The run capacitor needs replacement

C. The motor insulation has failed to ground

D. The refrigerant charge is slightly low

100. A three-phase motor hums but will not start, with one leg reading no current. The fault is:

A. An overcharge blocking the startup

B. Single-phasing from a blown fuse or open leg

C. A stuck condensate pump float switch

D. A crankcase heater drawing all the current

101. An evaporator coil ices over while airflow is confirmed adequate. The next likely cause to check is:

A. A low refrigerant charge dropping coil temperature

B. An overcharge of refrigerant in the condenser

C. A failed crankcase heater on the compressor

D. A blocked condensate drain at the trap

102. During service, the suction line frosts back to the compressor. The most likely cause is:

A. A flooding or low-load condition carrying liquid back

B. A dirty condenser restricting heat rejection

C. A failed crankcase heater drawing current

D. An open high-pressure cutout stopping the unit

103. Non-condensable gases in a system typically present as:

A. Lower head pressure than the condensing temperature suggests

B. A vacuum forming in the high side during operation

C. Higher head pressure than the condensing temperature suggests

D. Excessive subcooling with evaporator frosting

104. A run capacitor measures far below its rated microfarads. The motor will:

A. Run faster than its rated nameplate speed

B. Fail to start or run with reduced torque

C. Improve its operating efficiency noticeably

D. Operate with no change in performance

105. A TXV suspected of losing its bulb charge will show:

A. The valve closing and starving the evaporator

B. The valve flooding the evaporator completely

C. Subcooling dropping far below normal

D. Head pressure rising far above normal

106. A contactor's contacts are pitted and burned. The correct action is to:

A. File the contacts smooth and return to service

B. Apply dielectric grease to the burned contacts

C. Replace the contactor rather than filing contacts

D. Increase the control voltage to compensate

107. A compressor cycles repeatedly on its internal overload. After ruling out high head pressure, the technician next checks:

A. The colour of the suction line insulation

B. The slope of the condensate drain line

C. The brand of the refrigerant cylinder

D. Low voltage, a weak capacitor, or a mechanical bind

108. The most sensitive method for finding a small refrigerant leak is:

A. A visual inspection of the joints with a light

B. An electronic leak detector calibrated for the refrigerant

C. Listening for hissing near the connections

D. Soap bubbles on accessible joints only

109. After opening a sealed system for repair, the filter drier is replaced because:

A. The old drier may be saturated and cannot protect the system

B. A new drier is required only for appearance

C. The old drier improves flow when reused

D. The old drier increases the cooling capacity

110. A heat pump stuck in defrost and not returning to heating should have which component checked first?

A. The defrost control board and termination sensor

B. The indoor blower motor run capacitor

C. The liquid-line sight glass for bubbles

D. The condensate pan float switch

111. During service, refrigerant must be recovered into an approved cylinder because:

A. Recovery improves the machine's efficiency

B. Mixing types in one cylinder is encouraged

C. Venting to atmosphere is prohibited by regulation

D. Slow release reduces the environmental impact

112. Oil logging in a commercial evaporator indicates:

A. The condenser is rejecting excessive heat

B. The system has excessive subcooling at the coil

C. The high-pressure cutout is set too high

D. Poor oil return from low velocity or piping issues

113. A recovery cylinder must not be overfilled because:

A. Overfilling improves the recovery efficiency

B. Overfilling lowers the cylinder's internal pressure

C. Liquid with no vapour space can rupture from expansion

D. Overfilling has no safety consequence at all

114. An infinite-ohms reading across a motor winding indicates:

A. An open winding with a broken circuit path

B. A grounded winding shorted to the shell

C. A shorted winding drawing excess current

D. A normal winding within specification

115. A dirty condenser coil produces which direct operating symptom?

A. Lower head pressure with excessive subcooling

B. Higher head pressure and reduced efficiency

C. Reduced suction pressure with high superheat

D. Increased refrigerant charge in the receiver

116. During service, both superheat and subcooling are measured to diagnose a charge problem because:

A. Subcooling measures only the airflow across the coil

B. Together they isolate charge versus metering issues

C. Superheat alone identifies every charge fault

D. Subcooling is irrelevant to charge diagnosis

117. An A2L flammable refrigerant system requires the additional service precaution of:

A. Eliminating ignition sources and ensuring ventilation

B. Using any standard recovery machine without change

C. Brazing with an open flame near the charge port

D. Skipping leak detection since A2L is mildly flammable

118. A hot, discoloured discharge line with a burnt odour indicates:

A. The system operating well within normal limits

B. The refrigerant charge slightly above target

C. Excessive discharge temperature, possibly low charge or restriction

D. The condensate drain overflowing the cabinet

119. A cooling-tower condenser-water loop is serviced. The key water-treatment concern is:

A. Increasing water flow to raise condensing temperature

B. Reducing airflow across the tower fill material

C. Eliminating the makeup water supply entirely

D. Controlling scale, corrosion, and biological growth

120. A system has lost its entire charge with no obvious leak. Before recharging, the technician must:

A. Recharge immediately and watch for another drop

B. Add extra refrigerant to offset the expected loss

C. Pressure-test with nitrogen, repair, then evacuate

D. Install a larger receiver to hold more reserve

121. A compressor trips on overload and resets when cooled. After confirming charge, the next likely cause is:

A. The colour code of the discharge insulation

B. Poor cooling, low voltage, or a failing capacitor

C. The slope of the condensate drain line

D. The brand of the replacement drier installed

122. For refrigerant compliance, the most important service record is:

A. The colour of the equipment cabinet and location

B. The brand of the tools used on the call

C. The ambient temperature in the parking lot

D. The type and quantity of refrigerant added or recovered

123. A TXV sensing bulb is checked for clamping and insulation during maintenance because:

A. Loose clamping increases the refrigerant charge

B. Poor contact gives false superheat and misfeeds the coil

C. The bulb sets the condenser subcooling value

D. The bulb regulates the compressor amperage draw

124. A glide-blend system is topped up during service by removing refrigerant from the cylinder as:

A. Vapour from the top of an upright cylinder

B. Whichever phase is most convenient

C. Liquid, to preserve the blend composition

D. A shaken mixture from an inverted cylinder

125. An oversized drive pulley is found on a belt-driven blower. Increasing blower speed will:

A. Decrease both airflow and motor amperage

B. Reverse the direction of the airflow

C. Have no effect on airflow or amperage

D. Increase both airflow and motor amperage draw

Practice Exam 32: Answer Key and Explanations

1. C — Ammonia is toxic and a sharp pungent odour signals a leak, so the correct first action is to evacuate the area and activate ventilation to protect life. Personnel safety precedes any leak-finding step. Locating the leak comes only after the space is cleared and ventilated.

2. B — The sling leg closer to vertical (steeper to horizontal) carries more tension because more of the load force acts along that leg. As the angle approaches horizontal, leg tension rises sharply. Recognizing this prevents overloading the more vertical leg in an uneven lift.

3. C — Before re-energizing, all guards must be replaced and personnel confirmed clear so no one is exposed when power returns. Restoring guards and clearing people prevents injury at start-up. Lock colour and nameplate notes do not protect against contact with live or moving parts.

4. D — A neutral flame shows a well-defined inner cone with no acetylene feather, indicating a balanced oxygen-acetylene mixture. This is the correct flame for most brazing. A feathery cone is carburizing and a short hissing flame is oxidizing.

5. B — A WHMIS workplace label is required when a hazardous product is decanted into a different container in the workplace. The new container must identify the contents and hazards. Sealed supplier containers already carry the required supplier label.

6. B — A mid-job hazard must be communicated promptly to the affected workers and the supervisor so it can be controlled before anyone is harmed. Timely reporting is a core safety-communication duty. Delaying or assuming others will find it leaves people exposed.

7. D — A micron gauge measures deep vacuum in microns of mercury during evacuation, confirming the system is dry and leak-free before charging. It does not read mass, superheat, or winding resistance. A low, stable micron level is the benchmark for proper evacuation.

8. C — Grinding throws sparks and fragments, so a face shield worn over safety glasses provides both impact and full-face protection. The glasses guard the eyes if the shield is lifted. A dust mask or tinted goggles alone do not address impact hazards.

9. A — Organizing parts and tools before a service call reduces wasted trips and improves job efficiency. Preparation ensures the right materials are on hand for the diagnosis and repair. It is a basic organizational skill that saves time and cost.

10. B — Acetylene cylinders are used and stored upright to prevent withdrawing the liquid acetone in which the acetylene is dissolved. Drawing acetone damages equipment and is unsafe. Upright positioning ensures only gaseous acetylene is supplied.

11. A — Effective mentoring on recovery means demonstrating the correct procedure, then supervising the apprentice while they practise. This pairs modelling with guided, corrected practice. Manuals or videos alone lack the hands-on supervision that builds reliable skill.

12. B — The SDS is consulted before handling an unfamiliar refrigerant to learn its hazards, required PPE, and safe handling. It is the authoritative chemical-safety source. Resale value, colour, and paint compatibility are irrelevant to safe handling.

13. C — A flashback arrestor prevents a flame from traveling back into the hoses and regulators, protecting against an explosion. It stops the reverse burn at the device. It does not increase flow, regulate pressure, or cool the joint.

14. A — A pinhole with poor penetration usually results from insufficient heat that prevented the filler from fully flowing into the joint by capillary action. Proper base-metal temperature is needed to draw the filler in. Inadequate heating leaves voids and leak paths.

15. D — Brazing filler flows toward the hotter metal, so uneven heating draws the filler to one side and leaves the cooler side unbonded. Even heating of fitting and tube ensures the filler is drawn fully around the joint. This produces a sound, leak-free connection.

16. D — A swage depth of about one tube diameter gives enough overlap for a strong brazed joint between equal-diameter tubes. Too shallow leaves insufficient bonding surface. Matching depth to diameter is the standard field rule.

17. A — Deburring removes the internal burr that would otherwise restrict flow, create turbulence, and trap oil. A clean full-bore inside diameter preserves designed refrigerant and oil flow. Deburring does not enlarge the OD or work-harden the tube.

18. C — Purging dry nitrogen during brazing prevents copper-oxide scale from forming on the inner tube walls. That scale flakes off and can clog metering devices and contaminate oil. Nitrogen purging keeps internal surfaces clean.

19. D — A cracked flare typically results from over-flaring or a tube end that was not deburred before forming. Burrs and excess material stress the copper as it forms. A properly cut, deburred, and correctly flared tube seals reliably.

20. D — Gas-line threads are sealed with an approved pipe-thread sealant rated for the specific gas service. Refrigeration oil, brazing flux, and temperature-only anti-seize are not gas-rated. The correct rated sealant ensures a leak-tight, code-compliant joint.

21. C — Soft 50/50 solder lacks the strength and temperature rating for high-pressure liquid lines, which require brazed joints. Refrigeration high-side connections must use silver or phos-copper filler. Soft solder is limited to low-pressure water or drain work.

22. C — A spring bender supports the tube wall so it does not collapse, preventing kinking during the bend. The spring maintains the bore through the radius. Freehand or unsupported bending crushes soft copper.

23. B — Excess internal flux can react with refrigerant and oil, causing contamination, acid formation, and metering-device fouling. Flux belongs only on the external joint surfaces in minimal amounts. Internal residue is a known source of long-term system problems.

24. A — Phos-copper (BCuP) filler is self-fluxing on copper-to-copper joints because the phosphorus acts as a deoxidizer. No separate flux is needed for copper-to-copper. Joining copper to steel or brass still requires flux.

25. D — Dry nitrogen is preferred for pressure testing because it is inert and adds no moisture or reaction risk to the system. Shop air introduces moisture and oxygen reacts with oil. Nitrogen gives a clean, safe pressure test.

26. C — Hanger spacing must prevent sag and stress while allowing for thermal expansion and contraction of the copper line. Over-spacing causes sagging and joint strain. Proper spacing and isolation maintain alignment through temperature swings.

27. A — A drip leg captures debris and condensate in the gas line before it reaches the appliance control valve, protecting the valve and burner. It is not a regulator or the primary shutoff. The trap keeps contaminants out of the controls.

28. C — The correct sequence is to isolate or recover the refrigerant and purge the section with nitrogen before applying a brazing flame. This prevents flame contact with refrigerant and contamination. Brazing on a charged or unpurged section is unsafe.

29. C — A condensate drain is sloped about 1% so it drains by gravity without standing water. A level or reverse slope causes backup and overflow. Adequate downward slope ensures continuous, reliable drainage.

30. A — Galvanic corrosion forms when copper contacts a dissimilar metal such as bare steel in the presence of moisture, creating a corrosion cell. Isolation between dissimilar metals breaks the cell. Copper-to-copper, foam, and plastic clips do not create this risk.

31. C — The restricted bore before reaming is caused by the inward burr rolled by the cutting wheel. Reaming removes that rolled-in edge to restore the full inside diameter. This protects refrigerant and oil flow.

32. C — A long-radius elbow lowers turbulence and friction loss because air follows the gentler curve more smoothly. Sharp elbows create turbulence and added static pressure. Smooth transitions improve efficiency and reduce noise.

33. D — Suction-line sizing balances adequate oil-return velocity against acceptable pressure drop. Too small raises pressure drop and hurts capacity; too large drops velocity and lets oil log. The designer trades these competing needs.

34. C — A tall liquid-line lift causes a static pressure drop that can drop the refrigerant below its saturation pressure, flashing it at the TXV. Flash gas reduces feed and capacity. The lift loss, not oil or subcooling gain, is the concern.

35. B — The equal-friction duct method maintains a constant friction loss per unit length throughout the system. Each section is sized to that loss rate. It is a standard, balanced duct-sizing approach.

36. A — Cold-storage loads uniquely include product respiration and door-infiltration heat gains not present in comfort cooling. These are easily underestimated yet significant. Solar gain, office lighting, and rooftop heat are not the defining cold-room loads.

37. A — A TXV is selected to match the evaporator load and the design pressure drop across the valve. An oversized or undersized valve hunts or starves the coil. Capacity matching ensures stable, correct refrigerant feed.

38. B — A condensing unit needs adequate clearance for airflow and heat rejection to operate efficiently. Restricted airflow raises head pressure and cuts capacity. Electrical proximity, appearance, and drain routing are secondary.

39. D — A fan-to-cooling interlock prevents cooling from running unless airflow is proven, protecting the coil from freezing and the compressor from floodback. Proven airflow is a prerequisite for safe cooling. It is not a capacity, defrost, or bypass function.

40. C — Low-voltage control circuits use multi-conductor, colour-coded thermostat cable rated for the 24 V circuit. Line-voltage armoured cable, heating cable, and bare ground wire are inappropriate. The colour coding aids correct terminal connections.

41. A — A disconnect and conductors are sized from the nameplate minimum circuit ampacity and maximum fuse size. These values define the circuit's protection and conductor needs. Tonnage, refrigerant type, and cabinet size do not set the electrical rating.

42. B — A receiver stores liquid refrigerant and accommodates charge variation between operating conditions, ensuring a solid liquid column to the metering device. It does not superheat vapour, purge non-condensables, or meter flow. Storage is its primary role.

43. D — A continuous vapour barrier on cold suction insulation prevents moisture migration that would cause internal condensation, dripping, and loss of R-value. Wet insulation fails and corrodes the pipe. The barrier protects insulation performance.

44. A — Global warming potential (GWP) is now a leading regulatory driver in refrigerant selection due to environmental phase-down rules. Lower-GWP refrigerants are favoured. Boiling point and viscosity matter technically but are not the leading regulatory factor.

45. B — A draw-through coil sits under negative pressure, so the trap must be deep enough to overcome that negative pressure and allow water to drain. An inadequate trap lets water back up and overflow. Trap depth is matched to the fan's negative static.

46. B — Equivalent length adds the friction-equivalent of fittings, valves, and bends to the straight-pipe length for pressure-drop calculation. Each fitting behaves like a length of pipe. Building height, charge weight, and ambient temperature are not part of it.

47. A — An evaporator pressure regulator maintains a higher pressure and temperature on a warmer evaporator sharing one compressor, preventing it from being pulled to the lowest coil's pressure. This allows multiple temperatures on one system. The EPR throttles that coil's suction.

48. A — A low-ambient control maintains enough head pressure in cold weather so the TXV has the pressure differential needed to feed properly. Without it, low head pressure starves the evaporator. It keeps the system operating in winter.

49. B — Code requires conductors and protection for a continuous load to be sized at not less than 125% of the load, so 40 A × 1.25 = 50 A. The margin accounts for sustained heating. This prevents conductor overheating.

50. A — A glide blend is referenced using the appropriate dew or bubble temperature because its components boil over a range, not at a single point. Using the correct reference gives accurate superheat and subcooling. A single saturation value would mislead.

51. A — The TXV external equalizer connects to the suction line just downstream of the sensing bulb, sensing evaporator-outlet pressure to compensate for coil pressure drop. This lets the valve maintain correct superheat. Wrong placement defeats its purpose.

52. B — On a large horizontal suction line the bulb is clamped at the upper-side 10 or 2 o'clock position to avoid sensing oil pooled at the bottom. Good contact there gives an accurate temperature. The 6 o'clock position reads false low.

53. D — A liquid-line filter drier is installed with its arrow toward the metering device, matching liquid flow, so it traps moisture and debris before the TXV or orifice. Reversed installation defeats protection. Flow-direction orientation is critical.

54. B — A scroll compressor run in reverse produces no pumping and risks damage, so rotation must be verified. Correct three-phase rotation is essential for compression. Rotation does not affect drain flow and is not irrelevant to scrolls.

55. B — A long line set requires adding refrigerant per the manufacturer's length chart, based on grams per metre beyond the pre-charge. The extra tubing volume needs the added charge. Reducing, ignoring, or changing refrigerant type would misfeed the system.

56. C — A condensate pump below a coil is interlocked with a float switch that disables cooling on a high-water condition, preventing overflow. This protects the building if the pump fails. A pressure cutout, time delay, or fan relay does not address overflow.

57. B — Wiring through a sheet-metal panel must pass through a bushing to prevent the sharp edge from abrading the insulation, which could short or ground. The bushing protects the wiring at the entry. It does not affect ampacity or voltage drop.

58. A — A suction-line accumulator prevents liquid refrigerant slugging from reaching the compressor, protecting it during transient flooding such as heat-pump defrost. It traps liquid and meters it back slowly. It does not raise suction pressure or meter the coil.

59. C — A crankcase heater is energized during off-cycles to keep the oil warm and prevent refrigerant migration and condensation in the crankcase. Cold oil saturated with refrigerant causes a startup slug. The heater protects the compressor.

60. A — A flexible duct connector at the air handler isolates fan vibration from the duct system, preventing structure-borne noise. It does not raise static pressure, filter air, or reduce duct area. Vibration isolation is its sole purpose here.

61. D — A refrigerant line through a fire-rated wall requires an approved firestop that maintains the wall's rating at the penetration. Leaving it open or uninsulated breaches the rating. Doubling the diameter is irrelevant to fire separation.

62. C — A 410-type blend must be charged as liquid to preserve the blend composition, since vapour charging would fractionate it. Liquid removal keeps the intended mix. A metering device is used to avoid slugging the compressor.

63. A — A drain pan must slope toward the drain or standing water will accumulate and overflow, causing damage and microbial growth. Proper slope empties the pan completely. Pan slope does not affect charge, capacity, or airflow direction.

64. D — An oil separator is installed in the discharge line to capture oil and return it to the compressor, which is important on low-temperature systems where oil return is difficult. It keeps the compressor lubricated. It does not trap suction liquid or meter refrigerant.

65. D — Undersized line-voltage conductors overheat under load and create a fire hazard, so conductors are sized to their ampacity. Proper sizing keeps conductor temperature safe. Wire size does not change capacity, control voltage, or refrigerant flow.

66. A — Conductors must carry at least the minimum circuit ampacity (MCA), which is 22 A here, while MOCP sets the maximum protective device. MCA defines the required conductor ampacity. Using MCA prevents undersized wiring.

67. A — A hard-start kit boosts starting torque to help a compressor that struggles to start, typically using a start capacitor and relay. It addresses hard starting, not running amperage or head pressure. It is a starting aid for marginal compressors.

68. B — A reversing valve redirects discharge and suction flow so the indoor and outdoor coils swap roles, switching the heat pump between heating and cooling. This flow reversal lets one system do both. Other components handle metering and oil.

69. D — A liquid-line sight glass with a moisture indicator is installed in the liquid line downstream of the drier, where it shows a full liquid column and any bubbles indicating low charge or restriction. Its position after the drier reflects true liquid condition. This aids charging and diagnosis.

70. B — A 24 V control transformer is protected from a secondary short by an inline fuse or built-in thermal protection that opens before the windings burn. Pressure cutouts, contactors, and thermostats do not protect the transformer. Overcurrent protection safeguards the secondary.

71. D — A tall suction riser needs an oil-return feature to carry oil up the vertical run to the compressor, since the basement unit sits below the indoor coil. Traps or proper velocity ensure oil return. Without it, oil logs and starves the compressor.

72. D — Over-torquing a flare can crack it while under-torquing leaves it leaking, so manufacturer torque values produce a reliable seal. More torque is not always better, and hand-tight alone is insufficient. Correct torque ensures a leak-tight flare.

73. C — UV exposure degrades unprotected pipe insulation over time, so outdoor insulation is jacketed with UV-resistant covering. Degraded insulation crumbles and loses R-value. UV protection preserves the insulation's performance.

74. C — A bottomed-out vibration isolator can no longer flex, so it transmits vibration directly into the structure. Proper isolators must be free to deflect under load. Correct selection and installation prevent structure-borne noise.

75. D — A gas heat section requires adequate combustion air and proper flue venting for safe, complete combustion and removal of flue gases. Without them, carbon monoxide and incomplete combustion result. Sealing the cabinet or restricting gas pressure is unsafe.

76. C — The cold suction line is insulated because it would otherwise sweat and lose capacity through heat gain. The liquid line is warm and not prone to sweating in a cooling-only system. Insulation does not block flow or keep the line warm here.

77. B — High head pressure with high subcooling and low superheat, after ruling out a dirty condenser, points to an overcharge. Excess liquid backs up in the condenser (raising subcooling and head) and overfeeds the evaporator (lowering superheat). A low charge gives the opposite readings.

78. D — Subcooling is condensing temperature minus liquid-line temperature: 45 − 39 = 6°C. It indicates how far the liquid is cooled below saturation. Subcooling is a key charge and condenser-performance indicator.

79. D — Superheat is suction-line temperature minus saturation temperature: 11 − 4 = 7°C. It measures how far the vapour is heated above its boiling point at the evaporator outlet. Superheat confirms proper evaporator feed.

80. A — When the micron gauge is isolated and the reading climbs continuously without stabilizing, a leak is admitting atmosphere into the system. A stabilizing rise would indicate moisture instead. The continuous climb is the signature of a leak.

81. B — Only 1°C of superheat means the TXV is overfeeding the evaporator, risking liquid floodback to the compressor. Very low superheat indicates too much refrigerant entering the coil. The valve setting or condition needs correction.

82. C — Using the maximum-deviation method, the worst leg deviates 10 V from the 592 V average, giving 10 ÷ 592 ≈ 1.7%, near the typical 2% limit. Voltage imbalance approaching 2% warrants attention. Imbalance causes motor overheating.

83. D — Higher-than-design external static pressure points to a dirty filter or closed dampers restricting airflow. The added resistance raises static pressure. Oversized ducts, open registers, or low fan speed would lower it instead.

84. C — Frost on the outdoor coil in heating mode is cleared by the defrost control initiating a defrost cycle. The control reverses operation or applies heat to melt the frost. Crankcase heaters, driers, and accumulators do not defrost the coil.

85. B — Amperage of 30 A against a 22 A RLA signals overload, possibly from high head pressure or a mechanical problem. High current directly indicates excessive loading. This must be diagnosed before the motor is damaged.

86. D — A fixed-orifice system is charged using superheat referenced to indoor and outdoor conditions on the manufacturer's chart, because the orifice does not control superheat. Superheat becomes the charging indicator. Subcooling is the primary method on TXV systems instead.

87. C — A high-pressure cutout is verified by inducing high pressure, for example by restricting condenser airflow, to confirm it trips at its setpoint. This proves the safety functions. Reducing charge or disconnecting wiring does not test the actual trip point.

88. A — Recording baseline pressures, temperatures, and amperages provides a reference for diagnosing future performance changes. Technicians compare later readings to the baseline. This documentation supports ongoing service.

89. D — Correct multi-stage operation is confirmed when each stage energizes in sequence as the load increases, matching capacity to demand. Simultaneous, random, or single-stage operation indicates a fault. Staged sequencing is the expected behaviour.

90. B — A balancing damper is set by measuring airflow in CFM at the diffuser until the design value is reached. Airflow measurement confirms correct balancing. Subcooling, voltage, and discharge pressure are unrelated to air balance.

91. A — A glide blend's readings are interpreted using the dew or bubble point appropriate to the blend, because it evaporates and condenses over a range. The correct reference gives accurate superheat and subcooling. A single saturation value would mislead.

92. B — Pouring water into the condensate pan confirms the trap and drain line carry water away without backing up. A blocked trap or drain shows immediately. This verifies proper drainage at commissioning.

93. D — The defrost cycle's purpose is to remove ice accumulation from the evaporator coil so it can maintain airflow and heat transfer. Iced coils lose capacity. Defrost is not for adding capacity, recovering refrigerant, or lowering suction pressure.

94. A — On a TXV system the charge is weighed in to the manufacturer's specification because the valve maintains superheat across conditions, making pressure-only charging unreliable. Weighing gives the precise correct charge. It is the accurate method for TXV systems.

95. D — A low-pressure control protects the compressor from operating at unsafely low suction pressures, which signal loss of charge or restricted flow. Low suction causes overheating and oil-return problems. The control stops the compressor to protect it.

96. C — A 13°C dry-bulb drop across an evaporator coil falls within the normal comfort-cooling range of roughly 8–14°C. It indicates the coil is removing heat as designed. This value does not signal overcharge, failure, or an impossible condition.

97. B — Three-leg voltage imbalance beyond the allowable limit causes excessive current and heating in the motor windings, leading to insulation damage. A small voltage imbalance produces a much larger current imbalance. It does not affect charge, drain flow, or superheat.

98. D — Normal subcooling with high superheat and low suction pressure, once charge is confirmed correct, points to a restriction such as a clogged drier or starved TXV. The restriction limits refrigerant reaching the evaporator while condenser charge stays normal. This signature isolates a flow restriction.

99. C — Very low resistance from a winding to the shell on a megohmmeter means the motor insulation has failed to ground. A grounded hermetic compressor cannot be repaired and must be replaced. Insulation testing reveals this fault.

100. B — A three-phase motor that hums but will not start with one leg showing no current is single-phasing from a blown fuse or open leg. Loss of one phase removes starting torque. The fault is electrical phase loss.

101. A — With airflow confirmed adequate, a coil icing over most likely has a low refrigerant charge driving the coil temperature below freezing. Low charge lowers evaporator pressure and temperature. Checking charge is the next step.

102. A — Suction-line frosting back to the compressor indicates a flooding or low-load condition carrying liquid back. Unboiled liquid chills the line below freezing. This floodback risks compressor damage and must be corrected.

103. C — Non-condensable gases such as air raise the head pressure above what the condensing temperature alone would indicate, because the air adds partial pressure in the condenser. This abnormally high head pressure is the telltale symptom. Purging or recovery and evacuation correct it.

104. B — A run capacitor far below its rated microfarads provides insufficient phase shift, so the motor may fail to start or run with reduced torque. The capacitor is essential to proper operation. A weak capacitor degrades performance.

105. A — A TXV that has lost its bulb charge cannot open, so it closes and starves the evaporator of refrigerant. Loss of sensing pressure removes the opening force. The result is starvation and high superheat.

106. C — Pitted, burned contactor contacts should be addressed by replacing the contactor, not filing, since filing removes plating and shortens life. The contactor is a low-cost wear item. Replacement restores reliable, low-resistance switching.

107. D — A compressor cycling on its overload, once high head is ruled out, should be checked for low voltage, a weak capacitor, or a mechanical bind, all of which overload the motor. These cause excessive current that trips the protector. Insulation colour, drain slope, and cylinder branding are irrelevant.

108. B — An electronic leak detector calibrated for the refrigerant is the most sensitive method for finding small leaks, detecting trace concentrations beyond sight, sound, or bubbles. It locates leaks the other methods miss. It is the preferred precision tool.

109. A — A filter drier is replaced after opening a sealed system because the old drier may be saturated and can no longer protect against moisture and acids. A spent drier offers no protection. A fresh drier safeguards the repaired system.

110. A — A heat pump stuck in defrost should have its defrost control board and termination sensor checked first, since these govern entering and exiting defrost. A failed sensor or board prevents normal termination. These components control the defrost sequence.

111. C — Regulations prohibit venting refrigerant to atmosphere, so it must be recovered into an approved cylinder regardless of quantity. Venting and mixing types are not permitted. Proper recovery protects the environment and complies with law.

112. D — Oil logging in an evaporator indicates poor oil return, commonly from low refrigerant velocity or improper piping. The oil collects instead of returning to the compressor. Correcting velocity or piping restores oil return.

113. C — A recovery cylinder must not be overfilled because liquid refrigerant with no vapour space expands with temperature and can cause a hydrostatic rupture. Cylinders are filled only to a safe percentage to allow expansion room. This is a serious safety requirement.

114. A — Infinite ohms across a winding indicates an open winding with a broken circuit path, so no current can flow through it. An open winding renders the motor inoperative. Resistance testing identifies the open circuit.

115. B — A dirty condenser coil restricts heat rejection, raising head pressure and reducing efficiency. The compressor works harder against the higher discharge pressure. This is the classic dirty-condenser symptom.

116. B — Measuring both superheat and subcooling isolates whether a problem is charge or metering, because each reflects a different part of the cycle. Superheat reflects evaporator feed and subcooling reflects condenser liquid. Together they pinpoint the fault.

117. A — Servicing an A2L flammable refrigerant requires eliminating ignition sources and ensuring ventilation to prevent ignition of leaked gas. Mild flammability still poses a real risk. These precautions are mandatory for A2L work.

118. C — A hot, discoloured discharge line with a burnt odour indicates excessive discharge temperature, often from a low charge or a restriction. High discharge heat degrades oil and refrigerant. This is a fault requiring diagnosis.

119. D — Cooling-tower and condenser-water maintenance centres on controlling scale, corrosion, and biological growth in the loop. Untreated water fouls heat transfer and promotes Legionella. Water treatment protects the system and health.

120. C — A system that has lost its full charge must be pressure-tested with nitrogen to find and repair the leak, then evacuated before recharging. Recharging without repair wastes refrigerant and violates good practice. Locate, repair, evacuate, then charge is the correct order.

121. B — A compressor tripping on overload and resetting when cooled, after charge is confirmed, points next to poor cooling, low voltage, or a failing capacitor. These cause overheating and overload trips. Each overloads the motor and triggers the protector.

122. D — For refrigerant compliance, the most important record is the type and quantity of refrigerant added or recovered during the service. This supports regulatory tracking and leak management. Cabinet colour, tool brand, and outdoor temperature are not compliance data.

123. B — A TXV sensing bulb must be properly clamped and insulated because poor contact gives a false superheat reading and causes the valve to misfeed the coil. Accurate bulb temperature is essential for correct metering. Good contact and insulation ensure proper feed.

124. C — A glide blend must be drawn from the cylinder as liquid to preserve the blend composition, since removing vapour would change the proportion of components remaining. Liquid removal keeps the charge composition correct. This applies when topping up the system.

125. D — Installing an oversized drive pulley raises blower speed, increasing both airflow and motor amperage draw. More air moved means more work and current. It does not decrease airflow, leave it unchanged, or reverse it.