PRACTICE EXAM 7: ASE A7 SIMULATION (50 QUESTIONS)

1. A vehicle's A/C system was working normally until the customer drove through a flooded roadway. After the incident, the A/C blows warm air. The compressor clutch engages and the compressor turns. Gauge readings show a low side of 58 psi and a high side of 92 psi at 84°F ambient. What is the MOST likely cause?

A. Water intrusion into the electrical connector at the compressor caused internal damage to the reed valves

B. The serpentine belt became saturated and lost traction, causing the compressor pulley to spin without driving

C. The condenser sustained impact damage from debris in the floodwater that ruptured a tube and lost the charge

D. The orifice tube screen became clogged with debris that entered the system through a breached seal

2. A technician is replacing the condenser and compressor after a catastrophic compressor failure on a vehicle with a serpentine tube condenser. All of the following components should also be replaced EXCEPT:

A. The evaporator core, provided it has been successfully flushed with approved solvent in reverse flow direction

B. The accumulator or receiver-drier, since its desiccant will be exposed to atmosphere during the repair

C. The radiator, since it is mounted behind the condenser and may have absorbed debris through shared airflow

D. The orifice tube or thermostatic expansion valve, since its screens trap debris from the compressor failure

3. A customer reports that their vehicle produces a clicking or ticking sound from behind the dashboard every time the ignition is turned on, even before the A/C or heater is activated. The sound lasts

approximately 10 seconds and then stops. The HVAC system functions normally after the noise stops. What is the MOST likely cause?

A. A failing blower motor bearing that briefly protests at initial startup before lubricant circulates

B. Refrigerant pressure equalizing through the metering device that occurs at engine key-on before startup

C. A worn serpentine belt tensioner that vibrates briefly until the belt seats into its operating position

D. HVAC door actuators performing their normal calibration sweep at system initialization during key-on

4. A technician measures 14.1V at the blower motor connector on the HIGH speed setting with the engine running. The blower motor runs but noticeably slower than a known-good identical vehicle. The ground circuit voltage drop tests at 0.2V. What is the MOST likely cause of the reduced blower speed?

A. An excessively high voltage drop in the power supply wire that is not being detected at the connector

B. A blower motor with increased internal resistance from worn brushes drawing less current at the same voltage

C. A failing alternator that cannot maintain stable output voltage under the blower's high current demand

D. A partially blocked cabin air filter creating back-pressure that physically slows the fan wheel rotation

5. On a vehicle with automatic temperature control, the scan tool shows the evaporator temperature reading −10°F. The actual evaporator temperature measured with an independent probe is 36°F. The A/C compressor is not engaging. What is the MOST likely explanation?

A. The evaporator has frozen solid due to a failed cycling clutch switch and the sensor reading is accurate

B. The compressor clutch coil has failed open and the cold evaporator reading is coincidental to the failure

C. The sensor is reading far colder than actual, and the module is preventing compressor engagement to avoid freeze-up

D. The HVAC control module has entered a protective shutdown mode unrelated to the evaporator sensor reading

6. A vehicle's engine thermostat opens at 195°F as rated. However, the customer complains that on very cold winter days (below 10°F ambient), the engine never fully reaches 195°F — the temperature gauge stabilizes at approximately 170°F and the heater output is insufficient. What is the MOST likely cause?

A. The thermostat wax element has weakened with age and is beginning to open prematurely below its rating

B. The engine coolant concentration is too low, reducing the coolant's ability to absorb and retain heat

C. The water pump is circulating coolant too quickly at highway speed, preventing adequate heat retention

D. The radiator is rejecting more heat than the engine produces under the extreme cold ambient conditions

7. Technician A says that a variable displacement compressor adjusts its pumping output by changing the angle of the internal swashplate. Technician B says that some variable displacement compressors are clutchless and run whenever the engine runs. Who is correct?

A. Technician A only, because all variable displacement compressors use an electromagnetic clutch for control

B. Both Technician A and Technician B are correct about variable displacement compressor design and operation

C. Technician B only, because variable displacement is achieved by varying compressor shaft speed not swashplate angle

D. Neither Technician A nor Technician B, because variable displacement compressors are not used in automobiles

8. A technician is checking for a heater core leak on a vehicle with no visible external coolant leaks. The cooling system holds pressure during a standard 15-minute pressure test. The technician suspects a very small heater core leak. What is the most sensitive detection method for this scenario?

A. Adding combustion gas test fluid to the coolant reservoir and checking for a color change indicating gases

B. Leaving the pressure tester connected for an extended period of 2–4 hours to detect a very slow pressure drop

C. Performing a visual inspection of the evaporator condensation drain for coolant-tinted or sweet-smelling fluid

D. Removing the dashboard and performing a direct visual inspection of the heater core exterior surface

9. A vehicle's HVAC system has the A/C compressor engaging normally, gauge pressures within specification, and cold vent temperatures of 40°F from the center vent. However, the customer complains of intermittent warm air from the driver-side face vent only. All other vents blow cold consistently. What should the technician investigate?

A. The driver-side face vent ductwork for a flap or damper that intermittently opens and allows warm air to mix in

B. The evaporator for a partial restriction that unevenly cools the left and right halves of the evaporator core

C. The blend door actuator for an intermittent position error that allows the door to drift slightly toward heat

D. The refrigerant charge for a marginal undercharge that cannot sustain even cooling across all outlet vents

10. A technician retrieves DTCs from a vehicle's HVAC control module and finds code B0131 — A/C Pressure Sensor Signal Range/Performance. The A/C compressor will not engage. What does this code indicate?

A. The A/C compressor clutch coil has an internal short that is detected by the module's diagnostic routine

B. The refrigerant charge has leaked below the minimum level required for safe compressor engagement

C. The A/C cycling clutch switch has failed and is sending a permanent open-circuit signal to the module

D. The pressure sensor signal is outside the module's expected voltage range, indicating a sensor or circuit fault

11. A vehicle's A/C system produces good cooling from the dashboard vents but poor cooling from the rear auxiliary vents. The rear blower motor operates at full speed. The front system gauges show normal pressures. What should the technician check FIRST?

A. The main system compressor for reduced output that is insufficient to supply both circuits adequately

B. The total system refrigerant charge to determine if it is sufficient for both front and rear evaporators

C. The rear expansion device for restriction or failure preventing adequate refrigerant flow to the rear evaporator

D. The front evaporator for a partial restriction that is stealing refrigerant flow from the rear system circuit

12. A technician is replacing the accumulator on an orifice tube system. Before installing the new accumulator, the technician should perform all of the following EXCEPT:

A. Remove the desiccant bag from the new accumulator and replace it with the desiccant from the old unit

B. Add the manufacturer-specified amount of fresh refrigerant oil to the new accumulator before installation

C. Remove the protective shipping caps from the new accumulator ports at the latest possible moment

D. Verify the new accumulator's port sizes and mounting configuration match the original component exactly

13. A vehicle has both the A/C and heating systems functioning poorly. The A/C produces vent temperatures of 55°F when 40°F–45°F is expected, and the heater produces maximum vent temperatures of only 105°F when 130°F+ is expected. Engine temperature is normal. What single underlying cause could affect both systems?

A. A low refrigerant charge that explains the poor A/C but has no mechanism to affect the heating system

B. A failed condenser fan that explains the poor A/C performance through inadequate condenser heat rejection

C. A clogged cabin air filter that is restricting total airflow through the evaporator and the heater core equally

D. Restricted airflow through the HVAC housing from a severely clogged cabin air filter reducing total heat exchange

14. A technician is diagnosing a vehicle where the compressor clutch does not engage. The scan tool shows the HVAC module is commanding the relay ON. At the relay socket, terminal 30 has 12.4V and terminal 86 has 12.2V. Terminal 85 has 11.8V with the A/C requested. What does the 11.8V reading at terminal 85 indicate?

A. Normal relay coil operation with the expected small voltage drop across the module's internal driver circuit

B. The HVAC module is NOT providing an adequate ground signal — terminal 85 should be near 0V when grounded

C. The relay coil has an internal short that is back-feeding voltage to the ground terminal from the power side

D. The fuse between the battery and terminal 30 has excessive internal resistance reducing available voltage

15. A vehicle with electronic HVAC controls has a mode door that correctly moves to each commanded position during a scan tool bidirectional test but does not respond when the mode buttons on the control panel are used. The blend door and blower speed respond normally to their respective control panel inputs. Which diagnostic path is MOST appropriate?

A. Replace the mode door actuator since it clearly has an intermittent motor that only responds to direct commands

B. Replace the HVAC control module since it correctly processes blower and blend commands but not mode

C. Inspect the CAN bus for an intermittent fault that drops mode data while allowing other data to pass

D. Test the mode selection buttons and their circuits on the HVAC control panel for an open or failed switch

16. A vehicle's A/C compressor runs and the system cools, but the technician notices that the compressor produces a brief metallic rattle for 1–2 seconds each time the clutch engages. The noise diminishes once the compressor reaches steady operation. Gauge pressures are normal. What is the MOST likely cause?

A. A worn serpentine belt that momentarily slips during the torque spike caused by compressor clutch engagement

B. A misaligned compressor mounting bracket that allows the compressor body to shift during engagement shock

C. Normal compressor startup behavior as internal components settle into their operating positions under load

D. Liquid refrigerant present in the compressor that is briefly hammered during the initial compression strokes

17. A technician is inspecting a compressor that has been removed from a vehicle. The discharge port has a blue-black heat discoloration, and the oil drained from the compressor is dark black with a burnt odor. What do these findings indicate about the compressor's operating history?

A. The compressor experienced prolonged overheating from insufficient lubrication, restricted airflow, or both

B. The compressor was operating with an incompatible refrigerant type that caused chemical decomposition

C. The findings are normal for a compressor with over 100,000 miles of service and do not indicate a problem

D. The compressor was flooded with liquid refrigerant that washed away the oil film and caused thermal damage

18. Technician A says that when pressure testing a cooling system, the tester should be pumped to the pressure cap's rated pressure and the system should hold that pressure for at least 10–15 minutes without dropping. Technician B says that a pressure test only detects external leaks and cannot identify internal leaks such as a head gasket breach. Who is correct?

A. Technician A only, because pressure testing can detect both internal and external leaks through pressure decay

B. Both Technician A and Technician B, because pressure testing only finds external leaks with visible dripping

C. Technician A only, because an internal head gasket leak will also cause the pressure to drop during the test

D. Technician B only, because a small external leak may not produce visible dripping during a short test period

19. A vehicle has a dual-zone ATC system. The driver side maintains the set temperature correctly. The passenger side blows maximum cold air regardless of the set temperature. The scan tool shows the passenger blend door commanded to 65% (near warm) but the actual position feedback reads 2% (full cold). No DTCs are stored. What is the MOST likely cause?

A. A faulty passenger-side in-car temperature sensor sending an incorrect signal to the HVAC control module

B. A failed passenger-side blend door actuator that cannot move the door to the commanded warm position

C. A seized passenger-side blend door that is physically stuck and cannot be moved by the actuator motor

D. A wiring fault between the module and the passenger actuator preventing the command signal from arriving

20. A technician performs a voltage drop test on the compressor clutch ground circuit while the clutch is engaged. The reading is 2.3V. What does this indicate?

A. Excessive resistance in the ground circuit is reducing the current flow through the clutch coil significantly

B. Normal voltage drop for a high-current electromagnetic component operating under full magnetic load

C. The clutch coil is internally shorted, drawing excessive current that produces the high voltage drop reading

D. The test was performed incorrectly because voltage drop tests cannot be performed on ground circuits

21. A technician charges an A/C system with the specified 20 ounces of R-134a. After charging, the system cools adequately, but the customer returns one week later with reduced cooling. The technician recovers 15 ounces — a loss of 5 ounces. The technician repairs a leak at a fitting, evacuates, and recharges with 20 ounces. What additional step is essential?

A. Verify the condenser fan is operating correctly since a fan issue could mask a charge problem

B. Perform a post-repair leak test with the system operating to confirm the repair sealed the leak completely

C. Replace the compressor as a precaution since it ran for a week with insufficient refrigerant and oil volume

D. Add an extra 2 ounces of oil to compensate for oil that was lost along with the 5 ounces of refrigerant

22. A vehicle's A/C compressor has a shaft seal leak that has been confirmed by electronic leak detection and UV dye. The compressor is three years old and otherwise functions normally with no abnormal noises or pressure issues. What is the correct repair approach?

A. Replace the entire compressor because shaft seals cannot be replaced independently on any compressor design

B. Apply an approved A/C sealant additive to the system as the primary repair for this type of small component leak

C. Add additional refrigerant to compensate for the leak rate and schedule seal replacement at the next major service

D. Recover refrigerant, replace the shaft seal if the design allows it or replace the compressor, evacuate, and recharge

23. A technician is testing the R-134a refrigerant in a vehicle using a refrigerant identifier. The results show R-134a at 96% with 4% air. What is the correct action?

A. Proceed with normal service since up to 5% air content is considered within the acceptable tolerance range

B. Recover the refrigerant, evacuate the system to remove the air contamination, and recharge with the correct amount

C. Add additional R-134a to the system to dilute the air concentration below the standard 2% acceptable threshold

D. Replace the accumulator or receiver-drier since air contamination indicates the desiccant has become saturated

24. On a vehicle with an ATC system, the technician observes that the blower motor starts at a very low speed after a cold start on a winter morning and gradually increases over the first 3–4 minutes. The customer has the blower speed set to AUTO and the temperature set to 78°F. What does this behavior indicate?

A. A faulty blower motor controller that is slow to reach full operating voltage due to cold temperature effects

B. A failing blower motor that draws insufficient current when cold and gradually improves as it warms up

C. Normal ATC cold-start strategy that limits blower speed until coolant warms enough to provide useful heat

D. A defective in-car temperature sensor that reads colder than actual and delays the module's heating response

25. A technician is diagnosing a vehicle with no A/C cooling. The compressor clutch engages. The low-side pressure reads 65 psi and the high-side pressure reads 70 psi at 82°F ambient. What is the MOST likely cause?

A. A severely worn compressor that has lost nearly all internal compression capability and cannot pump effectively

B. A massively overcharged system where excess refrigerant has flooded both sides and equalized pressures

C. A completely blocked condenser that is preventing any refrigerant from flowing through the high side

D. A stuck-wide-open TXV that has eliminated the pressure differential between the high and low sides

26. A vehicle's heater blows hot air from the floor vents and cold air from the defrost vents simultaneously when the mode is set to floor only. The scan tool shows the mode door commanded to floor position and the actual position feedback matches. What is the MOST likely cause?

A. A failed HVAC control module sending simultaneous commands to both the floor and defrost output circuits

B. Normal HVAC design where floor mode always includes partial defrost delivery to prevent windshield fogging

C. A broken or missing HVAC housing seal that allows air to bypass the mode door and exit through the defrost path

D. The defrost ductwork is physically connected upstream of the mode door and always receives some uncontrolled airflow

27. Technician A says that the accumulator in an orifice tube system has an oil bleed hole at the base of its pickup tube that returns oil to the compressor. Technician B says that the receiver-drier in a TXV system also has an oil bleed hole to return oil to the compressor. Who is correct?

A. Technician A only, because the receiver-drier delivers liquid refrigerant with oil already mixed in to the TXV

B. Both Technician A and Technician B, because both components require dedicated oil return mechanisms

C. Technician B only, because only high-side components need oil bleed holes to overcome the pressure differential

D. Neither Technician A nor Technician B, because oil is returned to the compressor through the suction line alone

28. A vehicle's A/C system has been charged to specification. The ambient temperature is 75°F. The low-side pressure reads 38 psi and the high-side reads 180 psi. The center vent temperature is 42°F. The condenser outlet temperature measured with an infrared thermometer is 95°F. Using the P-T chart, the high-side pressure of 180 psi corresponds to approximately 110°F. What is the subcooling value?

A. 95°F, which represents the absolute condenser outlet temperature measured by the infrared thermometer

B. 180 psi, which represents the high-side system pressure and is used directly as the subcooling reference

C. 70°F, which represents the difference between the condenser outlet and the ambient air temperature

D. 15°F, which represents the difference between the P-T chart saturation temperature and the actual outlet temperature

29. A technician is diagnosing an ATC system where the customer reports that the temperature control works correctly but the air always comes out of the panel vents regardless of the mode selected. The scan tool shows the mode door is commanded to different positions for each mode selection, but the actual position remains fixed at 20%. What is the MOST likely cause?

A. A faulty HVAC control module that correctly commands the mode door but cannot detect the feedback error

B. A failed mode door actuator that is not responding to the module's commands due to a motor or gear failure

C. A disconnected position feedback wire that is sending a fixed reading while the door actually moves correctly

D. An obstruction inside the HVAC housing that is physically preventing the mode door from moving to any position

30. A technician is replacing a heater core on a vehicle. During reassembly, one of the heater hose connections at the firewall develops a drip when the cooling system is refilled. The technician tightens the clamp an additional quarter turn and the drip stops. What potential issue should the technician be aware of with this approach?

A. Over-tightening a hose clamp can crush the heater core inlet or outlet tube, causing a restriction or crack

B. The additional clamping force may cause the rubber hose to deform and create a leak at a different point

C. Quarter-turn adjustments exceed the clamp manufacturer's maximum torque specification in all applications

D. The heater hose has likely deteriorated internally and should be replaced regardless of the clamp adjustment

31. A vehicle's A/C system has the following condition: the low-side suction line from the evaporator to the compressor is covered in heavy frost, and the accumulator body is also frosted over completely. The low-side pressure is 24 psi and the high-side is 195 psi at 80°F ambient. Vent temperature is 34°F. What is the MOST likely cause?

A. A failed freeze protection device allowing the evaporator to overcool, with excess liquid flooding into the suction line

B. A critically low refrigerant charge that is causing the small amount of refrigerant to flash-freeze at the evaporator

C. A severely restricted orifice tube creating excessive pressure drop and corresponding temperature drop at the outlet

D. Normal system operation under moderate ambient conditions with slightly aggressive compressor cycling behavior

32. A vehicle with electronic HVAC controls has a complaint that the A/C compressor does not engage when the outside temperature is below 35°F, even when the defrost mode is selected. The scan tool shows the ambient temperature sensor reading correctly at 32°F. What is the MOST likely explanation?

A. A faulty ambient temperature sensor that is reading lower than actual, falsely triggering the cold lockout

B. A failed A/C pressure switch that prevents engagement at low ambient temperatures to protect the system

C. The HVAC module's programming includes a low-ambient lockout that disables the compressor below a preset threshold

D. A compressor clutch coil that loses magnetic strength in cold temperatures and cannot engage the clutch hub

33. A vehicle has an A/C system that was recently repaired at another shop. The customer now complains that the A/C cools but produces a chemical odor from the vents that was not present before the repair. The odor is strongest when the A/C first turns on. What is the MOST likely cause?

A. The previous shop used an incorrect refrigerant type that produces a detectable odor during evaporation

B. The evaporator was contaminated with solvents during the repair that were not fully purged from the system

C. Residual flux from a brazing repair performed on a refrigerant line near the evaporator is outgassing fumes

D. Residual flushing solvent left in the system that was not fully purged with nitrogen before reassembly and charging

34. Technician A says that when measuring the compressor clutch air gap, the measurement should be taken at a single point with the most accessible feeler gauge angle. Technician B says that the air gap should be measured at three or four equally spaced points around the clutch hub to check for uniformity. Who is correct?

A. Technician A only, because the air gap is manufactured to be perfectly uniform and a single point is sufficient

B. Technician B only, because an uneven gap indicates a warped hub or worn pulley that a single measurement would miss

C. Both Technician A and Technician B, because either measurement approach provides an acceptable result

D. Neither Technician A nor Technician B, because the air gap is not a serviceable specification on modern compressors

35. A technician is diagnosing a vehicle where the scan tool communicates with the HVAC module but receives "no response" errors when attempting to command the blend door actuator through bidirectional testing. All other actuator tests function normally. What is the MOST likely cause?

A. A communication fault on the LIN bus wire specifically connecting the HVAC module to the blend door actuator

B. A failed HVAC control module that has lost its ability to send commands to the blend door output circuit

C. A defective scan tool that is incompatible with the blend door actuator's specific communication protocol

D. A short circuit in the blend door actuator motor winding that is blocking all communication to the device

36. Technician A says that heat is transferred from the engine coolant to the cabin air through the heater core by a combination of conduction and forced convection. Technician B says that the heater core works by the same heat transfer principles as the evaporator, but in the opposite direction. Who is correct?

A. Technician A only, because the evaporator uses radiation rather than convection for its heat transfer

B. Technician B only, because the heater core uses a fundamentally different mechanism than the evaporator

C. Both Technician A and Technician B are correct about how the heater core transfers heat to the cabin air

D. Neither Technician A nor Technician B, because the heater core transfers heat purely through radiation

37. On a vehicle with vacuum-controlled HVAC mode doors, the technician replaces a cracked vacuum hose between the HVAC control panel and the mode door actuator for the floor outlet. After the repair, the floor mode works correctly. However, the technician notices that the defrost mode now blows from both the defrost and panel vents instead of defrost only. What is the MOST likely cause?

A. The new vacuum hose has a slightly smaller internal diameter that restricts vacuum flow to the defrost actuator

B. The technician accidentally connected the new hose to the wrong port on the HVAC control panel vacuum switch

C. The replacement hose is too long and has developed a kink that restricts vacuum flow to the defrost circuit

D. The defrost actuator diaphragm was damaged when the technician removed the old hose from its connection

38. A vehicle's cooling system pressure cap passes the pressure relief test at its rated 16 psi. However, the technician notices that the cap's rubber sealing gasket on the bottom is cracked and deteriorated. What potential problem could this damaged gasket cause?

A. The cap may not seal the system properly at lower pressures, allowing coolant vapor to escape and reducing the level

B. The system will overpressurize because the damaged gasket prevents the relief valve from opening at the rated pressure

C. The cap will function normally because the pressure relief mechanism is independent of the bottom sealing gasket

D. The coolant will become contaminated with rubber particles from the deteriorating gasket material in the cap

39. A technician replaces a TXV on a vehicle. After installation, the sensing bulb is clamped to the suction line at the evaporator outlet and insulated. On the first test drive, the system overcools the evaporator and frost forms on the suction line all the way to the compressor. What installation error is MOST likely?

A. The sensing bulb was mounted on the liquid line instead of the suction line, reading a higher temperature

B. The capillary tube between the bulb and valve body was kinked during installation, restricting bulb pressure

C. The insulation wrap on the sensing bulb is too thick, preventing the bulb from accurately sensing suction temperature

D. The sensing bulb was mounted on the bottom of the suction line where pooled liquid refrigerant gives a false cold reading

40. A vehicle with a cycling clutch orifice tube system has the compressor clutch cycling normally at 30-second intervals. The low-side pressure cycles between 25 psi (clutch disengages) and 45 psi (clutch re-engages). The ambient temperature is 82°F. What can the technician determine from these cycling pressures?

A. The system is slightly overcharged because the high cycling pressure of 45 psi exceeds the normal range

B. The cycling switch cutout point of 25 psi is too low and the switch should be replaced to prevent freeze-up

C. The cycling pressures and interval are within normal range, indicating a properly charged and functioning system

D. The compressor is worn internally because the pressure should drop further before the switch cuts out

41. A vehicle's A/C system was working normally. The customer had the vehicle's windows tinted with aftermarket film at a tint shop. After the tinting, the customer notices the A/C seems to work harder and

the vent temperature is approximately 3°F–5°F warmer than before. What is the MOST likely explanation?

A. The tint shop accidentally disconnected an A/C component during the window removal for tinting application

B. The window tint is reflecting heat back into the cabin interior rather than allowing it to pass through the glass

C. The adhesive used for the tint film is outgassing chemicals that are interfering with the evaporator surface

D. The darker tint is absorbing more solar radiation and re-radiating it as heat into the cabin, increasing the heat load

42. A technician checks the voltage at an NTC temperature sensor connector that is disconnected from the sensor. With the sensor unplugged, the voltmeter reads 5.0V between the signal wire and ground. When the sensor is reconnected, the voltage drops to 2.8V. What does this behavior indicate?

A. The sensor circuit has an open ground wire that is preventing current from flowing through the thermistor

B. The sensor and its voltage divider circuit are functioning normally — 5V reference drops to a lower signal voltage when the sensor provides its resistance

C. The 5V reference wire has excessive resistance that is causing a significant voltage drop under sensor load

D. The sensor is shorted internally and is pulling the reference voltage to an abnormally low reading value

43. A vehicle's A/C system has a slow leak that the technician has been unable to locate after multiple attempts with electronic detection and UV dye. The system loses approximately 3 ounces per month. The technician suspects the evaporator but cannot confirm. What additional diagnostic technique might reveal the leak?

A. Remove a blower motor resistor or access panel near the evaporator and insert an electronic detector probe into the housing

B. Inject a double dose of UV dye and wait an additional month for greater dye accumulation at the leak point

C. Pressurize the system to 300 psi with nitrogen to force the leak to become large enough for detection

D. Replace the evaporator preemptively since it is statistically the most common source of undetectable leaks

44. A vehicle has a confirmed R-1234yf A/C system. The technician has only R-134a recovery equipment available in the shop. What should the technician do?

A. Use the R-134a equipment with extra caution since the two refrigerants have nearly identical characteristics

B. Explain to the customer that R-1234yf requires dedicated SAE J2843 equipment that the shop does not have

C. Recover the R-1234yf with R-134a equipment but store it in a separate dedicated container for proper handling

D. Convert the system to R-134a first so that it can be serviced with the available R-134a shop equipment

45. A vehicle with ATC has the following scan tool data: set temperature 72°F, in-car sensor 72°F, ambient sensor 85°F, sun load sensor 0.2V (vehicle in full sun), evaporator temp 37°F. The customer reports the system cannot maintain temperature on sunny days. What is the MOST likely cause?

A. The evaporator temperature sensor is reading colder than actual and limiting compressor operation

B. The sun load sensor is reading near-zero in direct sunlight, so the module does not anticipate the solar heat load

C. The in-car temperature sensor aspirator fan has failed, causing delayed cabin temperature feedback

D. The ambient temperature sensor is heat-soaked and reading higher than actual, causing overcooling response

46. A vehicle's engine temperature gauge reads normal, but the technician notices that the upper radiator hose is cold after the engine has been running for 20 minutes. What is the MOST likely cause?

A. A clogged radiator that is preventing coolant from entering the radiator through the upper hose connection

B. A failed water pump that is not circulating coolant from the engine to the radiator through the upper hose

C. A faulty temperature gauge or sender that is displaying normal when the engine is actually running cold

D. A thermostat stuck in the closed position that is preventing hot coolant from flowing to the radiator

47. A vehicle has a cabin air filter located behind the glove box. The filter has never been replaced in 60,000 miles. What HVAC symptoms might this neglected filter produce?

A. Reduced airflow from all vents, increased blower motor noise at higher speeds, and possible musty odor from trapped debris

B. Elevated high-side A/C pressure due to the restricted airflow reducing heat transfer at the evaporator core

C. A/C compressor rapid cycling caused by the restricted airflow creating a false low-pressure reading at the sensor

D. Engine overheating because the restricted cabin filter also limits airflow through the engine cooling system

48. Technician A says that EPA Section 609 certification for motor vehicle A/C service is a one-time lifetime certification that never expires. Technician B says that the ASE A7 Heating and Air Conditioning certification must be renewed every five years. Who is correct?

A. Technician A only, because the ASE A7 is also a lifetime certification that never requires renewal testing

B. Technician B only, because EPA Section 609 certification also requires renewal every five years like the ASE

C. Both Technician A and Technician B are correct about the expiration policies of each respective certification

D. Neither Technician A nor Technician B, because both certifications require annual renewal and testing

49. A vehicle has an intermittent heating complaint. Sometimes the heater blows hot air normally, and other times it blows lukewarm air during the same drive. The engine temperature gauge remains steady in the normal range throughout. Both heater hoses feel hot when the heater works and slightly cooler when it does not. What is the MOST likely cause?

A. An intermittent blend door actuator that periodically moves the door toward the cold position without command

B. An air pocket in the heater core that intermittently blocks coolant flow and then clears as driving conditions change

C. A faulty engine thermostat that momentarily opens too wide and reduces coolant temperature during transients

D. A partially clogged heater core that restricts flow intermittently as debris shifts position within the core passages

50. A technician is evaluating a vehicle's A/C system after a customer complaint of poor cooling. The manifold gauges show low-side at 30 psi and high-side at 200 psi at 85°F ambient. The vent temperature is 44°F. Subcooling is 15°F and superheat is 10°F. The customer states the system "just doesn't feel as cold as my previous car." What should the technician conclude?

A. The system is slightly undercharged and would benefit from the addition of 2–3 ounces of refrigerant

B. The TXV is beginning to restrict and should be replaced to restore optimal evaporator refrigerant flow

C. The system is operating within normal specifications and the customer's expectation may exceed the system's design capability

D. The condenser is partially restricted and a thorough cleaning would likely improve vent temperatures by 5°F–8°F

Practice Exam 7: Answer Key and Explanations

1. A — Gauge readings of 58 psi low / 92 psi high with the compressor engaged show pressures trending toward equalization — the classic signature of a compressor with internal damage that cannot maintain adequate pressure differential. Water intrusion through the electrical connector during the flood event could have caused a short that damaged internal components, or water entering through a compromised seal could have caused hydraulic lock damage to reed valves or pistons. The compressor turns but cannot effectively compress.

2. C — The radiator does not need to be replaced after a compressor failure — it is not part of the refrigerant circuit and shares no internal passages with the A/C system. The accumulator/receiver-drier must be replaced (system opened to atmosphere), the orifice tube/TXV must be replaced (screens trap compressor debris), and the evaporator should be flushed if possible. The radiator is a cooling system component that is completely independent of the refrigerant circuit.

3. D — A brief clicking or ticking sound lasting approximately 10 seconds at key-on that resolves before any HVAC request is made is the characteristic sound of HVAC door actuators performing their initialization calibration sweep. The ATC module commands each actuator through its full travel range at startup to establish position reference points for the session. This self-test is normal and programmed behavior on most vehicles with electronic HVAC controls.

4. B — With 14.1V at the connector and only 0.2V ground voltage drop, the motor has adequate power supply and ground — yet it runs slower than an identical known-good vehicle at the same voltage. A motor with worn brushes, a partially open armature winding, or increased internal friction from a dragging bearing develops higher internal resistance, which reduces the current it draws at any given voltage. Less current means less electromagnetic force, which means the motor spins slower despite receiving the same voltage.

5. C — The evaporator sensor reads −10°F while the actual temperature is 36°F — a massive 46°F error reading far colder than reality. The ATC module believes the evaporator is frozen solid at −10°F and refuses to engage the compressor to prevent further freeze-up and potential compressor damage from

liquid slugging. The module is making the correct protective decision based on false data. The sensor or its circuit must be repaired to restore compressor operation.

6. D — At extremely cold ambient temperatures (below 10°F), the massive temperature differential between the engine coolant and the outside air causes the radiator to reject heat at an extremely high rate — even with the thermostat restricting flow. The engine's heat production from combustion may not be sufficient to overcome this extreme heat rejection, especially at highway speed where ram air further increases radiator cooling. The engine stabilizes at a temperature below the thermostat's opening point because heat loss exceeds heat production.

7. B — Both technicians are correct. Technician A correctly describes the variable displacement mechanism — the swashplate angle changes to vary the piston stroke length, directly controlling pumping volume. Technician B correctly identifies that some modern variable displacement compressors are clutchless — the pulley connects directly to the shaft and the compressor turns whenever the engine runs, with displacement control alone managing cooling output from maximum to near-zero.

8. B — A very small heater core leak may not produce enough pressure loss to be detectable in a standard 15-minute pressure test. Leaving the pressure tester connected for an extended period of 2–4 hours dramatically increases sensitivity — a slow leak that drops 1 psi per hour would lose less than 0.25 psi in 15 minutes (undetectable) but would show a clear 2–4 psi drop over 2–4 hours. This extended test is the most sensitive non-invasive method for confirming a suspected slow heater core leak.

9. A — The center vent blows consistently cold at 40°F, confirming the refrigeration system and blend door are functioning correctly. An intermittent warm-air problem from only the driver-side face vent while all other vents remain cold points to a ductwork issue specific to that single vent path. A loose flap, disconnected duct section, or gap in the driver-side ductwork could intermittently allow warm engine compartment air or recirculated cabin air to mix into that specific vent's airstream.

10. D — DTC B0131 indicates the A/C pressure sensor signal is outside the module's expected voltage range — either too high, too low, or erratic. The module cannot determine system pressure from an out-of-range signal, so it disables the compressor as a protective measure since it cannot verify safe operating conditions. The fault could be in the sensor itself, its wiring, its connector, or the module's input circuit. The DTC narrows the search to the pressure sensor circuit.

11. C — The front system works normally with correct pressures, proving the compressor, condenser, and total refrigerant charge are adequate for the shared circuit. The rear blower operates at full speed,

confirming the rear air distribution side is functional. The problem is isolated to the rear refrigeration circuit — specifically the rear expansion device, which controls refrigerant flow into the rear evaporator. A restricted or failed rear expansion device starves the rear evaporator while the front operates normally.

12. A — The desiccant bag from the old accumulator is saturated with moisture and contaminants — it should never be transferred to a new accumulator. The new accumulator arrives with a fresh desiccant bag specifically sized and rated for the application. Reusing old desiccant defeats the purpose of replacing the accumulator and introduces the very moisture contamination the new desiccant is meant to protect against. All other listed steps are correct service procedures.

13. D — A severely clogged cabin air filter restricts the total volume of air flowing through the HVAC housing, reducing the amount of air passing over both the evaporator and the heater core. Less airflow through the evaporator means less total heat absorption even though the evaporator is cold. Less airflow through the heater core means less total heat delivery even though the core is hot. Both the A/C vent temperature and heater vent temperature suffer because the same restricted airflow affects both heat exchangers.

14. B — Terminal 85 is the relay coil ground terminal — the HVAC module provides the ground path to energize the coil. When the module grounds terminal 85, the voltage should drop to near 0V (typically 0.1–0.5V representing the small voltage drop across the module's internal ground-side driver). A reading of 11.8V at terminal 85 indicates the module is NOT providing ground — the terminal is essentially floating at near-battery voltage through the coil winding. The module's ground-side driver has failed or the ground wire is open.

15. D — The scan tool bidirectional test proves the mode door actuator, the HVAC module's output circuit, and the LIN bus communication are all functional — the actuator responds correctly to direct commands. The blend door and blower speed buttons work normally from the control panel, proving the panel communicates with the module for those functions. Only the mode selection buttons produce no response, indicating a localized failure in the mode button section of the control panel assembly.

16. D — A brief metallic rattle for 1–2 seconds at clutch engagement that diminishes once the compressor reaches steady operation is characteristic of liquid refrigerant present in the compressor at startup. The compressor attempts to compress this incompressible liquid, producing hydraulic hammering sounds until the liquid clears and only vapor enters. This condition — called liquid slugging — typically results from a flooded evaporator, failed accumulator, or refrigerant migration during off-cycles.

17. A — Blue-black heat discoloration at the discharge port and dark black, burnt-smelling oil are definitive signs of sustained compressor overheating. The extreme temperatures that produce this discoloration result from insufficient lubrication (oil too low, wrong viscosity, or degraded), restricted condenser airflow creating abnormally high discharge pressures, or prolonged operation with a critically low refrigerant charge. The root cause of the overheating must be identified and corrected before installing a replacement.

18. C — Technician A is correct that a properly conducted pressure test should hold the rated pressure for 10–15 minutes, and that an internal head gasket leak will also cause pressure decay during the test because coolant is being pushed into the combustion chamber or oil passages under the applied pressure. Technician B is incorrect because pressure testing can detect both internal and external leaks — any pathway that allows coolant to escape under pressure will produce a measurable pressure drop, regardless of whether the leak exits externally or internally.

19. B — The scan tool shows a clear position disagreement: the module commands 65% (near warm) but the actual position reads 2% (full cold). The module is sending the correct command for the temperature setting, but the actuator is not moving the door to the commanded position. A failed actuator — stripped gears, burned motor, or electrical fault in the motor circuit — prevents the door from moving from its current full-cold position to the commanded near-warm position.

20. A — A ground circuit voltage drop of 2.3V far exceeds the maximum acceptable 0.3V for a ground circuit. This excessive resistance in the ground path is consuming 2.3V that should be available to the clutch coil, significantly reducing the current flowing through the coil. Reduced current means a weaker magnetic field, which may cause the clutch to slip, engage weakly, or fail to engage entirely. The ground connection must be cleaned, tightened, or repaired.

21. B — After repairing a leak and recharging, the critical final step is verifying the repair actually sealed the leak. A post-repair leak test with the system operating at full pressures (compressor running, high-side at normal operating pressure) confirms the repaired fitting holds under real-world conditions. A leak that appears sealed with static pressure may reopen under the higher dynamic operating pressures. Releasing the vehicle without this verification risks a repeat visit.

22. D — A confirmed shaft seal leak with an otherwise functional compressor requires proper repair — recover the refrigerant, replace the shaft seal (if the compressor design allows independent seal replacement) or replace the compressor (if the seal is not independently serviceable), evacuate the system, and recharge. Sealant additives are not an acceptable permanent repair. Adding refrigerant to compensate for the leak violates EPA regulations. The correct repair restores system integrity.

23. B — Air content of 4% exceeds the generally accepted 2% threshold for non-condensable gases in an A/C system. The air raises high-side pressure above normal, reduces cooling efficiency, and introduces moisture. The correct action is to recover the contaminated refrigerant, evacuate the system thoroughly to remove all air and moisture, and then recharge with the correct amount of pure R-134a. Simply adding more refrigerant to dilute the air does not remove it from the system.

24. C — This is normal ATC cold-start strategy. On a cold morning, the engine coolant is too cold to produce useful cabin heat. Blowing high-speed air across the cold heater core would deliver uncomfortable cold air directly at the occupants. The ATC module intentionally limits blower speed until the coolant temperature sensor confirms adequate warmth, then gradually ramps the blower speed upward. This prevents the blast of cold air that would occur if the blower ran at full speed from the start.

25. A — Pressures of 65 psi low / 70 psi high are nearly equalized, with minimal differential between the two sides. The compressor is the only component that creates the pressure differential — when the low side is nearly as high as the high side, the compressor has lost virtually all internal compression capability. Severely worn reed valves, piston rings, or scroll elements allow refrigerant to flow back through the compressor internally rather than being effectively pumped from low to high side.

26. C — The scan tool confirms the mode door is correctly commanded and positioned for floor-only delivery, so the actuator and module are functioning properly. Hot air from the floor with simultaneous cold air from the defrost vents indicates air is bypassing the mode door through a gap or broken seal in the HVAC housing. A missing or deteriorated foam seal around the mode door frame allows uncontrolled air to leak past the door and exit through the defrost path regardless of door position.

27. A — Technician A is correct that the accumulator has an oil bleed hole at the base of its pickup tube — this small opening allows compressor oil that settles to the bottom of the accumulator (with any liquid refrigerant) to be metered back into the suction vapor stream and returned to the compressor. Technician B is incorrect because the receiver-drier does not need an oil bleed hole — it delivers liquid refrigerant (with oil already dissolved in it) to the TXV, and the oil flows naturally with the refrigerant through the rest of the circuit.

28. D — Subcooling equals the P-T chart saturation temperature at the measured high-side pressure minus the actual measured condenser outlet temperature: 110°F (P-T chart at 180 psi) − 95°F (measured outlet) = 15°F subcooling. This 15°F value falls within the normal 10°F–20°F range, confirming that the condenser is fully condensing the refrigerant into liquid and sub-cooling it adequately before it reaches the metering device.

29. B — The scan tool shows the module commanding different positions for each mode selection (confirming the module and control panel are working), but the actual position remains stuck at 20% regardless of the command. This position disagreement — commanded moves but actual does not — is the classic signature of a failed actuator. The motor or internal gears have failed, preventing the actuator from driving the mode door to the commanded positions.

30. A — Over-tightening a hose clamp on the relatively thin-walled heater core inlet or outlet tube can crush, deform, or crack the tube material — particularly on aluminum heater cores. This may create a restriction that reduces coolant flow through the core, or it may cause a crack that develops into a leak days or weeks later when the system thermally cycles. The correct approach for a persistent drip is to inspect the tube surface and hose condition, replace the hose if deteriorated, and ensure proper clamp selection and torque.

31. A — Heavy frost extending from the evaporator through the suction line and across the entire accumulator body indicates liquid refrigerant is present well beyond the evaporator — the evaporator is being flooded with more refrigerant than it can evaporate. The excess liquid carries into the suction line and accumulator, chilling everything it contacts below the dew point and causing frost formation. The freeze protection device (cycling switch or evaporator temp sensor) has failed, allowing the evaporator to overcool without disengaging the compressor.

32. C — Many ATC modules are programmed with a low-ambient temperature lockout that prevents compressor engagement when the outside temperature drops below a preset threshold (typically 32°F–40°F). This feature protects the evaporator from freeze-up in conditions where the ambient air is already near or below freezing. If the ambient sensor reads accurately at 32°F and the module's lockout threshold is set above this temperature, the compressor will not engage — this is programmed behavior, not a fault.

33. D — A chemical odor from the vents after a recent A/C repair — strongest at initial startup — is most commonly caused by residual flushing solvent that was not fully purged from the system before reassembly and charging. The solvent evaporates slowly from internal surfaces and is carried into the cabin airstream by the blower. Proper flushing technique requires thorough nitrogen blow-dry of all flushed components to remove every trace of solvent before the system is sealed and charged.

34. B — Technician B is correct that the air gap must be measured at three or four equally spaced points around the clutch hub circumference. A single-point measurement could read within specification while other points are out of range — a warped hub or worn pulley face creates uneven gaps that only multi-point measurement reveals. An uneven gap causes partial engagement, clutch chatter, and premature wear. Technician A's single-point approach would miss this condition.

35. A — All other actuator tests work normally through the scan tool, confirming the HVAC module, the scan tool, and the general communication pathway are functional. Only the blend door actuator fails to respond. Since the HVAC module communicates with its actuators over the LIN bus — with individual wires to each actuator — a fault on the specific LIN bus wire connecting the module to the blend door actuator would prevent communication with only that actuator while all others function normally.

36. C — Both technicians are correct. Technician A correctly identifies that heat transfers from the hot coolant through the heater core tube walls (conduction) and then into the cabin air being pushed across the fins by the blower motor (forced convection). Technician B correctly recognizes that the heater core and evaporator operate on the same heat transfer principles — conduction through the tube walls and forced convection from airflow — but in opposite directions: the evaporator absorbs heat from the air, while the heater core releases heat into the air.

37. B — HVAC vacuum control panels have multiple ports, each routed to a specific actuator for a specific mode function. Connecting the replacement hose to the wrong port sends vacuum to the wrong actuator — restoring the floor function (because the floor actuator now receives vacuum through the incorrectly routed hose) while disrupting the defrost function (because the defrost actuator is now receiving vacuum from the wrong port or not at all). Carefully verify port-to-hose routing against the service diagram.

38. A — The bottom sealing gasket creates the primary pressure seal between the cap and the filler neck. If this gasket is cracked and deteriorated, it may not seal adequately — particularly at lower pressures during warm-up or during cooldown when the system transitions from positive pressure to slight vacuum. Coolant vapor can escape past the compromised gasket, resulting in gradual coolant loss even though the pressure relief mechanism tested correctly at its rated 16 psi.

39. D — The TXV sensing bulb must be mounted on the side or top of the suction line — never at the bottom. Liquid refrigerant naturally pools at the bottom of horizontal suction lines due to gravity. A bulb mounted at the 6 o'clock position reads the cold temperature of this pooled liquid rather than the vapor temperature, causing it to generate less opening pressure than appropriate. The valve opens wider than needed, flooding the evaporator with excess refrigerant that extends as frost into the suction line.

40. C — In a cycling clutch orifice tube system, normal clutch cycling behavior involves the compressor running until the low-side pressure drops to the cycling switch cutout point (typically 23–28 psi) and re-engaging when pressure rises to the cut-in point (typically 40–48 psi). A cutout of 25 psi and cut-in of 45 psi with 30-second intervals at 82°F ambient falls squarely within normal operating parameters, indicating a properly charged system with a functioning cycling switch.

41. D — Aftermarket window tint — particularly darker shades — absorbs a significant percentage of the solar radiation striking the glass. This absorbed energy heats the glass itself, which then re-radiates that heat inward as infrared radiation into the cabin. The net effect is an increased heat load inside the cabin that the A/C system must overcome, producing slightly warmer vent temperatures. This is a known trade-off of darker window films and is not an A/C system fault.

42. B — This is textbook voltage divider circuit behavior. With the sensor disconnected, the DMM reads the full 5V reference because no current flows through the circuit (infinite resistance at the open connector). When the sensor is reconnected, its NTC thermistor resistance creates a voltage divider with the module's internal fixed resistor, dropping the signal voltage to 2.8V — a value that corresponds to the sensor's resistance at the current temperature. Both readings confirm normal circuit operation.

43. A — Standard external electronic leak detection cannot reach the evaporator because it is sealed inside the HVAC housing. Removing a blower motor resistor, an access panel, or a drain plug near the evaporator creates a path to insert the electronic detector probe directly into the HVAC housing airspace near the evaporator surface. Any refrigerant leaking from the evaporator accumulates in this enclosed space at a higher concentration than at the vent outlets, making detection significantly more likely.

44. C — R-1234yf is classified as mildly flammable (A2L) and EPA regulations require dedicated SAE J2843-certified equipment — which includes a mandatory built-in refrigerant identifier — for R-1234yf service. Using R-134a equipment on an R-1234yf system violates federal regulations and creates cross-contamination and safety risks. The correct response is to inform the customer that the shop lacks the required equipment and either refer them to an equipped facility or invest in the proper R-1234yf equipment.

45. B — The sun load sensor reads 0.2V while the vehicle is in full sun — a reading that should be 3.5V–4.5V under direct sunlight conditions. The module receives this near-zero signal and believes almost no solar radiation is hitting the vehicle, so it does not anticipate or compensate for the additional solar heat load. On sunny days, the cabin warms from solar gain before the in-car temperature sensor detects the change and the module reacts, producing the "can't keep up" complaint.

46. D — After 20 minutes of engine operation, the upper radiator hose should be hot — filled with coolant that has passed through the engine and absorbed combustion heat. A cold upper radiator hose after extended running means no hot coolant is reaching the radiator. The thermostat — the valve that controls flow between the engine and radiator — is stuck in the closed position, trapping all coolant in the engine block. This condition will eventually cause engine overheating as heat builds with no path to the radiator.

47. A — A severely clogged cabin air filter restricts the total volume of air the blower motor can push through the HVAC housing. The blower motor must work harder to push air through the restriction, producing increased motor noise at higher speeds. The reduced airflow volume means less air passes over both the evaporator and heater core, reducing both cooling and heating capacity. Trapped organic debris in the filter promotes microbial growth that produces musty odors.

48. C — Both technicians are correct. Technician A is right that EPA Section 609 certification is a lifetime credential — once a technician passes an approved Section 609 exam, the certification never expires and does not require renewal. Technician B is right that the ASE A7 Heating and Air Conditioning certification is valid for five years and must be renewed by passing either the full certification test or the shorter recertification test before it expires.

49. B — An intermittent heating problem where both heater hoses fluctuate between hot (works) and slightly cooler (doesn't work) while the engine temperature remains stable suggests an air pocket in the heater core that intermittently blocks coolant flow. As the vehicle accelerates, brakes, and turns, the air bubble shifts position — sometimes allowing full flow and sometimes blocking a passage. This behavior is most common after cooling system service when air was not fully bled from the heater circuit.

50. C — Every measured parameter falls within normal specifications: pressures of 30 psi low / 200 psi high are textbook for 85°F ambient, vent temperature of 44°F represents excellent cooling output, subcooling of 15°F confirms adequate liquid production, and superheat of 10°F confirms proper TXV operation. The system is performing within its designed capability. When objective measurements confirm normal operation but the customer perceives inadequate cooling, the technician should document the results and explain the system's actual performance relative to its design limits.