

PRACTICE EXAM 5: ASE A7 SIMULATION (50 QUESTIONS)

1. A technician is evaluating an A/C complaint on a vehicle equipped with an orifice tube system. The manifold gauges show a low-side pressure of 12 psi and a high-side pressure of 105 psi at 84°F ambient. The compressor clutch cycles every 4–5 seconds. The vent temperature is 58°F. What is the MOST likely cause?

- A. A stuck-open orifice tube that is flooding the evaporator with excess liquid refrigerant
- B. A failed compressor with worn internal reed valves unable to maintain pressure differential
- C. A low refrigerant charge causing rapid clutch cycling as the low-pressure switch trips repeatedly
- D. A restricted condenser core preventing adequate heat rejection at the current ambient temperature

2. A technician removes an orifice tube and finds the inlet screen is completely blocked by dark brown waxy residue with no metallic particles. What does this debris MOST likely indicate?

- A. Normal compressor wear that has produced standard lubricant breakdown residue over time
- B. Compressor reed valve fragments that have broken off and been carried to the orifice screen
- C. Desiccant bead material from a deteriorated accumulator that has dissolved into the oil stream
- D. Sludge from refrigerant oil that has degraded due to moisture contamination or excessive heat cycling

3. A vehicle's A/C system has a measured subcooling of 28°F at the condenser outlet. The system was recently recharged. What does this high subcooling value MOST likely indicate?

- A. The condenser is oversized for the application and is rejecting more heat than the system requires
- B. The system has been overcharged with refrigerant, causing excess liquid to back up in the condenser
- C. The metering device is stuck fully open, allowing unrestricted refrigerant flow through the evaporator
- D. The condenser fan is running at excessive speed, overcooling the refrigerant beyond its design capacity

4. A vehicle's blower motor operates normally on speeds 1 through 3 but makes a loud buzzing noise on speed 4 (maximum). The noise was not present when the vehicle was new. What is the MOST likely cause?

A. The blower motor resistor block is vibrating at the frequency generated by the high-speed relay activation

B. A worn blower motor with degraded brushes or an unbalanced armature that resonates at maximum RPM

C. The high-speed relay contacts are arcing internally due to high current draw creating electromagnetic noise

D. The HVAC housing has a loose panel that vibrates at the specific airflow volume produced on maximum speed

5. A technician is testing a compressor clutch that does not engage. With the A/C requested, the scan tool shows the HVAC module commanding the clutch relay ON. The technician measures 12.3V at terminal 30 of the relay socket and 0V at terminal 86 of the relay socket. What does this indicate?

A. The relay coil power circuit is functional and the fault is in the relay contact output circuit downstream

B. The HVAC module is providing a proper ground signal but the relay coil has an internal open winding

C. The fuse supplying terminal 30 is intact but the module's relay driver circuit is not providing coil power

D. The relay coil is not receiving power on terminal 86, pointing to an open fuse or wire in the coil supply path

6. Technician A says that UV dye can remain in the A/C system indefinitely after injection without affecting performance. Technician B says that UV dye detection is most effective for locating slow leaks that electronic detectors may miss during a brief scan. Who is correct?

A. Technician A only, because UV dye must be flushed from the system within 48 hours to prevent damage

B. Technician B only, because UV dye degrades rapidly in the system and must be used within hours

- C. Both Technician A and Technician B are correct about UV dye properties and detection effectiveness
- D. Neither Technician A nor Technician B, because UV dye is not approved for use in modern A/C systems

7. A vehicle's engine coolant temperature is stable at 200°F. Both heater hoses at the firewall are hot. The blend door moves freely to the full hot position when commanded by the scan tool. The cabin air filter was recently replaced. Despite all this, the maximum floor vent temperature is only 100°F instead of the expected 130°F+. What is the MOST likely cause?

- A. A partially clogged heater core that restricts internal flow enough to reduce heat transfer despite hot hoses
- B. An incorrect thermostat rating that is limiting engine coolant temperature to a lower-than-optimal level
- C. A failed heater control valve that is only partially opening and restricting full coolant flow to the core
- D. An air pocket trapped in the heater core that is reducing the effective heat exchange surface area

8. During an A/C performance test, the technician measures a vent temperature of 44°F at 85°F ambient with the engine at 1,500 RPM and the blower on high. The low-side gauge reads 32 psi and the high-side reads 210 psi. Subcooling is 14°F and superheat is 10°F. What should the technician conclude?

- A. The system is slightly overcharged based on the high-side pressure and should have refrigerant recovered
- B. The system is operating within normal parameters across all measured values for the stated conditions
- C. The evaporator is beginning to ice over because the low-side pressure of 32 psi is below the safe limit
- D. The superheat reading indicates the TXV is restricting flow and should be replaced for better performance

9. A vehicle has a DTC B0229 — Blend Door Actuator Position Disagreement. The scan tool shows the blend door commanded to 85% (near full hot) and actual position feedback at 85%. However, the vent air is cold. The technician uses an infrared thermometer and confirms the vent temperature is 42°F. What is the MOST likely cause?

- A. A failed HVAC control module that is incorrectly commanding the actuator based on corrupted software
- B. A faulty blend door actuator potentiometer sending false feedback that matches the command by coincidence
- C. The heater core inlet hose has collapsed, preventing hot coolant from reaching the core despite proper door position
- D. The blend door actuator feedback potentiometer is reporting an incorrect position back to the control module

10. A technician is preparing to charge a vehicle's A/C system. The underhood label has been damaged and is unreadable. The service manual is not immediately available. What is the correct approach?

- A. Charge the system by pressure until the low-side gauge reads approximately 35 psi at the current ambient
- B. Charge with the standard 24-ounce charge amount that is typical for most mid-size passenger vehicles
- C. Charge until the center vent temperature reaches 40°F and the customer reports satisfactory cooling
- D. Look up the exact charge specification in a parts database, online service resource, or dealer information before charging

11. On a vehicle with an ATC system, the scan tool shows the sun load sensor reading 0.1V. The vehicle is parked outdoors in direct afternoon sunlight on a cloudless day. The sensor should be reading approximately 3.5–4.5V under these conditions. What effect will this faulty reading have on system operation?

- A. The module will underestimate the solar heat load and may provide insufficient cooling on sunny days
- B. The module will overestimate the solar load and run the compressor at maximum capacity continuously
- C. The module will ignore the sun load entirely and rely solely on the ambient sensor for cooling calculations
- D. The module will shut down the compressor because it interprets the low voltage as a sensor malfunction

12. A vehicle's A/C compressor makes a loud clanking noise for 2–3 seconds immediately after the clutch engages, then the noise diminishes to a quiet hum. This pattern repeats every time the clutch cycles. What is the MOST likely cause?

- A. A failing clutch pulley bearing that momentarily protests under the sudden load of engagement
- B. A worn serpentine belt that slips momentarily on the compressor pulley during the engagement torque spike
- C. Normal compressor startup behavior as the internal components begin rotating and oil distributes
- D. Liquid refrigerant slugging the compressor at each startup before the system reaches steady-state flow

13. Technician A says that R-12 systems use mineral oil as the compressor lubricant. Technician B says that mineral oil is compatible with R-134a and can be left in the system during a retrofit from R-12 to R-134a. Who is correct?

- A. Technician B only, because mineral oil actually provides superior lubrication in R-134a systems
- B. Both Technician A and Technician B, because mineral oil works equally well with both refrigerant types
- C. Technician A only, because mineral oil must be removed during a retrofit as it is incompatible with R-134a
- D. Neither Technician A nor Technician B, because R-12 systems use PAG oil just like R-134a systems

14. A technician replaces a blower motor resistor block on a vehicle. The new resistor restores all lower speed settings. However, within two weeks, the new resistor block fails again with the same burned-out appearance. What is the MOST likely root cause of the repeated failure?

- A. An incorrect replacement resistor block that is not rated for the current draw of this specific vehicle
- B. A blower motor drawing excessive current due to worn brushes or a dragging bearing overheating the resistors
- C. A wiring fault in the blower circuit that is creating a short circuit and routing excess current through the resistor
- D. A defective high-speed relay that is routing high-speed current through the resistor block instead of bypassing it

15. A vehicle's A/C system was operating normally until the engine overheated during a long uphill climb on a hot day. After the engine cooled and was restarted, the A/C blows warm air. Gauge readings show both-sides-low pressures. What is the MOST likely explanation?

- A. The high-pressure relief valve opened during the overheat event, venting refrigerant to prevent system rupture
- B. The compressor seized internally from the excessive heat and is no longer pumping refrigerant effectively
- C. The engine overheating caused the TXV sensing bulb to expand permanently and the valve is now stuck open
- D. The condenser was physically damaged by the extreme engine compartment temperatures during overheating

16. A vehicle's HVAC control panel illuminates and the display functions normally, but pressing any button — temperature up/down, fan speed, mode selection, A/C, or recirculation — produces no response from the system. The scan tool communicates with the HVAC module and shows no DTCs. What is the MOST likely cause?

- A. A failed HVAC control module that has lost its ability to process button inputs from the control panel
- B. A complete CAN bus failure that is preventing the control panel signals from reaching the HVAC module
- C. A failed blower motor relay that has shut down all HVAC output regardless of the button inputs selected
- D. A faulty HVAC control panel that is not transmitting any button press signals to the HVAC control module

17. Technician A says that a fixed orifice tube system uses an accumulator on the low side to prevent liquid slugging of the compressor. Technician B says that the accumulator's internal desiccant bag has unlimited moisture absorption capacity and never needs replacement. Who is correct?

- A. Both Technician A and Technician B, because the accumulator is a permanent lifetime component
- B. Technician A only, because the accumulator's desiccant has finite capacity and must be replaced periodically

C. Technician B only, because the accumulator prevents slugging but does not contain desiccant material

D. Neither Technician A nor Technician B, because accumulators are only found in TXV system configurations

18. A vehicle's cooling system pressure cap is rated at 15 psi. A technician tests the cap and finds it holds exactly 15 psi without releasing. However, when the technician releases the tester pressure, the cap does not allow the system to draw coolant back from the reservoir. What component of the cap has failed?

A. The pressure relief spring mechanism that prevents the cap from sealing properly under positive pressure

B. The rubber sealing gasket on the bottom of the cap that creates the airtight seal with the radiator neck

C. The vacuum valve (negative pressure valve) that should open to allow coolant return during cooldown

D. The locking tabs on the cap that prevent it from seating fully on the radiator filler neck during installation

19. A technician is diagnosing a vehicle where the A/C compressor clutch engages for exactly 2 seconds and then disengages. This pattern repeats identically each time the A/C is requested. The scan tool shows the module commanding the clutch ON continuously, but a high-pressure DTC is stored. What is the MOST likely cause?

A. The high-pressure cutout is tripping due to a rapidly rising high-side pressure from a severe condenser restriction

B. An intermittent clutch coil winding that opens circuit after 2 seconds of current flow due to heat buildup

C. A faulty cycling clutch switch that is miscalibrated and cutting the compressor off at too low a pressure

D. The HVAC module is intentionally cycling the clutch in a diagnostic self-test mode due to the stored DTC

20. A technician charges a system with the exact specified amount of refrigerant by weight. The manifold gauges show the low-side at 35 psi and the high-side at 205 psi at 82°F ambient. The vent

temperature reads 44°F. The technician then measures the suction line temperature at the evaporator outlet and finds it is 65°F. The low-side gauge pressure corresponds to approximately 33°F on the P-T chart. What does this indicate?

- A. Normal system operation with standard superheat levels that fall within the manufacturer's specification
- B. An overcharged system with excess refrigerant flooding beyond the evaporator into the suction line
- C. Excessive superheat of approximately 32°F, indicating the evaporator is starved for refrigerant flow
- D. A failed evaporator temperature sensor that is misreporting the outlet temperature to the control module

21. On a vehicle with vacuum-operated HVAC controls, the blend door operates correctly through its full range of temperature positions. However, the mode doors are stuck in the defrost position regardless of the mode selector. What can be determined from these symptoms?

- A. The blend door has a separate control mechanism from the mode doors, which may not share the same vacuum supply
- B. Vacuum supply to the HVAC system has been completely lost, affecting both the blend and mode door circuits
- C. The HVAC control panel is fully non-functional and is not sending commands to any of the door actuators
- D. The mode door actuators have all failed simultaneously due to a manufacturing defect in their diaphragms

22. A vehicle's A/C system exhibits a pulsating vent temperature — cold for 15 seconds, slightly warm for 10 seconds, cold again for 15 seconds, repeating continuously. The compressor runs continuously without clutch cycling. The system has a TXV and the gauges show the low-side pressure oscillating between 22 psi and 38 psi in sync with the temperature changes. What is the MOST likely cause?

- A. A TXV hunting condition caused by an improperly mounted or poorly insulated sensing bulb on the suction line
- B. A failing compressor that intermittently loses compression on some cylinders before recovering

C. An intermittent electrical fault in the blend door actuator that moves the door slightly between two positions

D. A partially clogged orifice tube that alternately passes and blocks refrigerant as debris shifts on the screen

23. After a catastrophic compressor failure, a technician replaces the compressor, flushes the serpentine tube condenser, replaces the orifice tube, replaces the accumulator, and installs new O-rings. The system is evacuated to 490 microns and charged with the correct amount of refrigerant. Within one week, the new compressor fails with the same internal damage. What step did the technician MOST likely miss?

A. Replacing the evaporator since it cannot be flushed effectively and must always be replaced after failure

B. Performing a nitrogen pressure test before evacuation to verify all connections were leak-free

C. Replacing the serpentine belt and tensioner since worn drive components caused the original failure

D. Flushing or replacing the evaporator and all connecting hoses to remove debris trapped in those components

24. A technician measures the voltage at a blower motor connector on the HIGH speed setting with the engine running. The reading is 11.2V instead of the expected 14V+. The blower motor runs but noticeably slower than normal. What does this voltage reading indicate?

A. Excessive voltage drop in the power supply or ground circuit is reducing the voltage delivered to the motor

B. A partially shorted blower motor winding that is drawing excessive current and pulling voltage down

C. A failing alternator that is not maintaining adequate system voltage under the blower's current draw

D. Normal voltage reading for a blower motor on the high-speed setting during full engine idle conditions

25. A customer brings a vehicle in for an A/C check after purchasing it used. The technician finds that the system has R-134a fittings but no retrofit label. The vehicle is a 1993 model that was originally equipped with R-12. What should the technician do before servicing the system?

- A. Use a refrigerant identifier to determine what is actually in the system before connecting any equipment
- B. Assume the system has been properly retrofitted to R-134a since the fittings have been changed already
- C. Recover the charge as R-134a using R-134a equipment since the fittings match the R-134a specification
- D. Refuse to service the vehicle until the original dealer provides documentation of the retrofit procedure

26. On a vehicle with electronic HVAC controls, the A/C compressor engages when the defrost mode is selected but does NOT engage when the A/C button is pressed in any other mode. No DTCs are stored. What is the MOST likely cause?

- A. A failed compressor clutch relay that only activates when the defrost circuit provides a higher voltage signal
- B. A faulty evaporator temperature sensor preventing compressor engagement except in the defrost override
- C. A defective A/C request switch or its wiring that fails to communicate the A/C button press to the module
- D. A failing compressor clutch coil that can only generate enough magnetic force at the higher defrost current

27. A technician is diagnosing a vehicle with an intermittent A/C cooling loss. The problem occurs only on hot days after approximately 30 minutes of driving. The technician cannot reproduce the fault during a 15-minute shop test at 78°F. What is the most effective diagnostic approach?

- A. Replace the compressor as a precaution since intermittent failures at high load suggest internal wear
- B. Perform a complete system flush and recharge since an undetectable contamination may be the cause
- C. Install a set of permanent diagnostic gauges and instruct the customer to read them when the fault occurs
- D. Connect a data logger to the scan tool and have the customer drive until the fault occurs to capture live data

28. Technician A says that all four answer options (A, B, C, D) on an ASE exam question are approximately equal in length, and an unusually long answer is not necessarily the correct one. Technician B says that on Technician A/Technician B questions, "Both" and "Neither" are correct just as often as "A only" or "B only." Who is correct?

A. Technician A only, because statistically the longest answer is the correct choice on most ASE questions

B. Both Technician A and Technician B are correct about ASE exam question formatting and answer patterns

C. Technician B only, because answer option length does vary significantly and can indicate the correct choice

D. Neither Technician A nor Technician B, because ASE exams do not follow any predictable answer patterns

29. A vehicle with an ATC system has the following scan tool readings: set temperature 70°F, in-car sensor 70°F, ambient sensor 90°F, evaporator temp 36°F, blend door commanded 18%, blend door actual 18%. The customer reports that the system maintains temperature correctly but makes a continuous clicking noise from behind the dashboard on the passenger side. What is the MOST likely cause?

A. A failing blower motor bearing that produces a clicking sound as the fan wheel rotates at steady speed

B. A refrigerant flow noise from the metering device that is louder than normal due to a partial restriction

C. A blend door or mode door actuator with stripped gears that clicks as the motor teeth skip repeatedly

D. Normal expansion valve operation that produces an audible clicking as it modulates refrigerant flow

30. A vehicle's coolant level drops by approximately half a pint every two weeks. There are no visible external leaks, the oil is clean on the dipstick, there is no white exhaust smoke, and the cooling system holds pressure for 15 minutes during testing. The heater works normally and there is no coolant smell in the cabin. Where should the technician look next?

A. The coolant reservoir for hairline cracks that allow slow seepage that evaporates before pooling visibly

- B. The head gasket using a combustion gas test on the coolant since pressure testing may miss small breaches
- C. The radiator core for pinhole leaks that only weep when the system is at full operating pressure and temperature
- D. The water pump weep hole for intermittent dripping that occurs only during operation and dries after shutdown

31. A vehicle's scan tool shows the HVAC control module has stored five DTCs, all related to blend door actuator position errors that occurred on different dates over the past month. The system currently operates normally with no active complaints. What should the technician recommend?

- A. Immediately replace the blend door actuator because the repeated codes indicate an impending failure
- B. Replace the HVAC control module because repeated DTCs indicate corrupted software logic in the module
- C. Clear the codes, inform the customer, and recommend returning if the symptom recurs for further diagnosis
- D. Replace both the actuator and its wiring harness to eliminate all possible causes of the intermittent fault

32. A vehicle with electronic HVAC controls has a blower motor that starts at full speed for 3 seconds when the ignition is first turned on, then reduces to the commanded speed setting. What does this behavior indicate?

- A. A failing electronic blower motor controller that momentarily passes full voltage before regulating
- B. Normal HVAC system initialization where the module tests the blower motor during the startup calibration cycle
- C. A defective blower motor speed switch that sends a maximum signal before its internal circuit stabilizes
- D. An electrical surge from the ignition switch that bypasses the controller and reaches the motor directly

33. A vehicle's A/C system has been properly charged with 20 ounces of R-134a. The vent temperature is 42°F at 80°F ambient. Two months later, the customer returns with a vent temperature of 50°F. The

technician recovers 17 ounces. What is the minimum percentage of the original charge that has been lost?

- A. 10%, which is within the normal annual refrigerant loss rate for a properly sealed system
- B. 12%, which indicates a slight seepage that does not require leak repair at this time
- C. 18%, which is above normal tolerance and may indicate a connection that needs re-torquing
- D. 15%, confirming a leak exists that must be found and repaired before recharging the system

34. A vehicle has a rear auxiliary A/C system with its own expansion valve and evaporator. The front system cools normally but the rear vents blow only slightly cool air. The rear blower motor works at all speeds. What should the technician check FIRST on the rear system?

- A. The rear evaporator for ice buildup that may be blocking airflow through the rear evaporator fin pack
- B. The rear heater core (if equipped) for a stuck-open valve that is adding unwanted heat to the rear airflow
- C. The rear expansion valve for restriction or failure that is preventing adequate refrigerant flow to the rear evaporator
- D. The main system compressor displacement to determine if it is large enough to serve both circuits simultaneously

35. A vehicle owner reports that the A/C system makes a brief squealing noise every time the compressor clutch engages, but the noise stops after 1–2 seconds. The A/C cools normally otherwise. The belt appears to be in good condition. What is the MOST likely cause?

- A. A failing compressor with internal resistance that creates momentary drag when the clutch first engages
- B. A worn clutch friction surface that slips briefly during initial engagement before the magnetic field fully seats it
- C. Normal belt-to-pulley friction noise that occurs during the momentary load change of clutch engagement
- D. A weak or worn automatic belt tensioner that allows momentary belt slip under the sudden compressor load

36. A technician is diagnosing a vehicle with an ATC system. The driver complains that the system always blows slightly warm air from the vents, never reaching the cold temperature that it used to achieve. The scan tool shows the compressor is commanded ON and running. The evaporator temperature sensor reads 50°F. Normal evaporator temperature during operation should be 34°F–40°F. What is the MOST likely cause?

- A. A faulty evaporator temperature sensor reading warmer than actual, causing the module to limit cooling
- B. A low refrigerant charge that is preventing the evaporator from reaching its optimal cooling temperature
- C. A failed sun load sensor reading maximum voltage that is commanding the module to overcool the cabin
- D. A restricted cabin air filter reducing airflow volume and causing the evaporator to run too cold

37. Technician A says that the automatic belt tensioner should be replaced whenever the serpentine belt is replaced as a preventive maintenance item. Technician B says that the tensioner only needs replacement when it shows signs of failure such as noise, excessive arm movement, or inability to maintain proper tension. Who is correct?

- A. Technician A only, because tensioners always fail shortly after a new belt is installed on worn components
- B. Technician B only, because tensioners are designed to outlast multiple belt replacements if functioning properly
- C. Both Technician A and Technician B, because the correct approach depends on the vehicle manufacturer's recommendation
- D. Neither Technician A nor Technician B, because tensioners are non-serviceable and must be replaced with the vehicle

38. A vehicle's A/C compressor makes a growling noise that is present whenever the engine is running, regardless of whether the A/C is turned on or off. The noise increases in pitch with engine RPM. What is the MOST likely source of this noise?

- A. The compressor clutch pulley bearing, which spins whenever the engine runs whether the A/C is on or off

- B. The compressor's internal mechanism, which only operates when the clutch is engaged and the A/C is on
- C. A worn serpentine belt that is slipping on the compressor pulley due to incorrect tension adjustment
- D. The compressor discharge valve that vibrates at high frequency when refrigerant passes through at speed

39. A technician removes a compressor and finds the discharge port internal surface has a blue-black discoloration and the oil drained from the compressor is dark brown to black. What do these findings indicate?

- A. The compressor was filled with an incorrect oil type that chemically reacted with the refrigerant
- B. Normal wear patterns that develop in all compressors over time and do not indicate any specific issue
- C. The compressor experienced sustained overheating, likely from loss of lubrication or restricted airflow
- D. The refrigerant in the system was contaminated with an aftermarket blend that caused acid formation

40. A technician is testing an R-134a system's performance. The ambient temperature is 100°F. The manifold gauges show a low-side pressure of 45 psi and a high-side pressure of 285 psi. The vent temperature is 52°F. What should the technician conclude?

- A. The high-side pressure is too high and indicates a condenser airflow restriction or system overcharge
- B. The system is significantly undercharged because the vent temperature should be much lower at this ambient
- C. The evaporator is freezing over because the low-side pressure of 45 psi is above the safe operating range
- D. The system is operating within acceptable parameters for the extreme ambient temperature conditions

41. A vehicle has a DTC U0073 — Control Module Communication Bus Off stored in the HVAC module. No other modules respond to the scan tool on the same bus. What is the MOST likely cause?

- A. A single failed HVAC control module that has disrupted all other modules by flooding the bus with data

- B. A failed scan tool communication interface that is unable to connect to the vehicle's diagnostic network
- C. Multiple simultaneous module failures across different vehicle systems caused by a voltage surge event
- D. A CAN bus wiring fault such as an open, short, or missing termination resistor affecting the entire network

42. A vehicle's ATC system maintains the correct cabin temperature but the blower runs at noticeably higher speed than expected for the current conditions. The set temperature is 72°F, the in-car sensor reads 71°F, and the evaporator temperature reads 37°F. All sensor readings verify accurate with independent instruments. What should the technician investigate?

- A. The aspirator fan circuit for the in-car temperature sensor, since a failed aspirator may delay feedback
- B. The blend door actuator calibration since an incorrect door position would require more airflow to compensate
- C. The refrigerant charge level since a marginal undercharge would force the system to compensate with higher fan speed
- D. The condenser fan relay since reduced condenser cooling would cause the module to increase blower speed as compensation

43. Technician A says that mixing R-134a and R-1234yf in the same system will cause immediate catastrophic failure of the compressor. Technician B says that mixing these two refrigerants will degrade system performance and may damage components over time, but is unlikely to cause instant destruction. Who is correct?

- A. Technician A only, because the chemical reaction between the two refrigerants destroys internal surfaces
- B. Neither Technician A nor Technician B, because R-134a and R-1234yf are completely interchangeable
- C. Technician B only, because the similar properties prevent instant failure but cross-contamination degrades performance
- D. Both Technician A and Technician B, because the severity depends on the ratio of the two refrigerants mixed

44. A technician is testing the compressor clutch air gap on a vehicle. The measurements at four points are: 0.020 inches, 0.022 inches, 0.019 inches, and 0.021 inches. The specification is 0.016–0.040 inches. What should the technician conclude?

- A. The air gap is too narrow and shims should be added behind the hub to increase the gap dimension
- B. The air gap is uniform and within specification, indicating the clutch is properly adjusted and functional
- C. The clutch hub should be replaced because the readings are too close to the minimum specification limit
- D. The readings are inconsistent and indicate a warped hub that will cause engagement problems

45. A vehicle has an A/C system that was working normally before a timing belt replacement. After the repair, the engine runs normally but the A/C compressor does not turn. The serpentine belt is routed correctly and all accessories except the compressor appear to operate normally. What should the technician check FIRST?

- A. Whether the compressor electrical connector was accidentally disconnected during the timing belt service
- B. The refrigerant charge level since the system may have been accidentally discharged during the engine work
- C. The compressor for internal seizure caused by debris that entered the system during the timing belt service
- D. The HVAC control module for fault codes since the timing belt replacement may have reset module memory

46. On a vehicle with electronic HVAC controls, the mode door operates correctly when tested with the scan tool's bidirectional function, but the mode buttons on the dash panel produce no mode change. The temperature and fan speed buttons work normally. What is the MOST likely cause?

- A. A failed mode door actuator motor that only responds to the higher voltage provided by the scan tool
- B. An HVAC control module fault that processes fan and temperature commands but ignores mode commands

C. A CAN bus communication error that intermittently drops mode commands while passing other data correctly

D. A faulty section of the HVAC control panel where the mode selection buttons have failed while other buttons work

47. A customer complains that their vehicle's heating system works well at first but gradually loses heat output over a 30-minute drive. The temperature gauge remains stable in the normal range. The coolant level in the reservoir slowly drops during the drive. No external leaks are visible. What is the MOST likely cause?

A. A stuck-open thermostat that progressively allows more coolant to flow through the radiator over time

B. An air pocket in the cooling system that expands as coolant temperature rises and blocks heater core flow

C. A small heater core leak that loses coolant into the HVAC housing, reducing the available volume for heating

D. A degrading water pump impeller that gradually slows as the pump bearing wears during extended operation

48. A technician is performing a voltage drop test on the blower motor ground circuit. With the blower running on HIGH, the technician places the red DMM lead on the blower motor ground terminal and the black lead on the battery negative terminal. The reading is 1.8V. What does this indicate?

A. Normal ground circuit voltage drop that is within the acceptable range for a high-current blower circuit

B. Excessive ground circuit resistance that is reducing voltage and current available to the blower motor

C. A reversed DMM connection that is reading the motor operating voltage rather than the ground circuit drop

D. A properly functioning ground circuit since any reading under 2.0V is considered acceptable for motor circuits

49. Technician A says that a properly functioning A/C system is a sealed system and should never lose refrigerant over its lifetime. Technician B says that all A/C systems lose a small amount of refrigerant

annually through normal permeation through hoses and seals, which is considered acceptable. Who is correct?

- A. Technician B only, because a small annual loss through permeation is normal and does not indicate a leak requiring repair
- B. Technician A only, because modern barrier hoses and HNBR seals eliminate all measurable refrigerant permeation
- C. Both Technician A and Technician B, because the answer depends on the age and type of hose material used
- D. Neither Technician A nor Technician B, because refrigerant loss only occurs through catastrophic system failures

50. A technician is diagnosing a vehicle where the A/C performance is poor only when the vehicle is in stop-and-go traffic on hot days. The system works well at highway speed and during moderate temperature days. The condenser fan operates and gauge readings at highway speed are normal. What should the technician investigate?

- A. The compressor displacement control valve for a fault that limits output during low-RPM operation
- B. The evaporator temperature sensor for a calibration error that limits cooling capacity under high heat loads
- C. Whether the condenser fan is running at the correct speed, since a fan running on low instead of high may provide insufficient airflow under extreme conditions
- D. The refrigerant charge level since a marginal undercharge would only be noticeable during maximum demand

Practice Exam 5: Answer Key and Explanations

1. C — Both-sides-low pressures (12 psi low / 105 psi high) combined with rapid clutch cycling every 4–5 seconds is the classic signature of a low refrigerant charge in a cycling clutch orifice tube system. The compressor engages, quickly drops the already-low suction pressure below the cycling switch cutout threshold, the clutch disengages, pressure slowly creeps back up, and the cycle repeats. The system needs a leak test, repair, evacuation, and proper recharge.

2. D — Dark brown waxy residue without metallic particles indicates oil degradation — the compressor oil has broken down from moisture contamination, excessive operating temperatures, or extended service life beyond the oil's chemical stability. This sludge coats internal surfaces and progressively clogs the orifice tube screen. The system requires a complete flush, accumulator replacement, and fresh oil charge to remove all contaminated residue.

3. B — Subcooling of 28°F significantly exceeds the normal 10°F–20°F range, indicating excess liquid refrigerant is backing up in the condenser. More liquid than needed fills the condenser tubes, subcooling the refrigerant far below its condensation temperature. Since the system was recently recharged, the most likely cause is an overcharge — too much refrigerant was added. The correct remedy is to recover the charge, verify the exact amount, and recharge with the specified weight.

4. A — A buzzing noise that occurs only on maximum speed and was not present when new suggests a mechanical wear issue that manifests at the motor's highest RPM. A blower motor with worn brushes, a slightly unbalanced armature, or a bearing with developing play will vibrate and resonate most noticeably at maximum rotational speed. Lower speeds do not generate enough centrifugal force to excite the vibration. The motor should be inspected and likely replaced.

5. D — Terminal 86 is the relay coil power supply terminal — it should receive battery voltage when the A/C is requested so current can flow through the coil to ground (terminal 85). A reading of 0V at terminal 86 means no power is reaching the coil, so the relay cannot energize. The fault is upstream of terminal 86 — a blown fuse in the coil supply circuit, a broken wire, or a corroded connector between the power source and the relay socket.

6. C — Both technicians are correct. Technician A is right that A/C-specific UV dyes are formulated to remain in the system indefinitely without degrading system performance, oil properties, or refrigerant chemistry when used in the manufacturer-specified quantity. Technician B is right that UV dye excels at detecting slow leaks because the dye accumulates at the leak point over days or weeks, making even tiny leaks visible that an electronic detector might miss during a brief scan.

7. A — Both heater hoses are hot (confirming hot coolant arrives and leaves), the blend door reaches full hot (confirmed by scan tool), the engine temperature is adequate at 200°F, and the cabin air filter is new. Despite all correct upstream conditions, the vent temperature maxes at only 100°F. A partially clogged heater core with internal deposit buildup restricts flow enough to reduce heat transfer efficiency — hot coolant passes through but the insulating deposits prevent efficient heat exchange with the passing air.

8. B — Every measured parameter falls within normal ranges: vent temperature of 44°F at 85°F ambient is excellent, low-side at 32 psi and high-side at 210 psi are textbook normal, subcooling of 14°F confirms adequate liquid at the condenser outlet, and superheat of 10°F confirms proper TXV operation within the 8°F–12°F specification. This system is performing correctly across all measurements and requires no corrective action.

9. D — The DTC indicates a position disagreement, yet the scan tool shows commanded and actual both at 85%. If the vent air is actually cold (42°F) despite the door supposedly being at 85% (near full hot), the feedback potentiometer is sending a false reading — it reports 85% while the door is actually near full cold. The module sees the positions matching and does not flag a disagreement because the false feedback coincidentally matched the command. The potentiometer must be replaced.

10. D — Charging by pressure, by a "standard" amount, or by vent temperature are all inaccurate methods that can result in under- or overcharging. Every vehicle has a specific charge specification that varies by model, year, engine, and whether rear A/C is equipped. The only correct approach is to find the exact specification from a reliable source — parts database, online service information, or the dealer — before introducing any refrigerant. Guessing risks damaging the system.

11. A — The sun load sensor reading 0.1V in direct afternoon sunlight (where it should read 3.5–4.5V) tells the ATC module that virtually no solar radiation is hitting the vehicle. The module will not anticipate or compensate for the additional heat load from direct sunlight, resulting in the cabin warming before the in-car temperature sensor detects the rise and the module reacts. On sunny days, the system will feel sluggish and behind in its cooling response.

12. D — A loud clanking noise for 2–3 seconds at each compressor engagement that then subsides suggests liquid refrigerant is present in the compressor at startup. When the clutch engages, the compressor attempts to compress this incompressible liquid, producing hydraulic hammering sounds. Once the liquid clears and only vapor enters, the noise stops. This liquid slugging typically results from a failed accumulator, a stuck-open TXV, or system overcharge.

13. C — Technician A is correct that R-12 systems use mineral oil as the compressor lubricant — this is a fundamental fact about R-12 system design. Technician B is incorrect because mineral oil is not compatible with R-134a — it does not mix well with the newer refrigerant and provides inadequate lubrication. During a retrofit, mineral oil must be removed as thoroughly as possible and replaced with PAG or POE oil compatible with R-134a.

14. B — A blower motor resistor block that burns out repeatedly in the same manner points to a root cause that is overstressing the resistors — excessive current flow. The most common source of excess current is a blower motor with worn brushes, a dragging bearing, or a developing short in its armature winding. The failing motor draws more amperage than the circuit was designed for, overheating the resistors until they fail. Replacing the resistor without addressing the motor guarantees recurrence.

15. A — Both-sides-low pressures after an engine overheating event indicate refrigerant has been lost from the system. The high-pressure relief valve — a safety device designed to prevent catastrophic system rupture — opens and vents refrigerant to atmosphere when system pressure exceeds its threshold (typically 500–550 psi). During severe engine overheating, the extreme engine compartment temperatures can drive A/C system pressures high enough to trip this valve. The system must be leak-tested, recharged, and the cause of the overheat corrected.

16. D — The HVAC module communicates on the scan tool with no DTCs, confirming the module itself is powered, functional, and its communication circuits work. All accessories that the module controls are unresponsive to the control panel buttons, yet the panel illuminates normally. This indicates the control panel is receiving power for its display but its button-press signals are not reaching the module — a failed control panel circuit board, a disconnected data connector between the panel and module, or failed switches within the panel.

17. B — Technician A is correct that the accumulator in an orifice tube system prevents liquid slugging by separating liquid refrigerant from vapor and allowing only vapor to reach the compressor through its top-mounted pickup tube. Technician B is incorrect because the desiccant inside the accumulator has a finite moisture absorption capacity — once saturated, it can no longer protect the system. The accumulator must be replaced whenever the system is opened or when moisture contamination is suspected.

18. C — The pressure relief function tested correctly at 15 psi, confirming the cap's positive-pressure side is functional. However, the cap's failure to draw coolant back from the reservoir during cooling indicates the vacuum valve (negative pressure valve) has failed. This valve should open when the system cools and pressure drops below atmospheric, drawing coolant back from the reservoir. Without it, air enters the system instead of coolant, leading to a progressively low coolant level and potential air pockets.

19. A — The compressor engages for exactly 2 seconds and disengages with a high-pressure DTC stored — a precise, repeatable pattern that indicates the high-pressure cutout is tripping each time. Within 2 seconds of engagement, the high-side pressure spikes above the cutout threshold due to a severe condenser restriction (debris, blocked airflow, failed fan, or collapsed condenser tubes). The

module or high-pressure device then disengages the clutch to protect the system. The condenser and its airflow path must be inspected immediately.

20. C — Superheat equals the actual suction line temperature minus the P-T chart boiling temperature at the measured pressure: $65^{\circ}\text{F} - 33^{\circ}\text{F} = 32^{\circ}\text{F}$. This is drastically above the normal 8°F – 12°F range for a TXV system, indicating the refrigerant has fully evaporated long before reaching the evaporator outlet and the remaining vapor has superheated excessively. The evaporator is starved for refrigerant — likely from a restricted TXV, a partially blocked liquid line, or a low charge despite the correct amount being added (suggesting a leak developed during or after charging).

21. B — In a vacuum-operated system, the blend door and mode doors may receive vacuum from different ports and hose circuits on the HVAC control panel. If the blend door operates correctly through its full range, its vacuum supply circuit is intact. If the mode doors are stuck in defrost (their default spring-loaded position), only the mode door vacuum circuit has lost supply. This tells you the vacuum source is present but a specific distribution line, port, or control valve serving the mode actuators has failed.

22. A — A pulsating vent temperature synchronized with oscillating low-side pressure on a TXV system — while the compressor runs continuously — is the classic signature of a hunting TXV. The sensing bulb alternately reads warmer (opening the valve wider) and cooler (closing the valve) in a cycle because it is not in proper thermal contact with the suction line. Poor bulb mounting, missing insulation, or an incorrect bulb position causes the valve to overcorrect repeatedly rather than finding a stable equilibrium.

23. D — The technician flushed the serpentine tube condenser and replaced the orifice tube and accumulator — but may not have flushed the evaporator and the connecting hoses between the condenser, evaporator, and compressor. Debris from the original compressor failure lodged in the evaporator's narrow passages and in the suction and liquid lines would circulate into the new compressor during operation, causing the identical failure pattern within days or weeks.

24. A — Battery voltage with the engine running should be 13.5V – 14.5V , so receiving only 11.2V at the blower motor on the high-speed setting means approximately 2.8 – 3.3V is being consumed by unwanted resistance somewhere in the power supply or ground circuit. This excessive voltage drop reduces the current reaching the motor, causing it to run noticeably slower than designed. The technician should perform voltage drop testing on both the power and ground sides to locate the resistance — corroded connectors, damaged wires, or poor ground connections.

25. A — A 1993 model with R-134a fittings but no retrofit label has an undocumented service history. The fittings suggest a retrofit was performed, but without a label, you cannot confirm what refrigerant is actually in the system — it could be R-134a, residual R-12, a mix of both, or an aftermarket blend. An adapter could have been installed on R-12 fittings without performing a proper retrofit. Always use a refrigerant identifier to verify the actual contents before connecting any equipment.

26. C — The defrost mode automatically engages the compressor through a built-in override in the module's programming — separate from the A/C button request path. Since the compressor works in defrost, the compressor itself, the clutch coil, the relay, and the module's compressor output circuit are all proven functional. The fault is specific to the A/C request input — the A/C button or its wiring is not communicating the press to the module, so the module never receives the normal A/C engagement request.

27. D — Intermittent problems that cannot be reproduced in the shop require data capture during the actual failure event. A scan tool data logger records all live parameters — pressures, temperatures, clutch status, sensor readings — continuously while the customer drives. When the fault occurs, the recorded data reveals exactly what changed at that moment: a pressure drop, a sensor spike, a clutch dropout, or a module command change. This objective data eliminates guesswork and directs the repair.

28. B — Both technicians are correct about ASE exam formatting. Technician A is right that ASE deliberately makes all four answer options approximately equal in length so the correct answer cannot be identified by being the longest or most detailed option. Technician B is right that on Technician A/B questions, "Both" and "Neither" are correct with roughly equal frequency to "A only" and "B only" — no combination is statistically more likely than another.

29. C — The scan tool data shows all temperatures, pressures, and actuator positions are correct and the system maintains the set temperature — confirming the refrigeration and air management systems are functioning properly. A continuous clicking noise from behind the dashboard on the passenger side, with no performance impact, is characteristic of a door actuator with stripped or worn gears. The motor runs repeatedly trying to maintain position, and the damaged teeth skip with each attempt, producing the clicking.

30. A — All major internal and external leak paths have been systematically eliminated: pressure test holds (no external leak under static conditions), clean oil (no head gasket breach), no white smoke (no combustion chamber entry), normal heater (no heater core leak), and no visible leaks. The coolant reservoir itself — often made of semi-translucent plastic — can develop hairline cracks that weep small amounts of coolant that evaporate on the warm surface before pooling. Careful visual inspection under bright light and a hand feel for dampness around the reservoir seams is the next logical step.

31. C — The system currently operates normally with no active symptoms, and the stored DTCs occurred on different dates over a month — suggesting an intermittent issue rather than a progressive failure. Replacing components based on historical codes that are not currently active risks unnecessary expense and may not even address the root cause. The correct approach is to clear the codes, inform the customer about the history, and recommend returning if symptoms recur so the technician can capture live data during the actual fault.

32. B — Many ATC systems perform a startup calibration sequence when the ignition is first turned on. During this sequence, the module commands the blower motor to full speed briefly, drives each actuator through its full range, and verifies that all components respond correctly. This self-test takes only a few seconds and establishes the module's reference points for the session. The brief full-speed blower burst during initialization is normal and expected behavior.

33. D — The system lost 3 ounces of its original 20-ounce charge: $(20 - 17) \div 20 = 15\%$ loss over two months. Automotive A/C systems are sealed circuits where refrigerant should not be consumed or lost during normal operation. A 15% loss in two months far exceeds any normal permeation rate and definitively confirms a leak exists. The leak must be found using electronic detection, UV dye, or both, repaired, and the system properly evacuated and recharged.

34. C — The front system works normally, proving the compressor, condenser, and refrigerant charge are adequate for the shared circuit. The rear blower works, confirming the rear air distribution side is functional. The problem is isolated to the rear refrigeration circuit — specifically the rear expansion valve, which is the component that controls refrigerant flow into the rear evaporator. A restricted or failed rear expansion valve prevents adequate refrigerant from reaching the rear evaporator while the front circuit operates normally.

35. D — A brief squeal at clutch engagement that stops after 1–2 seconds indicates the belt momentarily slips when the sudden compressor load is applied. A worn or weakened automatic belt tensioner cannot maintain sufficient belt tension to grip the compressor pulley during the instantaneous torque spike of clutch engagement. Once the initial engagement transient passes and the compressor reaches steady-state operation, the reduced load allows the belt to grip adequately and the noise stops.

36. B — The compressor is running and the evaporator temperature reads 50°F — significantly warmer than the normal 34°F–40°F operating range. This elevated evaporator temperature with the compressor operating indicates the refrigeration system cannot cool the evaporator to its design temperature. A low refrigerant charge is the most common cause — insufficient refrigerant mass means less latent heat absorption at the evaporator, resulting in a warmer-than-normal evaporator that produces warmer-than-normal vent air.

37. B — Technician B is correct that automatic belt tensioners are designed to be durable, long-life components that can outlast multiple belt replacements when functioning properly. Replacement is warranted when the tensioner shows specific signs of failure — bearing noise, arm flutter, weak spring tension, or inability to maintain proper belt deflection. Technician A's blanket recommendation to replace the tensioner with every belt is unnecessarily conservative unless the manufacturer specifically recommends it as a maintenance interval item.

38. A — A growling noise present at all times regardless of A/C status originates from a component that spins whenever the engine runs. The compressor clutch pulley rotates on its bearing any time the serpentine belt is turning — whether the A/C is on or off, because the clutch hub only engages when the A/C is activated but the pulley always spins. A failing pulley bearing produces a continuous growl that increases with RPM. Internal compressor noise would only be present with the A/C on because the mechanism only turns when the clutch engages.

39. C — Blue-black discoloration at the discharge port and dark brown to black oil are signs of sustained high-temperature operation inside the compressor. This thermal damage pattern results from loss of lubrication (insufficient oil allowing metal-to-metal contact and friction heating), restricted condenser airflow (causing the compressor to work against abnormally high discharge pressures), or prolonged operation with a low refrigerant charge (reducing oil circulation). The root cause of the overheating must be identified and corrected before installing a replacement.

40. D — At 100°F ambient — an extreme heat load condition — pressures of 45 psi low / 285 psi high and a vent temperature of 52°F are within the acceptable operating range for a properly charged system working at its capacity limit. Higher ambient temperatures naturally produce higher system pressures and warmer vent temperatures. The system is performing as well as can be expected under these demanding conditions. No corrective action is needed.

41. D — DTC U0073 (Communication Bus Off) stored in the HVAC module combined with no other modules responding on the same bus indicates a complete CAN bus failure — not a single-module problem. An open CAN wire, a short between CAN High and CAN Low, a short to battery voltage or ground, or a missing termination resistor would take down communication for all modules on that bus segment simultaneously. The bus wiring and termination must be inspected and repaired.

42. A — The system maintains the correct temperature (71°F vs. 72°F set point) and all sensors verify accurate, but the blower runs faster than expected. A failed aspirator fan for the in-car temperature sensor would cause the sensor to read stagnant air rather than circulated cabin air. The stagnant air near the sensor may be slightly warmer or respond more slowly to temperature changes, causing the module

to perceive a small persistent offset that it compensates for by running the blower at a higher speed than necessary.

43. C — Technician B is correct that mixing R-134a and R-1234yf degrades system performance and may cause gradual component damage, but the similar pressure-temperature characteristics of the two refrigerants prevent an immediate catastrophic failure. Technician A is incorrect because the mixture does not cause instant compressor destruction — the refrigerants are chemically similar enough that the system continues operating, albeit with reduced efficiency and potential long-term seal and oil compatibility issues.

44. B — Measurements of 0.020, 0.022, 0.019, and 0.021 inches all fall well within the 0.016–0.040 inch specification. The variation between the four points is only 0.003 inches (from 0.019 to 0.022), which indicates excellent uniformity across the clutch face. The air gap is properly set — uniform and centered within the specification range — confirming the clutch is correctly adjusted and functional. No corrective action is needed.

45. A — A timing belt replacement requires significant disassembly around the front of the engine, and the compressor and its wiring are often in close proximity to the work area. The most common cause of an A/C compressor that does not operate after unrelated engine service is an electrical connector that was disconnected for access and not reconnected afterward. Checking the compressor's electrical connector is a quick, zero-cost first step before pursuing more complex diagnosis.

46. D — The scan tool bidirectional test proves the mode door actuator and the HVAC module's output circuit are functional — the actuator responds correctly to direct commands. Temperature and fan speed controls work normally from the dash panel, proving the panel's communication with the module is functional for those inputs. The mode selection buttons specifically have failed while the rest of the panel works, indicating a localized failure in the mode button section of the control panel assembly.

47. C — Gradually diminishing heat output combined with a slowly dropping coolant level — but no external leaks and a stable temperature gauge — points to a small heater core leak that is losing coolant into the HVAC housing. The lost coolant volume reduces the total available for circulation through the heater core, progressively reducing heat output. The coolant may be dripping into the HVAC drain pan and exiting through the condensation drain, or accumulating on the floorboard beneath carpet padding where it is not immediately visible.

48. B — A voltage drop of 1.8V across the blower motor ground circuit far exceeds the maximum acceptable 0.3V for a ground circuit. This means 1.8V of the available battery voltage is being

consumed by unwanted resistance in the ground path — a corroded ground connection, a loose terminal, a damaged wire, or a poor chassis ground point. This excessive resistance reduces the effective voltage at the motor by 1.8V, causing it to run slower and deliver less airflow than designed.

49. A — Technician B is correct that all automotive A/C systems experience some minimal refrigerant loss through permeation — the slow diffusion of refrigerant molecules through hose walls and seal materials over time. Even modern barrier hoses have a non-zero permeation rate. Industry standards generally consider a loss of up to approximately 0.5–1.0 ounces per year as normal permeation, not requiring leak repair. Technician A's claim that a system should "never" lose any refrigerant is technically incorrect, though the losses should be very small.

50. C — The system works well at highway speed (ram air provides condenser airflow) and on moderate days (lower total heat load), but struggles in stop-and-go traffic on hot days (maximum heat load with minimum ram air). The condenser fan operates, but if it is running on the low-speed setting when the high-speed setting should be engaged, the airflow volume may be sufficient for moderate conditions but inadequate for extreme demand. Verifying that the fan reaches high speed when conditions demand it — and that the high-speed relay and control circuit are functional — is the most targeted diagnostic step.