PRACTICE EXAM 6: ASE A7 SIMULATION (50 QUESTIONS)

1. A technician is diagnosing a vehicle where the A/C gauge readings fluctuate rhythmically — the low side swings between 20 psi and 45 psi every 8–10 seconds, and the high side swings between 180 psi and 250 psi in the same pattern. The compressor runs continuously without clutch cycling. The system uses a TXV. What is the MOST likely cause?

A. A low refrigerant charge that is causing the remaining refrigerant to surge unevenly through the circuit

B. An intermittent electrical connection in the compressor clutch circuit producing erratic engagement

C. A restricted condenser that causes periodic pressure buildup and release as airflow fluctuates

D. A hunting TXV that is oscillating between open and closed due to a sensing bulb mounting problem

2. Technician A says that when a compressor fails catastrophically, the orifice tube or TXV must always be replaced as part of the repair. Technician B says that the condenser can always be flushed regardless of its design type after a compressor failure. Who is correct?

A. Technician A only, because some condenser types like parallel flow cannot be reliably flushed clean

B. Both Technician A and Technician B, because the orifice tube must be replaced and all condensers flush well

C. Technician B only, because orifice tubes and TXVs only need replacement if visible debris is found

D. Neither Technician A nor Technician B, because catastrophic failures only require compressor replacement

3. A vehicle's electronic blower motor controller has failed. The blower motor runs at full speed constantly and cannot be reduced to any lower setting. The technician finds that the controller's power transistor has shorted internally. Before replacing the controller, what additional step should the technician take?

A. Replace the HVAC control module since the shorted transistor may have sent a voltage spike upstream

B. Reprogram the body control module to recalibrate the blower speed parameters for the new controller

C. Measure the blower motor current draw to verify the motor is not drawing excessive amperage

D. Replace all HVAC fuses as a precaution since the shorted transistor may have caused overcurrent damage

4. A vehicle with an R-134a system has the following gauge readings at 80°F ambient: low side 28 psi, high side 160 psi. The vent temperature is 50°F. The technician measures subcooling of 6°F at the condenser outlet. Superheat at the evaporator outlet is 18°F. What do these combined measurements indicate?

A. The system has an overcharged condition with too much refrigerant backing up in the condenser core

B. The TXV is stuck fully open and flooding the evaporator with liquid refrigerant beyond its capacity

C. The system is undercharged — low subcooling confirms insufficient liquid and high superheat confirms evaporator starvation

D. The condenser fan is operating at reduced speed, causing incomplete condensation and poor performance

5. A technician needs to verify that the HVAC control module is providing a ground signal to the A/C clutch relay coil. With the relay removed from its socket and the A/C requested, the technician connects a test light between terminal 86 (coil power) and terminal 85 (coil ground) at the relay socket. The test light illuminates brightly. What does this confirm?

A. The clutch relay is defective and should be replaced with a new unit of the same rating and type

B. The relay coil circuit has both power and ground, confirming the module is commanding the relay

C. The HVAC module has failed internally and is providing constant ground regardless of the A/C request

D. The test light result is inconclusive because a digital multimeter must be used instead of a test light

6. A customer complains that the heater only blows lukewarm air. The technician verifies the following: engine coolant temperature reaches 205°F, the heater supply hose at the firewall is hot, the heater return hose at the firewall is warm (approximately 160°F), the blend door moves to full hot position, and the blower motor operates at all speeds. What does the warm (but not cold) return hose temperature indicate?

A. Coolant is flowing through the heater core and transferring some heat, but the core may have partial internal restriction

B. The heater core is completely blocked and the warm reading is residual heat radiating from the supply hose

C. The thermostat is stuck partially open, allowing coolant temperature to fluctuate during heater operation

D. The water pump is failing and cannot circulate enough coolant through the heater core at any engine speed

7. A technician inspects an R-134a system's compressor oil during a compressor replacement. The oil drained from the compressor is clear amber with no particles, but it measures only 1.5 ounces. The total system oil specification is 7 ounces. What does this low compressor oil volume indicate?

A. The system has a significant oil leak that has depleted the total charge below the minimum safe level

B. The previous service technician drained the new compressor completely and added too little oil back

C. The oil has broken down chemically and evaporated from the compressor due to excessive heat exposure

D. Oil has migrated from the compressor to other components, which is normal when the compressor is drained alone

8. A vehicle with automatic temperature control has the A/C system operating normally by all measured parameters — correct pressures, good vent temperatures, accurate sensor readings, and properly positioned actuators. However, the customer insists the driver-side face vents blow slightly warmer air than the passenger-side face vents. This is a single-zone system. What should the technician investigate?

A. The refrigerant charge for a marginal undercharge that would cause uneven evaporator cooling distribution

B. The evaporator for partial restriction or uneven frost patterns that would cool one side more than the other

C. The dashboard ductwork routing for a heat source near the driver-side ducts, such as proximity to the heater core

D. The blend door for a slight warp that creates uneven air mixing on the two sides of the HVAC housing

9. A technician is diagnosing an A/C system that was charged with the correct amount of refrigerant but produces both-sides-high gauge readings and poor vent temperatures. The condenser fans operate normally and the condenser face is clean. What should the technician check next?

A. The compressor clutch for slippage that may be limiting the compressor's ability to develop full pressure

B. The system for air or non-condensable gas contamination that was introduced during the charging process

C. The evaporator for freeze-up that would block airflow and cause the system to appear as overcharged

D. The metering device for a stuck-open condition that is flooding the evaporator beyond its capacity

10. On a vehicle equipped with automatic temperature control, the system maintains the set temperature correctly in all conditions. However, the customer reports hearing a faint whirring noise from behind the dashboard that was not present before. The noise is continuous and does not change with fan speed, temperature setting, or mode selection. What is the MOST likely source of this noise?

A. The in-car temperature sensor aspirator fan motor running continuously to draw cabin air across the sensor

B. A failing blower motor bearing that produces noise at all speed settings due to progressive shaft wear

C. The blend door actuator motor running continuously because it has lost its calibration reference points

D. A refrigerant flow restriction at the TXV that produces a high-pitched whining sound at steady pressure

11. A vehicle's cooling system was recently flushed and refilled with new coolant. The customer returns two days later complaining that the heater blows cold on the driver side but hot on the passenger side. The system has dual-zone climate control. What is the MOST likely cause?

A. An overheating engine causing the HVAC module to reduce heat output to the driver side as a safety measure

B. A blend door actuator on the driver side that was damaged during the cooling system service procedure

C. An incompatible coolant type that is causing uneven heat distribution within the heater core passages

D. An air pocket trapped in the heater core from the coolant refill procedure that is blocking driver-side flow

12. Technician A says that the compressor clutch pulley bearing can usually be replaced separately without replacing the entire compressor. Technician B says that a failed clutch pulley bearing produces noise that is present regardless of whether the A/C system is turned on or off. Who is correct?

A. Technician A only, because a failed pulley bearing causes noise only when the A/C is turned on and active

B. Both Technician A and Technician B are correct about pulley bearing serviceability and noise characteristics

C. Technician B only, because compressor clutch assemblies are sealed units that cannot be partially repaired

D. Neither Technician A nor Technician B, because pulley bearings never fail independently of the compressor

13. A technician is diagnosing a vehicle where the scan tool communicates normally with all modules, but the HVAC control panel display is blank and no buttons respond. All HVAC fuses test good. What is the MOST likely cause?

A. A failed HVAC control module that has lost its ability to drive the display and process button inputs

B. A CAN bus fault that is preventing the control panel from receiving the data it needs to illuminate

C. A faulty HVAC control panel assembly with a failed display backlight or internal circuit board failure

D. A failed body control module that is not providing the ignition run signal to power up the control panel

14. A vehicle's heater performance has gradually decreased over the past year. The technician observes that the coolant in the reservoir appears muddy brown instead of its original orange color. The coolant tests indicate depleted inhibitors and a pH below 7.0 (acidic). What is the MOST likely connection between the coolant condition and the heater complaint?

A. Degraded, acidic coolant has promoted internal corrosion and deposit formation that is restricting heater core flow

B. The low pH coolant has caused the thermostat wax element to deteriorate, lowering the engine operating temperature

C. The brown discoloration indicates the coolant has mixed with engine oil from a head gasket leak affecting heat

D. The depleted inhibitors have allowed the water pump impeller to corrode, reducing circulation to the heater core

15. A vehicle owner reports that after starting the car on a humid summer morning, the outside of the windshield fogs heavily when the A/C is turned on with the defrost mode selected. This clears after a few minutes of driving. What is occurring?

A. The A/C system has a refrigerant leak at the evaporator that is releasing vapor onto the windshield exterior

B. The defroster ductwork is misdirecting cold air to the exterior surface of the windshield through a housing gap

C. The heater core is leaking coolant vapor that condenses on the windshield exterior rather than the interior

D. Cold air from the defroster is cooling the windshield glass below the exterior air's dew point, causing external condensation

16. A vehicle's A/C system has a slow leak that loses approximately 2–3 ounces of refrigerant per month. The technician has performed electronic leak detection and UV dye injection but cannot locate the leak after two weeks. What should the technician try next?

A. Recheck the evaporator by inspecting the HVAC drain for UV dye or using an electronic detector at the vents

B. Pressurize the system with nitrogen and submerge individual removed components to pinpoint the leak source

C. Increase the UV dye concentration by adding a second dose and waiting another month for accumulation

D. Replace all O-rings and hoses as a shotgun repair since the leak is too small to detect by other methods

17. A technician replaces a compressor on a vehicle. The new compressor arrives with 8 ounces of PAG 46 oil. The service manual specifies PAG 100 oil for this vehicle. The total system oil capacity is 7 ounces. What must the technician do?

A. Drain all oil from the new compressor and refill with the correct PAG 100 oil in the amount specified for this replacement

B. Install the compressor as-is since the factory oil is always the correct type for the specific application

C. Mix PAG 46 and PAG 100 in equal proportions to achieve an intermediate viscosity suitable for the system

D. Use the PAG 46 temporarily and schedule a return visit to flush and replace with PAG 100 after break-in

18. A vehicle's A/C system has been converted from R-12 to R-134a. The system currently uses POE oil. The customer wants to convert the system to R-1234yf for environmental reasons. What should the technician advise?

A. Proceed with the conversion since POE oil is compatible with R-1234yf and the systems use similar pressures

B. The conversion is straightforward and only requires changing the service fittings and applying a new label

C. The conversion is generally not recommended because the vehicle was not engineered for R-1234yf safety requirements

D. The conversion is illegal under EPA regulations and cannot be performed under any circumstances on any vehicle

19. A vehicle's heater produces excellent heat at highway speed. At idle, the heat output drops noticeably but the engine temperature gauge remains stable in the normal range. The coolant level is full and both heater hoses are hot at idle. What is the MOST likely cause?

A. A stuck-open thermostat that is allowing excessive coolant flow to the radiator during idle operation

B. A water pump with a partially eroded impeller that provides marginal flow at low RPM idle speeds

C. A restricted heater core that passes enough coolant at highway RPM but restricts at idle flow rates

D. A failing condenser fan that is overcooling the coolant at idle by drawing excessive air across the radiator

20. A technician is diagnosing an electronically controlled HVAC system. The scan tool shows the A/C pressure sensor reading fluctuates between 0 psi and 250 psi at a rate of several times per second while the system is at rest. Normal static pressure should be a steady 95 psi. What does this erratic reading indicate?

A. A refrigerant charge that is unstable due to temperature fluctuations in the parked vehicle's engine bay

B. Normal sensor behavior during the module's self-test calibration sequence that occurs at key-on

C. An intermittent restriction in the system that causes rapid pressure changes between the high and low sides

D. A faulty pressure sensor or a wiring fault such as a loose connector or chafed wire causing signal dropout

21. A technician is performing a leak test on a completely empty A/C system using dry nitrogen. The technician pressurizes the system to 175 psi and monitors the gauge. After 30 minutes, the pressure has dropped to 168 psi. The shop temperature has remained constant. What does this pressure drop indicate?

A. A leak exists in the system that must be located and repaired before evacuation and charging can proceed

B. Normal pressure equalization that occurs as nitrogen distributes evenly throughout all system components

C. The nitrogen regulator is slowly bleeding off pressure through its internal relief valve mechanism

D. Thermal contraction of the nitrogen gas as it cools from the compression heating during the fill process

22. On a vehicle with electronic HVAC controls, the recirculation indicator light on the dashboard illuminates when the recirculation button is pressed, but the technician notices that outside air continues to flow into the cabin. The scan tool shows the air inlet door is commanded to recirculation. What is the MOST likely cause?

A. The recirculation button and control panel are functioning correctly based on the indicator illumination

B. The HVAC control module has a software error that illuminates the light but does not send the actuator command

C. The air inlet door actuator or the door itself has failed and is not responding to the module's command

D. The indicator light circuit is separate from the actuator circuit and the light illumination is not meaningful

23. A vehicle's A/C system has a confirmed evaporator leak. The labor estimate for the evaporator replacement is 8 hours. The customer wants to know if there is a less expensive temporary repair option. What should the technician explain?

A. A/C sealant products exist but are not a permanent repair, may damage system components, and the evaporator will eventually need replacement

B. The evaporator can be soldered or brazed at the leak point through an access panel without full dashboard removal

C. The technician can add extra refrigerant to compensate for the leak rate and avoid the expensive evaporator repair

D. A smaller replacement evaporator can be installed externally under the hood as a permanent bypass modification

24. A technician connects a manifold gauge set to a vehicle and finds the static pressure reads 55 psi at 80°F ambient. The expected static pressure at this temperature is approximately 90–95 psi. What does this reading indicate?

A. The manifold gauge set is malfunctioning and should be verified against a known accurate reference gauge

B. The system has been charged with R-1234yf instead of R-134a, which has slightly lower static pressures

C. The metering device is stuck partially open, creating a permanent pressure imbalance across the device

D. The system has a partial refrigerant charge — enough to produce measurable pressure but below the full specification

25. A vehicle's scan tool HVAC data shows the engine coolant temperature at 195°F, but the technician's infrared thermometer aimed at the thermostat housing reads 220°F. What could explain this discrepancy?

A. The scan tool is reading the ECT sensor data, which may be located at a different point in the circuit than the thermostat housing

B. The infrared thermometer is malfunctioning because it is impossible for any cooling system point to exceed the sensor reading

C. The ECT sensor and the thermostat housing can read different temperatures depending on sensor location and coolant flow

D. The thermostat housing is always the hottest point in the system and the ECT sensor is always the coolest measurement

26. A vehicle's A/C compressor has been replaced twice in the past year. Both replacement compressors failed with similar internal damage. The system was properly flushed each time and the accumulator and orifice tube were replaced. What additional factor should the technician investigate?

A. Whether the compressor mounting bracket is cracked and allowing excessive vibration to damage internals

B. Whether the correct oil type and amount are being used, as incorrect oil is a common cause of repeat failure

C. Whether the refrigerant identifier was used to verify purity before each recharge to rule out contamination

D. Whether the drive belt tension is excessive and placing abnormal radial load on the compressor shaft bearing

27. On a vehicle with automatic temperature control, the technician notices that the system provides noticeably better cooling performance when the vehicle is first started (for the first 5–10 minutes) than after extended driving. The vent temperature starts at 40°F but gradually rises to 52°F after 20 minutes of driving at highway speed. Gauge pressures gradually increase over the same period. What is the MOST likely cause?

A. An intermittent compressor clutch coil that weakens as it heats up during extended operation periods

B. A marginal refrigerant charge that performs well when the system is cold but degrades as it heats up

C. A failing blower motor that gradually reduces speed as its internal resistance increases with temperature

D. A condenser that becomes increasingly heat-soaked from engine and road heat during extended driving

28. Technician A says that the high-pressure relief valve on a compressor or system component should never open during normal operation. Technician B says that if a high-pressure relief valve opens and vents refrigerant, the system has a severe underlying problem that must be diagnosed before recharging. Who is correct?

A. Both Technician A and Technician B are correct about high-pressure relief valve function and significance

B. Technician A only, because the relief valve opening is a normal pressure regulation mechanism

C. Technician B only, because the relief valve opens regularly to prevent minor pressure spikes from damage

D. Neither Technician A nor Technician B, because modern systems no longer use high-pressure relief valves

29. A vehicle's cooling system repeatedly loses coolant from the reservoir overflow. The pressure cap has been tested and holds the correct 16 psi rating. The engine does not overheat and the oil is clean. A combustion gas test on the coolant reservoir is negative. What should the technician investigate next?

A. The radiator for internal tube blockage that causes localized boiling and steam pressure buildup

B. The heater core for an internal leak that is directing overflow into the HVAC housing rather than externally

C. The cooling fan operation to determine if it is running continuously and overcooling the system at startup

D. Whether the coolant level was overfilled above the maximum mark, causing normal expansion to overflow

30. A technician is using a scan tool to diagnose a vehicle where the mode door actuator moves to the floor position when commanded, but the air comes out of both the floor and defrost vents simultaneously instead of the floor vents alone. What is the MOST likely cause?

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

B. A second mode door (defrost-to-floor door) that is not fully closing because its actuator has failed or its linkage is broken

C. Normal system operation because the floor mode always includes partial defrost delivery for windshield visibility

D. The air inlet door is stuck in the outside air position and is forcing excess airflow through both vent paths

31. A customer reports that their vehicle's A/C system makes a loud hissing or rushing noise from the dashboard area immediately after the engine is shut off. The noise lasts approximately 30–60 seconds and then stops. The A/C system functions normally during operation. What is the MOST likely explanation?

A. Normal refrigerant pressure equalization through the metering device as high-side and low-side pressures balance

B. A refrigerant leak at the evaporator that is more audible when the blower motor is not running

C. Air entering the system through a failed Schrader valve that opens when compressor suction stops

D. The compressor shaft seal releasing refrigerant vapor when the clutch disengages and bearing loads change

32. A technician is measuring voltage drop across the blower motor power supply wire on the HIGH speed setting. The DMM reads 0.3V. The voltage drop across the blower motor ground wire reads 0.2V. Battery voltage with the engine running is 14.2V. What is the voltage available at the blower motor?

A. 14.2V because voltage drops in the supply and ground circuits do not affect the voltage at the motor

B. 13.9V because only the supply-side voltage drop reduces the voltage available to the motor component

C. 14.5V because the generator compensates for voltage drops by increasing output under high-current loads

D. 13.7V because both the supply-side and ground-side voltage drops reduce the effective voltage at the motor

33. A vehicle with a TXV system has a receiver-drier with a sight glass. With the system fully charged and operating, the sight glass shows a steady stream of bubbles in the liquid refrigerant. What is the MOST likely cause in an R-134a system?

A. A severe refrigerant overcharge that is causing turbulence in the liquid line and generating visible bubbles

B. An air pocket trapped in the receiver-drier that is circulating with the refrigerant through the sight glass

C. A normal condition, as R-134a systems commonly show bubbles in the sight glass even when properly charged

D. A significant undercharge with insufficient liquid refrigerant to fill the line, allowing vapor to be visible

34. Technician A says that a 50/50 coolant-to-water mixture provides the best combination of freeze protection, boiling point elevation, and heat transfer efficiency. Technician B says that using a higher concentration of coolant (such as 70/30) always provides better overall protection. Who is correct?

A. Technician A only, because concentrations above 60% actually reduce heat transfer efficiency

B. Both Technician A and Technician B, because higher glycol concentration always improves every property

C. Technician B only, because the maximum glycol concentration provides the maximum protection possible

D. Neither Technician A nor Technician B, because the optimal ratio varies with every vehicle manufacturer

35. A technician is performing a bidirectional scan tool test on a blend door actuator. When commanded from 0% to 100%, the actuator moves smoothly and the feedback tracks accurately. However, when the technician releases the scan tool command, the actuator immediately snaps back to the 0% position without being commanded. What does this behavior indicate?

A. A normal actuator response where the return spring pulls the door to the default cold position automatically

B. A faulty actuator that has lost its internal holding mechanism and cannot maintain a commanded position

C. Normal operation because all blend door actuators return to full cold when a scan tool bidirectional test ends

D. A wiring problem that is causing the actuator to lose its position signal when the scan tool disconnects

36. A vehicle has an A/C system that works correctly during the morning commute but loses cooling effectiveness during the afternoon return drive on the same route. Mornings are typically 75°F while afternoons reach 98°F. The system was recently charged to specification. What is the MOST likely explanation?

A. An intermittent compressor clutch coil failure triggered specifically by afternoon engine bay temperatures

B. A condenser partially blocked by debris that only becomes problematic under high ambient heat loads

C. A marginal refrigerant charge that performs adequately in moderate conditions but cannot maintain cooling under extreme heat

D. The system is reaching its maximum cooling capacity under the higher afternoon ambient temperature conditions

37. A vehicle owner had the A/C system repaired at an independent shop six months ago. The owner now brings the vehicle to a different shop reporting poor cooling. The second technician identifies the refrigerant with an identifier and finds 94% R-134a and 6% R-22. What action should the technician take?

A. Proceed with R-134a service since the R-22 concentration is low enough to be within acceptable limits

B. Add additional R-134a to dilute the R-22 to below the 2% contamination threshold for acceptable purity

C. Recover the contaminated charge into a dedicated contaminated-refrigerant container and recharge with pure R-134a

D. Flush the entire system with approved solvent before recharging to remove all traces of the R-22 contamination

38. A vehicle's heater core was replaced three months ago. The customer returns complaining that the heat output has decreased noticeably. Both heater hoses are hot. The technician removes the coolant reservoir cap and notices the coolant is a different color than what was installed during the heater core replacement. The customer admits to adding a different brand and type of coolant to top off the level. What is the MOST likely connection?

A. Mixing incompatible coolant types has caused gel or sludge that is beginning to restrict the new heater core

B. The different coolant brand has a lower operating temperature that reduces the available heat transfer capacity

C. The added coolant has a higher water content that dilutes the freeze protection but does not affect heating

D. The different coolant color is cosmetic only and has no effect on heating performance in any modern vehicle

39. A technician recovers the refrigerant from an A/C system and the recovery machine displays a total recovered amount of 28 ounces. The vehicle's specified charge is 20 ounces. No refrigerant was added during the current service visit. What does this overcharge indicate?

A. The recovery machine's scale is inaccurate and should be recalibrated before the technician proceeds

B. The previous service technician charged by pressure rather than weight and inadvertently overcharged the system

C. The system naturally accumulates additional refrigerant over time through molecular absorption processes

D. A previous service added excess refrigerant, likely from charging by pressure or not recovering before recharging

40. A vehicle with electronic HVAC has the following complaint: the fan speed increases and decreases on its own without the driver touching the controls. The speed changes occur gradually over 30–60 second intervals. The temperature setting is at 72°F. What does this behavior indicate?

A. A faulty electronic blower motor controller that is intermittently changing its output voltage randomly

B. Normal ATC operation where the module adjusts blower speed continuously to maintain the set temperature

C. An intermittent short in the blower motor wiring that is creating random speed variations during operation

D. A failing blower motor with worn brushes that intermittently loses and regains contact during rotation

41. A vehicle has a confirmed R-134a system. The technician connects the recovery machine and begins the recovery process. The machine's built-in scale shows 18 ounces recovered. The specified charge is 22 ounces. What can the technician conclude about the original system condition?

A. Nothing definitive, because some oil is also recovered and the machine's accuracy has a typical tolerance of ±2 ounces

B. The system was approximately 20% undercharged, confirming a leak that must be found before recharging

C. The system was properly charged but lost 4 ounces during the connection of the recovery machine hoses

D. The machine is malfunctioning because a properly maintained system should always yield the exact specified charge

42. A technician is testing the A/C clutch relay. With a DMM, the technician measures 12.4V between terminal 30 and ground, and 12.1V between terminal 86 and ground. With the A/C requested, 0.3V is measured between terminal 85 and ground. The technician then measures resistance between terminals 30 and 87 with the relay removed and finds 0.4 ohms. What can be determined from these tests?

A. The relay coil circuit is functional and the relay contact resistance is within normal range for a good relay

B. The relay contacts have excessive resistance at 0.4 ohms and the relay should be replaced immediately

C. Terminal 85 has insufficient ground and the 0.3V reading indicates a high-resistance ground connection

D. The tests are inconclusive because relay testing requires an oscilloscope rather than a standard multimeter

43. Technician A says that an electric compressor in a hybrid or electric vehicle operates on high-voltage from the hybrid battery and requires specialized safety training to service. Technician B says that electric compressors use the same mineral oil lubricant as conventional belt-driven R-12 compressors. Who is correct?

A. Both Technician A and Technician B, because electric compressors use standard automotive lubricants

B. Technician B only, because electric compressors operate on 12V like all other automotive accessories

C. Neither Technician A nor Technician B, because electric compressors are not used in any production vehicles

D. Technician A only, because electric compressors use specialized non-conductive oil to prevent electrical hazards

44. A vehicle's A/C system has gauge readings of low side 38 psi and high side 185 psi at 78°F ambient. The vent temperature is 46°F. The customer's complaint is that the A/C is "not as cold as it used to be." The technician's performance test data shows the system is within normal parameters for the ambient conditions. What should the technician do?

A. Recover refrigerant and recharge with fresh R-134a since the existing charge may have degraded with age

B. Document the test results and explain to the customer that the system is performing within its designed capability

C. Add 2 ounces of refrigerant as a top-off since even a slight increase may satisfy the customer's expectation

D. Replace the evaporator temperature sensor since a marginal calibration error could limit maximum cooling

45. A vehicle has an intermittent A/C concern where the compressor clutch disengages randomly for 10–30 seconds and then re-engages. The scan tool shows no DTCs during or after the event. System pressures are normal when the compressor is running. The fault occurs every 15–20 minutes. What should the technician investigate?

A. An intermittent electrical fault in the clutch coil circuit such as a loose connector or damaged wire

B. The cycling clutch pressure switch for a calibration drift that causes premature cutoff during operation

C. The HVAC control module for a software glitch that periodically drops the compressor engagement command

D. The high-pressure cutout switch for an intermittent trip condition caused by borderline-high pressures

46. A technician is diagnosing a vehicle where the condenser cooling fan runs continuously at high speed from the moment the engine is started, even when the A/C is off and the engine is cold. What is the MOST likely cause?

A. Normal operation on vehicles with electric cooling fans that are designed to run at all times for safety

B. A failed HVAC control module that is continuously commanding the fan relay to the high-speed position

C. A faulty coolant temperature sensor or fan relay circuit causing the fan control logic to default to high speed

D. An overcharged A/C system that is creating high head pressure even with the compressor not running

47. A vehicle's A/C system has been operating with a slow leak for approximately one year. The customer finally brings the vehicle in when the cooling stops entirely. The technician recovers zero refrigerant. After leak repair and evacuation, the technician charges the system. It cools, but the compressor is noticeably noisier than normal. What has MOST likely occurred?

A. The new refrigerant charge is slightly higher than specification, creating additional compressor workload

B. The compressor has sustained internal damage from extended operation with insufficient lubricating oil

C. The leak repair introduced debris into the system that is now circulating through the compressor internals

D. The compressor bearings have developed surface corrosion from sitting idle without refrigerant for protection

48. Technician A says that the blend door in an HVAC system controls the temperature of the air delivered to the cabin. Technician B says that the mode doors in an HVAC system control which outlet vents receive the conditioned air. Who is correct?

A. Technician A only, because mode doors also control temperature by varying the amount of heater core exposure

B. Both Technician A and Technician B are correct about the functions of the blend door and mode doors

C. Technician B only, because the blend door controls air volume rather than temperature in modern systems

D. Neither Technician A nor Technician B, because a single universal door controls both functions simultaneously

49. A vehicle's A/C evaporator condensation drain tube is clogged. What symptoms will this produce?

A. Reduced cooling performance because the accumulated water insulates the evaporator and blocks heat transfer

B. A musty odor and possible water overflow onto the passenger floorboard from the HVAC housing

C. Water accumulation inside the HVAC housing that can overflow onto the passenger floor and promote microbial growth

D. Evaporator freeze-up because the standing water around the evaporator lowers the surrounding air temperature

50. A technician finds that a vehicle's engine thermostat is rated at 180°F but the manufacturer specifies a 195°F thermostat for this vehicle. The customer installed the 180°F thermostat to "keep the engine cooler." What effect does this lower-rated thermostat have on HVAC performance?

A. No effect on HVAC because the thermostat only controls radiator flow and does not affect heater output

B. The heater will produce less heat because the coolant will stabilize at a lower temperature than designed

C. The A/C system will overcool the cabin because the lower engine temperature reduces condenser heat load

D. The engine will overheat because the lower-rated thermostat opens too soon and disrupts normal cooling flow

Practice Exam 6: Answer Key and Explanations

1. D — Rhythmically oscillating pressures on both the low and high side while the compressor runs continuously is the classic signature of a hunting TXV. The sensing bulb is not maintaining stable thermal contact with the suction line — likely due to poor mounting, missing insulation, or incorrect positioning — causing the valve to alternate between opening too wide (pressure rises) and closing too far (pressure drops) in a repeating cycle that never reaches equilibrium.

2. A — Technician A is correct that the orifice tube or TXV must always be replaced after catastrophic compressor failure because these precision metering devices trap debris on their screens and in their internal passages. Technician B is incorrect because parallel flow and sub-cool condensers have micro-channels that trap debris and cannot be reliably flushed — they must be replaced. Only serpentine tube condensers with open flow paths can be flushed effectively.

3. C — A shorted power transistor in the blower controller explains the full-speed-only symptom — the transistor passes full voltage constantly instead of regulating it. Before installing a new controller, measuring the blower motor's current draw is essential because the most common cause of controller transistor failure is a blower motor drawing excessive current from worn brushes or a dragging bearing. Installing a new controller without checking the motor guarantees repeat failure.

4. C — Subcooling of only 6°F (well below the normal 10°F–20°F range) confirms the condenser is not producing adequate liquid refrigerant — the system is undercharged. Superheat of 18°F (well above the normal 8°F–12°F TXV specification) confirms the evaporator is starved — all liquid boils off too early and the remaining vapor superheats excessively. Both measurements independently confirm the same diagnosis: insufficient refrigerant in the system.

5. B — A test light connected between the relay coil power terminal (86) and the relay coil ground terminal (85) illuminates when the A/C is requested, confirming that voltage is present on the power side and a ground path exists on the control side. This proves the HVAC module is providing the ground signal to energize the relay coil. The relay coil circuit from power through coil to ground is complete and functional.

6. A — A return hose at 160°F indicates coolant is flowing through the heater core — if the core were completely blocked, the return hose would be ambient temperature or cold. However, the 45°F temperature drop between supply (205°F engine temp) and return (160°F) is larger than ideal, suggesting the flow rate through the core is reduced by a partial internal restriction. Full flow would produce a smaller temperature differential because the coolant would move through faster and lose less heat.

7. D — Compressor oil circulates with the refrigerant throughout the entire system — some resides in the condenser, evaporator, hoses, accumulator/receiver-drier, and lines at all times. When the compressor is drained alone, only the oil currently inside the compressor is captured. Finding only 1.5 ounces of the 7-ounce total in the compressor is normal because the remaining 5.5 ounces are distributed throughout the other components.

8. C — In a single-zone system with one evaporator and one blend door, both sides receive identically conditioned air from the HVAC housing. A slight temperature difference between the driver and passenger face vents points to the ductwork routing — the driver-side ducts may pass closer to the heater core, engine firewall, or other heat source inside the dashboard, picking up a small amount of radiant or conducted heat that the passenger-side ducts do not encounter.

9. B — Both-sides-high gauge readings with a correct charge, functioning condenser fans, and a clean condenser eliminate overcharge, airflow restriction, and fan failure as causes. The remaining explanation is non-condensable gases (air) in the system. Air cannot condense at system pressures and permanently raises the high-side pressure above what the refrigerant alone would produce. Air typically enters during improper charging procedures — failing to evacuate adequately or not purging hoses before connecting.

10. A — A continuous faint whirring noise from behind the dashboard that does not change with any control setting is characteristic of the in-car temperature sensor aspirator fan. This tiny fan runs constantly during system operation to draw cabin air across the temperature sensor for accurate readings. It is normally inaudible, but as the fan motor's bushings wear, it can develop a noticeable whir. The noise has no effect on system function and is a low-priority concern.

11. D — Immediately following a coolant flush and refill, the most common cause of uneven heating in a dual-zone system is a trapped air pocket. During the refill procedure, air can become trapped in the heater core — particularly on one side of a dual-passage core. The air pocket blocks coolant flow on the affected side, producing cold air from that zone while the other side receives full coolant flow and heats normally. Bleeding the cooling system should resolve the issue.

12. B — Both technicians are correct. Technician A is right that on many compressor designs, the clutch pulley bearing is a separately serviceable component — it can be pressed out and a new bearing pressed in without replacing the entire compressor. Technician B is right that the pulley bearing spins whenever the engine runs (the belt drives the pulley continuously), so bearing noise is present at all times regardless of whether the A/C is on or off.

13. C — The scan tool communicates with all modules (confirming the CAN bus and module processors are functional), and all HVAC fuses are good (confirming power supply to the system). A blank display with non-responsive buttons on the control panel itself — while the module behind it communicates normally — points to a failed control panel assembly. The panel's display backlight, internal circuit board, or button interface has failed while the module it connects to remains operational.

14. A — Degraded coolant with depleted inhibitors and acidic pH promotes internal corrosion of the heater core's aluminum tubes and passages. Corrosion products and mineral deposits gradually accumulate inside the narrow heater core channels, restricting coolant flow and insulating the tube walls from heat transfer. This progressive buildup directly explains the gradual decrease in heating performance over the past year as the coolant condition deteriorated.

15. D — This is external windshield condensation — not an A/C system fault. When cold air from the defroster cools the windshield glass below the dew point of the warm, humid outside air, moisture from the exterior atmosphere condenses on the outside of the glass. This occurs most commonly on humid mornings when the A/C produces very cold air that rapidly chills the glass. It clears naturally as driving warms the glass above the dew point. This is a physics phenomenon, not a malfunction.

16. B — After exhausting electronic detection and UV dye without finding the leak externally, the most likely source is the evaporator — which is hidden inside the HVAC housing and inaccessible to external electronic probes. Rechecking specifically for evaporator leaks by examining the HVAC condensation drain tube for UV dye traces or inserting an electronic detector probe into the center dashboard vent (with the blower off) targets the one location that standard external scanning cannot adequately reach.

17. A — The compressor arrives with PAG 46 oil, but this vehicle requires PAG 100. Different PAG viscosities are not interchangeable — using the wrong viscosity provides inadequate lubrication at the pressures and temperatures specific to that compressor design. The technician must drain all of the factory PAG 46 from the new compressor and refill with the correct PAG 100 in the amount specified by the service manual for this particular replacement scenario.

18. C — Converting an older vehicle from R-134a to R-1234yf is generally not recommended because the vehicle was not engineered with R-1234yf's mild flammability (A2L classification) in mind. Factory R-1234yf vehicles include specific safety features — crash-activated A/C shutoff, hose routing designed to avoid ignition sources, and ventilation provisions — that older vehicles lack. Additionally, R-1234yf costs significantly more per pound, and there is no meaningful performance benefit from the conversion.

19. B — Both heater hoses are hot at idle (confirming coolant temperature is adequate and flow is present), and the engine temperature gauge is stable (eliminating a stuck-open thermostat). The reduced heat output specifically at idle — where water pump speed is lowest — points to a water pump with a partially eroded impeller. At highway RPM, the faster pump speed pushes sufficient coolant through the heater core despite the damaged impeller. At idle's lower speed, the reduced pumping capacity produces insufficient flow for full heat transfer.

20. D — A static pressure reading that should be a steady 95 psi but instead fluctuates rapidly between 0 and 250 psi at rest (when no compressor operation is changing the actual pressure) indicates the signal itself is unstable — not the actual system pressure. A faulty pressure sensor with a failing internal element, a loose electrical connector with an intermittent connection, or a chafed signal wire touching chassis ground intermittently would produce exactly this erratic reading pattern.

21. A — A pressure drop from 175 psi to 168 psi (7 psi loss) over 30 minutes in a constant-temperature environment cannot be explained by thermal changes or gas redistribution — nitrogen does not leak through sealed connections by itself. The 4% pressure loss confirms a leak in the system. The technician must now locate the leak using soap solution at all fittings and connections, an ultrasonic detector, or by listening for the hiss of escaping nitrogen before proceeding with evacuation and charging.

22. C — The control panel correctly sends the recirculation command (indicator light illuminates and scan tool confirms the door is commanded to recirculation), proving the button, panel, and module communication path are all working. The door itself is not moving to the commanded position — either the air inlet door actuator has failed (motor, gears, or electrical connection) or the door is physically stuck, blocked, or disconnected from the actuator shaft.

23. A — The technician should be transparent with the customer: A/C sealant products exist as a temporary measure for small leaks, but they are not a permanent repair. Sealant particles can clog metering device screens, contaminate recovery equipment, and potentially damage system components. The evaporator will eventually need replacement regardless. The customer can make an informed decision between the temporary sealant option (knowing its limitations) and the proper permanent repair.

24. D — A static pressure of 55 psi at 80°F ambient — where R-134a should read approximately 90–95 psi per the P-T chart — confirms the system contains some refrigerant but not a full charge. Enough refrigerant remains to produce measurable pressure, but the mass is insufficient for normal system operation. The partial charge confirms a leak has occurred, and the system needs leak detection, repair, evacuation, and a complete recharge by weight.

25. C — The ECT sensor and the thermostat housing are at different physical locations in the cooling system. The ECT sensor may be in the cylinder head, engine block, or a coolant passage downstream of the thermostat, while the thermostat housing is at the engine outlet. Coolant temperatures can vary by 15°F–25°F between different points in the circuit depending on coolant flow, heat exposure, and sensor placement. Both readings can be simultaneously accurate because they measure different locations.

26. B — Repeat compressor failure with similar damage patterns despite proper flushing and component replacement suggests a systemic issue rather than a contamination issue. The most commonly overlooked factor is compressor oil — using the wrong oil type (PAG 46 instead of PAG 100, for example), the wrong oil amount (too little causes inadequate lubrication, too much causes slugging), or oil contaminated with moisture can destroy a compressor within months. Verifying oil type and quantity should be the next investigation step.

27. D — Cooling performance that starts strong but gradually degrades over extended driving, with pressures rising simultaneously, indicates the condenser's heat rejection capability is diminishing as the engine bay temperature climbs during sustained operation. Heat soaking from the engine, transmission, and exhaust system progressively raises the air temperature around the condenser, reducing the temperature differential needed for effective heat rejection. The condenser may also have marginal airflow from partial debris accumulation that becomes critical only under sustained high-load conditions.

28. A — Both technicians are correct. Technician A is right that the high-pressure relief valve is a safety device designed to prevent catastrophic component rupture — it should never open during normal system operation because normal pressures should never approach its opening threshold (typically 500–550 psi). Technician B is right that if the valve has opened, a severe underlying problem exists — massive overcharge, complete condenser blockage, or extreme contamination — that must be found and corrected before recharging.

29. C — With the pressure cap verified good and no head gasket breach, intermittent coolant overflow can result from brief temperature spikes that push pressure past the cap's rating before the gauge

registers the event. Investigating the cooling fan operation — particularly whether it engages at the correct temperature and runs at the appropriate speed — is the logical next step because a fan that activates late or runs at reduced speed allows momentary pressure surges that force coolant into the overflow reservoir. Once the fan activates, temperatures drop before the gauge reads an overheat condition.

30. B — Many HVAC systems use multiple mode doors to control air distribution — one door may direct air between the panel and floor outlets, while a separate door controls the defrost path. If the primary mode door correctly moves to the floor position but a secondary defrost-to-floor door fails to close the defrost pathway (due to a failed actuator, broken linkage, or stuck door), air escapes through both the floor and defrost outlets simultaneously instead of being directed exclusively to the floor.

31. A — A hissing or rushing sound from behind the dashboard for 30–60 seconds after engine shutdown is normal refrigerant pressure equalization. When the compressor stops, the high-side pressure (150–250+ psi) and low-side pressure (25–45 psi) equalize through the metering device, producing an audible hissing as refrigerant flows from the high side to the low side through the orifice tube or TXV. The sound stops once pressures equalize, typically within 30–90 seconds. This is expected behavior, not a system fault.

32. D — Total voltage available at the motor equals battery voltage minus all voltage drops in the circuit. The supply-side drop of 0.3V and the ground-side drop of 0.2V together consume 0.5V from the available 14.2V, leaving 13.7V at the motor (14.2 − 0.3 − 0.2 = 13.7V). Both supply and ground voltage drops reduce the effective voltage because current must flow through both paths to complete the circuit. These drops are within acceptable limits (under 0.5V each).

33. C — Sight glass diagnosis is unreliable on R-134a systems because R-134a's higher operating pressures and different miscibility characteristics with PAG oil can produce visible bubbles even in a properly charged system. Unlike R-12 systems where a clear sight glass confirmed a full charge, R-134a systems commonly show bubbles during normal operation. This is why modern R-134a and R-1234yf systems often omit the sight glass entirely. Charge accuracy should be verified by weight and subcooling measurement, not sight glass observation.

34. A — Technician A is correct that a 50/50 coolant-to-water ratio provides the best overall balance of freeze protection (approximately −34°F), boiling point elevation (approximately 265°F with a 15-psi cap), and heat transfer efficiency. Technician B is incorrect because concentrations above approximately 60% actually reduce heat transfer efficiency — pure ethylene glycol is a poorer heat conductor than water, so increasing glycol beyond the optimal ratio trades better freeze protection for worse heat transfer, which can reduce both cooling and heating performance.

35. B — Electric blend door actuators are designed to hold their commanded position using the motor's internal resistance and the gear reduction's mechanical advantage — they do not have return springs like vacuum actuators. If the actuator snaps back to 0% when the scan tool releases the command, the actuator has lost its ability to hold position. This indicates a failed actuator motor, a broken internal holding mechanism, or a wiring fault that drops the position-hold signal when the scan tool disconnects.

36. D — The system was recently charged to specification and works well in moderate 75°F morning conditions but cannot maintain the same performance at 98°F afternoon temperatures. This is not a fault — it is the system reaching its maximum cooling capacity under extreme ambient conditions. Every A/C system has a finite capacity determined by its condenser size, evaporator size, and compressor output. At very high ambient temperatures, the system operates at its limit and cannot produce the same vent temperatures it achieves in moderate conditions.

37. C — A refrigerant identifier reading of 94% R-134a and 6% R-22 confirms the system contains a contaminated, mixed charge. R-22 is a refrigerant not approved for automotive use and was likely introduced during the previous shop's service. This contaminated refrigerant must be recovered into a dedicated contaminated-only container (gray with yellow top) — never into the shop's clean R-134a storage tank. After recovery, the system is evacuated and recharged with pure R-134a.

38. A — Mixing incompatible coolant types (such as IAT green with OAT orange, or different HOAT formulations) causes the different inhibitor chemistries to react with each other, forming a gel-like sludge. This sludge progressively clogs the narrow passages inside the heater core — even a new heater core installed only three months ago. The customer's addition of an incompatible coolant type initiated the chemical reaction that is now restricting the new core's internal flow and reducing heat output.

39. D — The system specification is 20 ounces, but 28 ounces were recovered — an 8-ounce overcharge (40% excess). Since no refrigerant was added during the current visit, a previous service created the overcharge. The most common cause is charging by pressure rather than by weight (a technician added refrigerant until the gauges "looked right") or adding refrigerant to an existing partial charge without first recovering and measuring the existing amount. Overcharging reduces cooling performance and raises system pressures.

40. B — In an ATC system, the module continuously adjusts blower speed to maintain the set temperature. When the cabin temperature drifts slightly above 72°F, the module increases blower speed to deliver more conditioned air. As the temperature drops back to 72°F, the module reduces blower speed. These gradual 30–60 second speed changes are normal closed-loop ATC operation — the module is constantly fine-tuning its output based on the in-car temperature sensor feedback.

41. C — Recovering 18 of 22 specified ounces represents approximately 18% less refrigerant than the system should contain. While recovery machines have some measurement tolerance, a 4-ounce shortfall (18% of the total charge) significantly exceeds typical machine accuracy variation of approximately ±1 ounce. The most probable explanation is that the system had a slow leak that depleted approximately 4 ounces of the original charge over time, and this shortfall was contributing to the customer's complaint of reduced cooling performance.

42. A — Terminal 30 has battery voltage (power to relay contacts — good), terminal 86 has voltage (coil power supply — good), terminal 85 reads 0.3V when A/C is requested (module providing ground with minimal voltage drop — good). The relay contact resistance of 0.4 ohms between terminals 30 and 87 is well within normal range for closed relay contacts — typical values are under 1.0 ohm. All relay circuit tests indicate normal function. The relay is operational and can be ruled out as the cause of any engagement problem.

43. D — Technician A is correct that electric compressors in hybrid and electric vehicles operate on high-voltage from the hybrid battery system (typically 200V–400V+) and require specialized high-voltage safety training before any service is performed. Technician B is incorrect because electric compressors require specialized non-conductive oil — typically POE oil with specific electrical insulation properties — rather than mineral oil, to prevent the high-voltage electrical current from conducting through the oil and creating a safety hazard or damaging the motor windings.

44. B — The gauge readings (38 psi low / 185 psi high), vent temperature (46°F), and ambient temperature (78°F) all fall within normal operating parameters. The system is performing within its designed capability. When objective measurements confirm normal performance but the customer perceives inadequate cooling, the technician should document the test results and explain the system's actual performance capability. Adding refrigerant to a correctly charged system would create an overcharge.

45. A — The compressor operates normally with correct pressures when running, and no DTCs are stored during the dropout event — eliminating module logic faults and pressure switch trips as causes. A random 10–30 second disengagement every 15–20 minutes with no electronic record of the event points to a physical electrical fault in the clutch circuit that the module cannot detect. A loose connector, corroded terminal, or damaged wire in the clutch coil power or ground circuit that intermittently opens under vibration or heat would produce this exact pattern.

46. C — A cooling fan running continuously at high speed from cold start — regardless of A/C status — indicates the fan control logic has defaulted to the maximum-cooling safety mode. The most common cause is a faulty coolant temperature sensor sending an out-of-range or maximum temperature signal, or

a failed fan relay stuck in the closed position. Many fan control systems are designed to default to high-speed operation when they detect a sensor fault, ensuring the engine is always cooled even if the sensor data is unreliable.

47. D — After the system lost its entire refrigerant charge, the compressor's internal components — particularly the bearings and precision-machined surfaces — were left exposed without the protective film of refrigerant oil that normally coats them. Over the weeks or months the system sat empty, atmospheric moisture that entered through the leak point caused surface corrosion on these exposed metal surfaces. When the system is recharged and the compressor resumes operation, the corroded surfaces produce abnormal noise as they contact each other.

48. B — Both technicians are correct about these fundamental HVAC component functions. Technician A is right that the blend door controls outlet air temperature by varying the proportion of air routed through the heater core versus bypassing it — full cold bypasses the heater core entirely, full hot routes all air through it. Technician B is right that mode doors control air distribution by directing conditioned air to the panel (face) vents, floor outlets, defrost ducts, or combinations thereof.

49. C — A clogged condensation drain tube prevents the moisture that normally condenses on the cold evaporator from exiting the vehicle. This water accumulates in the bottom of the HVAC housing, can overflow onto the passenger floorboard, creates a persistently wet environment that promotes mold and bacterial growth on the evaporator surface, and produces the musty odor commonly associated with A/C operation. Clearing the drain tube and treating the evaporator with antimicrobial cleaner resolves both the water and odor issues.

50. B — Installing a 180°F thermostat instead of the specified 195°F thermostat causes the engine to stabilize at a lower operating temperature — approximately 15°F cooler than designed. Since the heater core receives its heat from engine coolant, lower coolant temperature directly means less heat available for cabin heating. On cold days, the difference is very noticeable — the heater produces lukewarm rather than hot air because the coolant never reaches the temperature the system was designed to operate at.