PRACTICE EXAM 9: T7 SIMULATION (50 QUESTIONS)

1. The most accurate method for verifying refrigerant charge on a heavy-duty truck A/C system is:

A. Recovery and weight measurement against OEM specification

B. Visual inspection of the sight glass for bubbles

C. Pressure measurement at idle conditions

D. Temperature measurement at the evaporator outlet

2. A heavy-duty truck A/C system shows symptoms of poor cooling. Manifold gauges show 25 psi low-side and 175 psi high-side at idle on a 75°F day. The most likely cause is:

A. Excessive refrigerant charge in the system

B. Failed compressor with no pumping action

C. Marginal but possibly low refrigerant charge

D. Restricted condenser airflow

3. Tech A says the A/C system high-side pressure varies with ambient temperature. Tech B says diagnostic gauge interpretation must consider ambient conditions. Who is correct?

A. Tech A only

B. Both Tech A and Tech B

C. Tech B only

D. Neither Tech A nor Tech B

4. A heavy-duty truck A/C system has the compressor clutch engaged but shows no cooling. Both manifold gauges read 90 psi at idle. The most likely cause is:

A. Excessive refrigerant charge in the system

B. Restricted high-side circuit

C. Failed expansion valve

D. Failed compressor with internal damage

5. The proper procedure for charging a heavy-duty truck A/C system after major service is:

A. Recover, evacuate to 29 inches Hg, leak-check, and charge by weight to OEM specification

B. Charge by pressure measurement at idle

C. Charge by sight glass observation

D. Charge by temperature measurement at the evaporator

6. Tech A says compressor failure can be caused by lack of refrigerant or oil. Tech B says system contamination from previous failures can cause new compressor failure. Who is correct?

A. Tech A only

B. Tech B only

C. Both Tech A and Tech B

D. Neither Tech A nor Tech B

7. A heavy-duty truck A/C system shows oil residue at the high-pressure service port area. The next diagnostic step should be:

A. Recharge the system and continue service

B. Use a leak detector to identify the specific leak source

C. Replace the service port cap

D. Replace the compressor as the most common cause

8. The proper sequence for diagnosing a heavy-duty truck A/C complaint is:

A. Replace the compressor first because it is the most common cause

B. Replace components in order of accessibility

C. Replace the refrigerant first to verify proper charge

D. Verify operation, identify symptoms, isolate causes, and confirm repairs

9. A heavy-duty truck A/C compressor is making noise during operation. The most likely cause is:

A. Insufficient refrigerant or oil causing internal damage

B. Excessive refrigerant charge causing pressure issues

C. Failed expansion valve unrelated to compressor

D. Failed evaporator unrelated to compressor

10. Tech A says heavy-duty truck A/C system service requires understanding of refrigerant cycle theory. Tech B says practical diagnostic skills require both theory knowledge and hands-on experience. Who is correct?

A. Tech B only

B. Tech A only

C. Both Tech A and Tech B

D. Neither Tech A nor Tech B

11. A heavy-duty truck A/C system has had its receiver-drier replaced but the system still shows moisture-related symptoms. The most likely cause is:

A. Defective replacement receiver-drier from the supplier

B. Excessive refrigerant charge in the system

C. Permanent moisture damage to the system

D. Inadequate evacuation during the recent service

12. The proper procedure for verifying A/C system performance after service is:

A. Performance testing at multiple operating conditions and ambient temperatures

B. Visual inspection only at idle

C. Pressure testing only at idle

D. Operating the system briefly without performance verification

13. Tech A says heavy-duty truck A/C system PM should include leak inspection. Tech B says preventive leak inspection identifies issues before complete refrigerant loss. Who is correct?

A. Tech A only

B. Tech B only

C. Both Tech A and Tech B

D. Neither Tech A nor Tech B

14. A heavy-duty truck A/C system shows ice formation on the evaporator face. The most likely cause is:

A. Excessive refrigerant charge causing flooded evaporator

B. Restricted airflow across the evaporator allowing freezing

C. Failed compressor causing system imbalance

D. Failed expansion valve causing constant maximum flow

15. The proper diagnostic approach for an A/C system leak is:

A. Replace components until the leak stops

B. Recharge with dye and observe operation

C. Pressurize the system and listen for leaks

D. Use UV dye, electronic leak detector, or pressure decay testing

16. Tech A says heavy-duty truck A/C systems require OEM-specified refrigerant and oil. Tech B says using non-specified refrigerant or oil can damage components and create safety hazards. Who is correct?

A. Both Tech A and Tech B

B. Tech A only

C. Tech B only

D. Neither Tech A nor Tech B

17. The proper procedure for cooling system maintenance on a heavy-duty diesel engine includes:

A. Coolant replacement only when complaints reported

B. Visual inspection only at every PM

C. Coolant testing, visual inspection, and pressure testing at scheduled intervals

D. Component replacement at fixed mileage intervals

18. A heavy-duty truck shows symptoms of engine overheating along with engine oil contamination. The most likely cause is:

A. Cylinder head gasket failure allowing coolant into the engine oil system

B. Failed water pump unrelated to oil contamination

C. Failed thermostat unrelated to oil contamination

D. Failed radiator unrelated to oil contamination

19. Tech A says heavy-duty diesel cooling systems require specific coolant types per OEM specification. Tech B says mixing different coolant types can cause additive depletion and component damage. Who is correct?

A. Neither Tech A nor Tech B

B. Tech A only

C. Tech B only

D. Both Tech A and Tech B

20. A heavy-duty truck cooling system shows symptoms of cylinder liner cavitation damage. The most likely root cause is:

A. Excessive coolant pressure damaging liners

B. Inadequate SCA inhibitor concentration in the coolant

C. Failed thermostat causing temperature variations

D. Failed water pump unrelated to cavitation

21. The proper coolant for a heavy-duty diesel engine is:

A. Any antifreeze available regardless of type

B. OEM-specified type at proper concentration

C. Pure water without antifreeze for maximum heat transfer

D. Pure antifreeze without water for maximum freeze protection

22. Tech A says heavy-duty truck cooling system PM should include thermostat inspection. Tech B says thermostat condition affects engine operating temperature and emissions. Who is correct?

A. Tech A only

B. Tech B only

C. Both Tech A and Tech B

D. Neither Tech A nor Tech B

23. A heavy-duty truck shows symptoms of poor cab heating with verified normal engine coolant temperature. The most likely cause is:

A. Restricted heater core flow or air-bound heater core

B. Failed engine thermostat unrelated to heating

C. Failed water pump unrelated to heating

D. Failed radiator unrelated to heating

24. The proper diagnostic procedure for cooling system overheating is:

A. Replace the thermostat as the most common cause

B. Replace the water pump as the most common cause

C. Replace the radiator as the most common cause

D. Verify coolant level, fan operation, thermostat operation, and radiator condition

25. The proper diagnostic approach for HVAC system faults on a multiplexed truck is:

A. Use a scan tool to retrieve fault codes and verify component operation

B. Replace the body controller as the primary cause

C. Disconnect the battery to reset the system

D. Replace components in sequence until the fault clears

26. Tech A says heavy-duty truck cabin air filter inspection should be part of every PM service. Tech B says cabin air filter replacement intervals depend on operating environment. Who is correct?

A. Neither Tech A nor Tech B

B. Tech A only

C. Both Tech A and Tech B

D. Tech B only

27. A heavy-duty truck HVAC system shows symptoms of incorrect blend temperature. The blend door actuator is verified moving correctly. The most likely cause is:

A. Failed actuator producing incorrect movement

B. Cabin temperature sensor or controller calibration issue

C. Failed compressor producing incorrect cooling

D. Failed evaporator producing incorrect cooling

28. The proper diagnostic procedure for a blower motor speed fault is:

A. Replace the blower motor as the primary cause

B. Replace the body controller as the primary cause

C. Disconnect the battery to reset the system

D. Verify control commands, power supply, and ground at the motor

29. Tech A says heavy-duty truck HVAC systems may use multiple sensors for ATC operation. Tech B says these sensors include cabin temperature, ambient temperature, and sun load. Who is correct?

A. Both Tech A and Tech B

B. Tech A only

C. Tech B only

D. Neither Tech A nor Tech B

30. A heavy-duty truck HVAC system shows symptoms of recirculation door not changing position. Scan tool shows actuator commands varying. The most likely cause is:

A. Failed body controller producing incorrect commands

B. Failed HVAC switch producing incorrect input

C. Mechanical binding or actuator power supply issue at the door

D. Failed compressor unrelated to door operation

31. The proper procedure for HVAC actuator replacement on a multiplexed truck is:

A. Installation, calibration, and verification through scan tool

B. Direct plug-and-play installation

C. Reflashing the body controller after installation

D. Disconnecting the battery before installation

32. Tech A says heavy-duty truck HVAC systems may include diagnostic capabilities accessible through the J1939 bus. Tech B says scan tool diagnostic information improves diagnostic accuracy and reduces repair time. Who is correct?

A. Tech A only

B. Tech B only

C. Both Tech A and Tech B

D. Neither Tech A nor Tech B

33. A heavy-duty truck sleeper auxiliary HVAC system fails to operate during engine-off periods. The auxiliary batteries are verified at full charge. The most likely cause is:

A. Failed auxiliary HVAC system from supplier defect

B. Power circuit or control circuit fault between batteries and HVAC system

C. Coincidental failure unrelated to power supply

D. Permanent system damage from improper use

34. The proper diagnostic approach for HVAC system communication faults is:

A. Replace the HVAC controller as the primary cause

B. Replace the body controller as the primary cause

C. Disconnect the battery to reset the system

D. Verify J1939 bus integrity, controller power, and ground connections

35. Tech A says heavy-duty truck HVAC system PM should include functional testing at multiple operating modes. Tech B says functional testing identifies issues that visual inspection alone may miss. Who is correct?

A. Both Tech A and Tech B

B. Tech A only

C. Tech B only

D. Neither Tech A nor Tech B

36. The proper diagnostic procedure for ATC system faults is:

A. Replace the ATC controller as the primary cause

B. Replace the cabin temperature sensor as the primary cause

C. Verify sensor signals, actuator operation, and controller calibration

D. Replace the blend door actuator as the primary cause

37. Per EPA regulations, refrigerant recovery is required:

A. Only when system leaks are present

B. Only when major service is performed

C. Only for newer refrigerant types

D. Before any A/C system opening regardless of service type

38. Tech A says heavy-duty truck shops must maintain records of refrigerant handling per EPA regulations. Tech B says these records must include refrigerant type, quantity, and disposal disposition. Who is correct?

A. Both Tech A and Tech B

B. Tech A only

C. Tech B only

D. Neither Tech A nor Tech B

39. The proper handling of cross-contaminated refrigerant (mixed types) is:

A. Continue using as a mixed refrigerant

B. Mix with pure refrigerant to dilute contamination

C. Recovery and disposal per EPA regulations

D. Vent to atmosphere because mixed refrigerants are unusable

40. EPA Section 609 certification is required for technicians who:

A. Service heavy-duty truck cooling systems

B. Service motor vehicle A/C systems

C. Service heavy-duty truck electrical systems

D. Service heavy-duty truck transmissions

PRACTICE EXAM 9: ANSWER KEY AND EXPLANATIONS

1. A — Recovery and weight measurement against OEM specification. The most accurate method for verifying refrigerant charge is recovery and weight measurement against OEM specification, providing quantitative determination of charge level. Other methods (sight glass, pressure, temperature) are less accurate and can produce false conclusions.

2. C — Marginal but possibly low refrigerant charge. Manifold pressures of 25 psi low-side and 175 psi high-side at idle on a 75°F day are at the low end of normal range, suggesting marginal or possibly low refrigerant charge. Verification through weight measurement is the next step before component replacement.

3. B — Both Tech A and Tech B. A/C system high-side pressure varies with ambient temperature, with pressure increasing as ambient temperature rises. Diagnostic gauge interpretation must consider ambient conditions to avoid misdiagnosis, with specifications adjusted for the test conditions.

4. D — Failed compressor with internal damage. Equal pressures at idle with the compressor running indicate the compressor is not pumping refrigerant from low side to high side, with internal compressor failure being the cause. The compressor reed valves or internal components have failed.

5. A — Recover, evacuate to 29 inches Hg, leak-check, and charge by weight to OEM specification. The proper charging procedure after major service includes recovery, evacuation to 29 inches Hg or higher, leak-checking, and charging by weight to OEM specification. This ensures proper system condition and accurate charge level.

6. C — Both Tech A and Tech B. Compressor failure can be caused by lack of refrigerant (insufficient refrigerant for cooling and oil return) or oil (inadequate lubrication), with both being common compressor failure causes. System contamination from previous failures (metal particles, debris) can cause new compressor failure if not properly flushed during service.

7. B — Use a leak detector to identify the specific leak source. Oil residue at the service port area indicates a refrigerant leak, with leak detection identifying the specific source before component replacement. The service port itself may not be the leak source — adjacent components could be the source with oil being deposited at the port area.

8. D — Verify operation, identify symptoms, isolate causes, and confirm repairs. The proper diagnostic sequence is to verify operation (replicate the complaint), identify symptoms (specific

observable indicators), isolate causes (systematic testing), and confirm repairs (verify the issue is resolved). This systematic approach prevents misdiagnosis and incomplete repairs.

9. A — Insufficient refrigerant or oil causing internal damage. Compressor noise during operation is most commonly caused by insufficient refrigerant or oil, which produces inadequate lubrication and cooling of internal components. This leads to bearing wear, scoring, and eventual mechanical damage.

10. C — Both Tech A and Tech B. Heavy-duty truck A/C system service requires understanding of refrigerant cycle theory to interpret system behavior correctly during diagnosis. Practical diagnostic skills require both theory knowledge (understanding why) and hands-on experience (recognizing patterns), making both essential to professional service.

11. D — Inadequate evacuation during the recent service. Moisture symptoms after receiver-drier replacement most likely trace to inadequate evacuation during the previous service, where moisture remained in the system and saturated the new desiccant material. Proper evacuation procedure (29 inches Hg for 30+ minutes) prevents this fault.

12. A — Performance testing at multiple operating conditions and ambient temperatures. The proper verification procedure is performance testing at multiple operating conditions (engine RPMs, electrical loads) and ambient temperatures, characterizing system operation across the operating envelope. Single-condition testing misses issues that appear only under specific conditions.

13. C — Both Tech A and Tech B. Heavy-duty truck A/C system PM should include leak inspection to identify developing issues before complete refrigerant loss. Preventive leak inspection identifies issues before complete refrigerant loss, allowing service before the system stops cooling and reducing overall service costs.

14. B — Restricted airflow across the evaporator allowing freezing. Ice on the evaporator face indicates the evaporator surface temperature has dropped below freezing, with restricted airflow being the most common cause. Insufficient airflow does not remove enough heat from the evaporator surface to prevent ice formation.

15. D — Use UV dye, electronic leak detector, or pressure decay testing. The proper leak diagnostic approach uses UV dye (visible under UV light), electronic leak detector (sensitive to refrigerant gas), or pressure decay testing (system pressure measurement over time), providing reliable leak identification. Random component replacement is wasteful.

16. A — Both Tech A and Tech B. Heavy-duty truck A/C systems require OEM-specified refrigerant and oil because component design is matched to specific refrigerant chemistry and oil compatibility. Using non-specified refrigerant or oil can damage components (seals, hoses, compressor) and create safety hazards including potential flammability issues.

17. C — Coolant testing, visual inspection, and pressure testing at scheduled intervals. The proper cooling system maintenance procedure includes coolant testing (chemistry verification), visual

inspection (component condition), and pressure testing (leak detection) at scheduled intervals. This comprehensive approach identifies developing issues across all system aspects.

18. A — Cylinder head gasket failure allowing coolant into the engine oil system. Engine overheating with engine oil contamination (milky oil) indicates an internal leak between the cooling system and the engine oil system, with cylinder head gasket failure being the most common cause. Continued operation risks severe engine damage.

19. D — Both Tech A and Tech B. Heavy-duty diesel cooling systems require specific coolant types per OEM specification because different coolants have different additive packages and chemistry. Mixing different coolant types can cause additive depletion (gel formation, inhibitor neutralization) and component damage from incompatible chemistry interactions.

20. B — Inadequate SCA inhibitor concentration in the coolant. Cylinder liner cavitation damage is most commonly caused by inadequate SCA inhibitor concentration, which fails to maintain the protective film on liner surfaces. The high-frequency liner vibration during combustion forms vapor bubbles that erode unprotected liner surfaces.

21. B — OEM-specified type at proper concentration. The proper coolant for a heavy-duty diesel engine is OEM-specified type at proper concentration (typically 50/50 with water), providing optimal heat transfer, freeze protection, and component protection. Other coolant choices may damage components or provide inadequate protection.

22. C — Both Tech A and Tech B. Heavy-duty truck cooling system PM should include thermostat inspection because thermostat condition directly affects engine operating temperature. Thermostat condition affects engine operating temperature and emissions, with malfunctioning thermostats producing temperature outside the optimal range for combustion efficiency.

23. A — Restricted heater core flow or air-bound heater core. Poor cab heating with verified normal engine coolant temperature indicates the heat is available but not reaching the cab, with restricted heater core flow or air-bound heater core being the most common causes. Other components are not the typical cause of this symptom pattern.

24. D — Verify coolant level, fan operation, thermostat operation, and radiator condition. The proper diagnostic procedure for cooling system overheating verifies multiple elements (coolant level, fan operation, thermostat, radiator) to isolate the cause. Random component replacement without diagnostic verification is inefficient.

25. A — Use a scan tool to retrieve fault codes and verify component operation. The proper diagnostic approach for HVAC faults on multiplexed trucks uses a scan tool to retrieve fault codes (system-reported issues) and verify component operation (commands and feedback). This systematic approach isolates the specific fault before component replacement.

26. C — Both Tech A and Tech B. Heavy-duty truck cabin air filter inspection should be part of every PM service to verify filter condition and replacement need. Cabin air filter replacement intervals

depend on operating environment, with dusty or contaminated environments requiring more frequent replacement than clean operating conditions.

27. B — Cabin temperature sensor or controller calibration issue. Incorrect blend temperature with verified normal actuator movement points to the sensor input or controller calibration rather than the actuator, with sensor signal verification and calibration check being the next diagnostic step. The actuator movement rules out the door operation.

28. D — Verify control commands, power supply, and ground at the motor. The proper diagnostic procedure for blower motor speed faults verifies control commands (PWM or relay signals), power supply, and ground at the motor. This isolates the cause (control circuit, motor, or supply) before component replacement.

29. A — Both Tech A and Tech B. Heavy-duty truck HVAC systems may use multiple sensors for ATC operation, providing comprehensive input data for automatic control. These sensors include cabin temperature, ambient temperature, and sun load, with each sensor providing specific data for control calculations.

30. C — Mechanical binding or actuator power supply issue at the door. Recirculation door not changing with varying commands points to issues at the door (mechanical binding) or actuator (power supply, motor failure). Verification at the actuator location identifies the specific cause before component replacement.

31. A — Installation, calibration, and verification through scan tool. The proper procedure for HVAC actuator replacement on multiplexed trucks includes installation, calibration through scan tool, and verification of operation. Modern actuators require calibration data and operation must be verified before returning to service.

32. C — Both Tech A and Tech B. Heavy-duty truck HVAC systems may include diagnostic capabilities accessible through the J1939 bus, providing detailed system information. Scan tool diagnostic information improves diagnostic accuracy and reduces repair time by providing specific fault data before physical inspection.

33. B — Power circuit or control circuit fault between batteries and HVAC system. Sleeper HVAC failure with verified full battery charge points to the circuit between the batteries and the HVAC system, with power circuit or control circuit faults being the most likely causes. Component replacement before circuit verification is premature.

34. D — Verify J1939 bus integrity, controller power, and ground connections. HVAC system communication fault diagnosis requires verification of J1939 bus integrity (terminating resistors, wiring), controller power supply, and ground connections, isolating the specific fault location. Component replacement without verification is inefficient.

35. A — Both Tech A and Tech B. Heavy-duty truck HVAC system PM should include functional testing at multiple operating modes (cooling, heating, defrost, recirculation) to verify proper

operation across all functions. Functional testing identifies issues that visual inspection alone may miss, particularly intermittent or load-related faults.

36. C — Verify sensor signals, actuator operation, and controller calibration. ATC system fault diagnosis requires verification of sensor signals (input data), actuator operation (output execution), and controller calibration (data processing) to identify the specific cause. Component replacement before verification can leave the actual fault in place.

37. D — Before any A/C system opening regardless of service type. EPA regulations require refrigerant recovery before any A/C system opening regardless of service type, with no exceptions for minor service or specific refrigerant types. Violations are subject to enforcement action.

38. A — Both Tech A and Tech B. Heavy-duty truck shops must maintain records of refrigerant handling per EPA regulations, providing accountability for refrigerant management. These records must include refrigerant type, quantity, and disposal disposition, allowing regulatory verification of compliance with EPA requirements.

39. C — Recovery and disposal per EPA regulations. Cross-contaminated refrigerant (mixed types) cannot be reused or recycled, requiring recovery and proper disposal per EPA regulations. The contamination prevents safe reuse and creates safety risks; venting is illegal and dilution does not address contamination.

40. B — Service motor vehicle A/C systems. EPA Section 609 certification is required for technicians who service motor vehicle A/C systems, including heavy-duty trucks. The certification ensures technicians understand proper refrigerant handling, recovery procedures, and EPA compliance requirements specific to motor vehicle A/C service.