PRACTICE EXAM 7: T7 SIMULATION (40 QUESTIONS)

1. A heavy-duty truck A/C system is producing poor cooling along with engine cooling system overheating during high-load operation. The most likely common cause is:

A. Failed compressor unrelated to engine cooling issues

B. Restricted condenser airflow affecting both A/C and engine cooling

C. Failed expansion valve unrelated to engine cooling issues

D. Failed evaporator unrelated to engine cooling issues

2. A heavy-duty truck shows the A/C compressor disengaging during heavy acceleration. The driver reports this is normal operation. The most likely explanation is:

A. Failed compressor clutch with intermittent operation

B. Failed body controller affecting compressor operation

C. Marginal refrigerant charge causing pressure switch cycling

D. Engine ECU commanding compressor disengagement to manage engine load

3. A heavy-duty truck shows symptoms of A/C system fault codes along with HVAC blower issues. The most likely common cause is:

A. Loose or corroded power supply or ground at the HVAC controller

B. Failed compressor unrelated to blower issues

C. Failed blower motor unrelated to A/C issues

D. Multiple coincidental component failures

4. Tech A says heavy-duty truck A/C system operation increases engine load, which can affect engine cooling demand. Tech B says proper engine cooling system operation is required for proper A/C condenser performance. 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

5. A heavy-duty truck shows symptoms of A/C system communication faults on the J1939 bus. The truck has had no recent service. The most likely cause is:

A. Loose or corroded primary chassis ground connection

B. Failed body controller producing communication faults

C. Failed engine ECU affecting HVAC communication

D. Failed compressor producing communication faults

6. Tech A says modern heavy-duty truck A/C systems use refrigerant cycle pressures and temperatures that vary with ambient conditions. Tech B says diagnostic specifications must account for ambient temperature when interpreting gauge readings. Who is correct?

A. Tech A only

B. Tech B only

C. Neither Tech A nor Tech B

D. Both Tech A and Tech B

7. A heavy-duty truck shows symptoms of intermittent A/C compressor cycling along with intermittent dash gauge issues. The most likely common cause is:

A. Failed compressor clutch with intermittent engagement

B. Loose or corroded primary battery cable connection

C. Failed body controller producing intermittent commands

D. Multiple coincidental electrical issues

8. A heavy-duty truck has had its alternator replaced 30,000 miles ago. The driver now reports A/C system performance issues. The most likely cause is:

A. Defective replacement alternator from the supplier

B. Permanent A/C system damage from the alternator service

C. Excessive AC ripple from the new alternator affecting A/C controls

D. Coincidental A/C system failure unrelated to the alternator

9. A heavy-duty truck shows symptoms of A/C system pressure issues along with engine cooling fan issues. The most likely common cause is:

A. Failed cooling fan affecting both engine cooling and A/C condenser performance

B. Failed compressor unrelated to fan issues

C. Failed expansion valve unrelated to fan issues

D. Multiple coincidental component failures

10. Tech A says heavy-duty truck A/C compressor clutch operation requires specific voltage and current. Tech B says voltage drop in the clutch circuit can prevent full clutch engagement. Who is correct?

A. Tech A only

B. Tech B only

C. Neither Tech A nor Tech B

D. Both Tech A and Tech B

11. A heavy-duty truck driver reports the A/C system stops cooling when the engine is at high RPM. The most likely cause is:

A. Failed compressor with internal damage at high RPM

B. Failed expansion valve at high RPM operation

C. High-pressure cutoff switch activating from elevated pressures

D. Failed body controller affecting high-RPM operation

12. A heavy-duty truck shows symptoms of A/C system poor cooling along with reduced cab heater performance. The most likely common cause is:

A. Loose primary chassis ground or cooling system issue affecting both

B. Failed compressor unrelated to heater issues

C. Failed evaporator unrelated to heater issues

D. Failed expansion valve unrelated to heater issues

13. A heavy-duty truck has had its serpentine drive belt replaced 10,000 miles ago. The driver now reports A/C system performance issues. The most likely cause is:

A. Defective replacement belt from the supplier

B. Permanent A/C system damage from belt service

C. Coincidental A/C system failure unrelated to belt service

D. Belt tension or routing affecting compressor drive

14. A heavy-duty truck shows symptoms of A/C system fault codes following a recent battery replacement. The codes include compressor clutch and pressure switch codes. The most likely cause is:

A. Permanent compressor damage from battery replacement

B. Voltage transients during battery replacement causing module faults

C. Defective replacement batteries from the supplier

D. Wiring damage during battery replacement service

15. A heavy-duty truck shows symptoms of A/C system ice formation on the suction line. The driver also reports the cab is too cold even at maximum heat. The most likely cause is:

A. Failed compressor with bypass through the system

B. Failed expansion valve allowing liquid flooding into suction line

C. Failed expansion valve causing constant maximum cooling

D. Failed compressor clutch unable to disengage

16. Tech A says heavy-duty truck A/C system service requires understanding of refrigerant cycle theory. Tech B says service procedures depend on system component design and OEM specifications. 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. A heavy-duty truck shows symptoms of engine overheating along with reduced cab heating performance. The most likely common cause is:

A. Failed engine ECU affecting both systems

B. Failed compressor affecting cooling system load

C. Failed heater control valve affecting both systems

D. Coolant level low or air-bound cooling system affecting both heat transfer functions

18. A heavy-duty truck shows symptoms of inadequate cab heating along with poor A/C performance. The most likely common cause is:

A. Failed compressor unrelated to heating issues

B. Restricted airflow through the HVAC system affecting both heating and cooling

C. Failed heater core unrelated to A/C issues

D. Multiple coincidental component failures

19. Tech A says heavy-duty truck cooling system operation supports both engine cooling and cab heating functions. Tech B says coolant flow and temperature affect both functions simultaneously. 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

20. A heavy-duty truck shows symptoms of engine overheating only when the A/C is operating. The most likely cause is:

A. Inadequate cooling fan operation when the additional A/C load is applied

B. Failed compressor unrelated to engine cooling

C. Failed engine thermostat unrelated to A/C operation

D. Failed water pump unrelated to A/C operation

21. A heavy-duty truck has had its cooling system serviced 5,000 miles ago. The driver now reports A/C performance issues. The most likely cause is:

A. Cooling system fault not addressed during the recent service affecting condenser performance

B. Defective replacement coolant from the supplier

C. Permanent A/C system damage from the recent service

D. Coincidental A/C system failure unrelated to the recent service

22. A heavy-duty truck shows symptoms of cylinder liner cavitation damage along with poor cab heating performance. The most likely common cause is:

A. Failed water pump affecting both cooling and heating

B. Failed engine thermostat affecting both functions

C. Inadequate SCA levels and air-bound cooling system affecting both

D. Coincidental engine damage and HVAC issues

23. A heavy-duty truck shows symptoms of intermittent overheating during high-load operation along with intermittent A/C cooling loss. The most likely common cause is:

A. Failed cooling fan or fan clutch affecting both engine and condenser cooling

B. Failed compressor unrelated to engine cooling

C. Failed thermostat unrelated to A/C cooling

D. Multiple coincidental component failures

24. Tech A says heavy-duty truck cooling system PM should include inspection of components affecting both engine cooling and cab heating. Tech B says coolant testing identifies issues that affect both system functions. Who is correct?

A. Tech A only

B. Tech B only

C. Neither Tech A nor Tech B

D. Both Tech A and Tech B

25. A heavy-duty truck shows symptoms of HVAC system fault codes from multiple modules. The truck has had no recent service. The most likely common cause is:

A. Loose or corroded primary chassis ground connection

B. Failed body controller producing all codes

C. Failed individual modules producing simultaneous codes

D. Failed engine ECU affecting HVAC communication

26. Tech A says heavy-duty truck HVAC controllers may communicate with the engine ECU to manage compressor load. Tech B says coordinated control improves fuel economy by reducing engine demand. 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

27. A heavy-duty truck shows symptoms of HVAC actuator fault codes along with general electrical system faults. The most likely common cause is:

A. Failed body controller affecting all systems

B. Loose or corroded primary battery or chassis ground connection

C. Failed engine ECU affecting all systems

D. Multiple coincidental electrical issues

28. A heavy-duty truck has had its body controller replaced 15,000 miles ago. The driver now reports HVAC system erratic behavior. The most likely cause is:

A. Defective replacement body controller from the supplier

B. Permanent HVAC damage from the body controller service

C. Coincidental HVAC failure unrelated to the body controller service

D. Body controller programming or configuration not completed properly after replacement

29. Tech A says modern heavy-duty truck HVAC systems use multiplexed control through the J1939 bus. Tech B says J1939 communication faults can affect HVAC operation along with other vehicle functions. 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 shows symptoms of HVAC blower motor issues along with other electrical issues. Battery condition is verified normal. The most likely common cause is:

A. Failed body controller affecting all systems

B. Failed alternator unrelated to specific HVAC issues

C. Loose or corroded primary chassis ground connection

D. Failed individual components producing simultaneous symptoms

31. Tech A says heavy-duty truck cabin air filter restriction affects HVAC airflow and can affect cooling and heating performance. Tech B says cabin air filter replacement intervals depend on operating environment conditions. Who is correct?

A. Tech A only

B. Tech B only

C. Neither Tech A nor Tech B

D. Both Tech A and Tech B

32. A heavy-duty truck shows symptoms of intermittent HVAC display freezing along with intermittent dash gauge issues. The truck has had no recent service. The most likely common cause is:

A. Failed HVAC controller producing erratic display

B. Loose or corroded power supply or ground affecting multiple modules

C. Failed body controller producing erratic operation

D. Multiple coincidental module failures

33. A heavy-duty truck driver reports the HVAC ATC system maintains incorrect cabin temperature. The cabin temperature sensor is verified within specification. The most likely cause is:

A. ATC controller calibration or sensor input scaling issue

B. Failed blend door actuator unrelated to temperature reading

C. Failed compressor unrelated to ATC operation

D. Failed body controller unrelated to ATC operation

34. Tech A says heavy-duty truck sleeper auxiliary HVAC systems use auxiliary battery banks for engine-off operation. Tech B says auxiliary battery condition affects sleeper HVAC operation duration during engine-off periods. 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

35. A heavy-duty truck shows symptoms of HVAC system intermittent operation along with intermittent communication faults on the J1939 bus. The most likely common cause is:

A. Failed HVAC controller producing communication faults

B. Failed body controller producing communication faults

C. Failed engine ECU producing communication faults

D. Loose or corroded J1939 bus connection affecting multiple modules

36. A heavy-duty truck driver reports HVAC system odors during operation. The most likely cause is:

A. Microbial growth or contamination in the evaporator drain or housing

B. Failed compressor producing oil contamination

C. Failed expansion valve producing refrigerant odor

D. Failed body controller affecting HVAC operation

37. A heavy-duty truck A/C system requires major service. The proper sequence for refrigerant handling is:

A. Open the system, repair components, recover refrigerant, and recharge

B. Recover refrigerant, leak-test, repair components, evacuate, and recharge

C. Recover refrigerant before any system opening, then perform service

D. Repair components first, then recover any remaining refrigerant

38. Tech A says heavy-duty truck A/C system service requires consideration of refrigerant type when selecting recovery and service equipment. Tech B says using equipment designed for one refrigerant on a different refrigerant can damage equipment and create contamination. 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

39. A heavy-duty truck shop is preparing for service of a vehicle containing R-1234yf refrigerant. The proper preparation includes:

A. Using R-134a recovery equipment because both are HFC-based

B. Using R-12 recovery equipment because the refrigerants are similar

C. Using any refrigerant recovery equipment available in the shop

D. Using R-1234yf-specific recovery equipment per manufacturer specifications

40. The proper handling of an A/C system service event that requires opening the refrigerant circuit includes:

A. Recovery of all refrigerant before any system opening per EPA regulations

B. Venting small amounts of refrigerant during component removal

C. Opening the system briefly to identify the issue before recovery

D. Discharging refrigerant pressure through the service ports before recovery

PRACTICE EXAM 7: ANSWER KEY AND EXPLANATIONS

1. B — Restricted condenser airflow affecting both A/C and engine cooling. Poor A/C cooling and engine overheating during high-load operation point to a common-element fault, with restricted airflow through the condenser and radiator (often mounted together) being the most common cause. Both systems share frontal airflow at the truck's cooling stack.

2. D — Engine ECU commanding compressor disengagement to manage engine load. Modern heavy-duty trucks include compressor disengagement during heavy acceleration as part of engine load management, improving acceleration response and fuel economy. The driver reporting this as normal confirms this is the engineered behavior.

3. A — Loose or corroded power supply or ground at the HVAC controller. A/C and blower fault codes together point to a common-element fault at the HVAC controller, with power supply or ground connection issues being the most common cause. Component-specific failures rarely produce simultaneous A/C and blower issues.

4. C — Both Tech A and Tech B. Heavy-duty truck A/C system operation increases engine load through compressor drive, which adds to engine cooling demand. Proper engine cooling system operation is required for proper A/C condenser performance because the condenser shares airflow with the radiator at the cooling stack.

5. A — Loose or corroded primary chassis ground connection. J1939 communication faults affecting HVAC without recent service point to a common-element fault, with primary chassis ground connection issues being the most likely cause. Single-module failures rarely produce communication faults.

6. D — Both Tech A and Tech B. Modern heavy-duty truck A/C systems use refrigerant cycle pressures and temperatures that vary with ambient conditions, with operating values being a function of ambient temperature. Diagnostic specifications must account for ambient temperature when interpreting gauge readings to avoid misdiagnosis.

7. B — Loose or corroded primary battery cable connection. Intermittent compressor cycling along with dash gauge issues points to a common-element electrical fault, with primary battery cable connection issues being the most likely cause. Component-specific failures rarely produce simultaneous A/C and dash issues.

8. C — Excessive AC ripple from the new alternator affecting A/C controls. A/C performance issues 30,000 miles after alternator replacement points to alternator-related electrical noise, with

excessive AC ripple from a degrading alternator affecting electronic A/C controls. Verifying ripple voltage at the alternator identifies this fault.

9. A — Failed cooling fan affecting both engine cooling and A/C condenser performance. A/C pressure issues with engine cooling fan issues point to the cooling fan itself, with the fan typically providing airflow to both the engine radiator and A/C condenser. Fan failure affects both systems simultaneously.

10. D — Both Tech A and Tech B. Heavy-duty truck A/C compressor clutch operation requires specific voltage and current to engage properly through the magnetic field generated by the clutch coil. Voltage drop in the clutch circuit (from corroded connections, damaged wiring) can prevent full clutch engagement, producing slipping or non-engagement.

11. C — High-pressure cutoff switch activating from elevated pressures. A/C cooling loss at high engine RPM most likely traces to elevated system pressures activating the high-pressure cutoff switch, which protects the system from over-pressure damage. Higher RPM produces higher compressor output and pressures.

12. A — Loose primary chassis ground or cooling system issue affecting both. Poor A/C cooling and reduced heater performance point to common-element issues, with primary ground (affecting electrical) or cooling system issues (affecting coolant heat transfer) being the most likely causes. Both functions depend on common chassis systems.

13. D — Belt tension or routing affecting compressor drive. A/C performance issues 10,000 miles after belt replacement points to the belt service, with belt tension or routing being the most likely cause of compressor drive issues. Belt seating and tension changes occur after installation.

14. B — Voltage transients during battery replacement causing module faults. A/C fault codes immediately following battery replacement most commonly trace to voltage transients during disconnect or reconnect, which produce momentary out-of-range readings logged as fault codes. These codes typically clear normally and don't indicate permanent damage.

15. C — Failed expansion valve causing constant maximum cooling. Ice on the suction line along with the cab being too cold even at maximum heat indicates the A/C system is providing constant maximum cooling (ice indicates flooded evaporator) and the heater cannot overcome the excess cooling. Expansion valve stuck open produces this pattern.

16. A — 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. Service procedures also depend on system component design and OEM specifications for proper procedure selection. Both knowledge areas are essential.

17. D — Coolant level low or air-bound cooling system affecting both heat transfer functions. Engine overheating with reduced cab heating points to coolant flow issues, with low coolant level or air-

bound cooling system being the most common cause that affects both engine cooling and heater core heat transfer. Both functions depend on coolant flow and contact.

18. B — Restricted airflow through the HVAC system affecting both heating and cooling. Inadequate cab heating with poor A/C performance points to airflow issues in the HVAC system, with restricted airflow (cabin filter, ductwork) reducing both heat transfer at the heater core and cooling at the evaporator. Both functions depend on cab airflow.

19. C — Both Tech A and Tech B. Heavy-duty truck cooling system operation supports both engine cooling (heat removal from engine) and cab heating (heat source for heater core), making it a dual-function system. Coolant flow and temperature affect both functions simultaneously, since the same coolant circulates through both the engine and the heater core.

20. A — Inadequate cooling fan operation when the additional A/C load is applied. Engine overheating only when A/C is operating points to inadequate fan operation when the additional A/C load (compressor drive, condenser heat) is applied to the cooling system. Verifying fan operation under combined load is the next step.

21. A — Cooling system fault not addressed during the recent service affecting condenser performance. A/C performance issues 5,000 miles after cooling system service points to cooling system issues that were not fully addressed, with the issues affecting condenser airflow or operation. Both systems share the cooling stack.

22. C — Inadequate SCA levels and air-bound cooling system affecting both. Cylinder liner cavitation (caused by inadequate SCA inhibitors) along with poor cab heating (caused by air-bound system) points to multiple cooling system maintenance issues, both of which affect coolant chemistry and circulation. Comprehensive cooling system service is required.

23. A — Failed cooling fan or fan clutch affecting both engine and condenser cooling. Intermittent overheating with intermittent A/C loss during high-load points to fan or fan clutch issues, with intermittent fan operation affecting both engine cooling and A/C condenser performance under load. Fan operation verification under load is required.

24. D — Both Tech A and Tech B. Heavy-duty truck cooling system PM should include inspection of components affecting both engine cooling and cab heating, since these functions share the cooling system. Coolant testing identifies issues (chemistry, contamination, inhibitor levels) that affect both engine cooling and cab heating performance.

25. A — Loose or corroded primary chassis ground connection. Multi-module HVAC fault codes without recent service point to a common-element fault, with primary chassis ground connection being the most likely cause that affects multiple modules simultaneously. Individual module failures rarely produce simultaneous fault codes.

26. C — Both Tech A and Tech B. Heavy-duty truck HVAC controllers may communicate with the engine ECU to manage compressor load through coordinated control commands. This coordinated

control improves fuel economy by reducing engine demand during critical operating conditions (heavy acceleration, hill climbing).

27. B — Loose or corroded primary battery or chassis ground connection. HVAC actuator faults along with general electrical issues point to a common-element fault in primary electrical systems, with battery or chassis ground connection issues being the most likely cause. Multiple coincidental component failures are statistically rare.

28. D — Body controller programming or configuration not completed properly after replacement. HVAC erratic behavior 15,000 miles after body controller replacement points to programming or configuration issues from the previous service, with proper programming being a critical step for multiplexed systems. Verification of programming is required.

29. A — Both Tech A and Tech B. Modern heavy-duty truck HVAC systems use multiplexed control through the J1939 bus, providing efficient digital communication between modules. J1939 communication faults can affect HVAC operation along with other vehicle functions, since the bus carries data for multiple subsystems.

30. C — Loose or corroded primary chassis ground connection. HVAC blower issues with other electrical issues and normal battery condition point to a primary ground fault affecting multiple systems, with chassis ground connection being the most likely cause. The battery condition rules out supply-side failures.

31. D — Both Tech A and Tech B. Heavy-duty truck cabin air filter restriction reduces HVAC airflow, which affects both cooling performance (less air across evaporator) and heating performance (less air across heater core). Cabin air filter replacement intervals depend on operating environment, with dusty environments requiring more frequent replacement.

32. B — Loose or corroded power supply or ground affecting multiple modules. Intermittent HVAC display freezing with dash gauge issues points to power supply or ground connection problems affecting multiple modules, with intermittent connections being the most common cause. Verification at primary power and ground points identifies the fault.

33. A — ATC controller calibration or sensor input scaling issue. Incorrect cabin temperature with verified normal sensor signal indicates the controller is receiving correct data but processing it incorrectly, with calibration or scaling issues being the most likely cause. Sensor verification rules out the input source.

34. C — Both Tech A and Tech B. Heavy-duty truck sleeper auxiliary HVAC systems use auxiliary battery banks for engine-off operation, allowing climate control during driver rest periods. Auxiliary battery condition affects sleeper HVAC operation duration, with degraded batteries providing shorter run time during engine-off periods.

35. D — Loose or corroded J1939 bus connection affecting multiple modules. HVAC intermittent operation with intermittent J1939 communication faults points to bus connection issues, with loose

or corroded connections being the most likely cause. Connection inspection at the affected modules identifies the fault.

36. A — Microbial growth or contamination in the evaporator drain or housing. HVAC system odors during operation are most commonly caused by microbial growth (mold, mildew) in the evaporator drain area or housing, where moisture creates ideal growth conditions. Cleaning and treatment with antimicrobial products typically resolves this issue.

37. C — Recover refrigerant before any system opening, then perform service. The proper refrigerant handling sequence requires complete recovery before any system opening per EPA regulations, with service performed only after recovery is complete. Other sequences violate EPA regulations or risk venting refrigerant.

38. B — Both Tech A and Tech B. Heavy-duty truck A/C system service requires consideration of refrigerant type when selecting recovery and service equipment, since R-134a and R-1234yf require different equipment per EPA regulations. Using equipment designed for one refrigerant on a different refrigerant can damage equipment and create cross-contamination.

39. D — Using R-1234yf-specific recovery equipment per manufacturer specifications. R-1234yf service requires R-1234yf-specific recovery equipment per manufacturer specifications and EPA regulations, since the refrigerant has different chemistry and handling requirements than R-134a. Cross-equipment use is not acceptable.

40. A — Recovery of all refrigerant before any system opening per EPA regulations. EPA regulations require recovery of all refrigerant before any A/C system opening, with no exceptions for small quantities or brief openings. Violations are subject to enforcement action.