

THE OFFICIAL ASE STUDY GUIDE

ASE Medium/Heavy Truck Tests



National Institute for
**AUTOMOTIVE
SERVICE
EXCELLENCE**

ASE MEDIUM/HEAVY TRUCK TESTS

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Introduction

The *Official ASE Study Guide for the Medium/Heavy Truck Tests* is intended to help technicians study for the ASE certification tests. The specific material about each test, included in the booklet is a useful tool for reviewing the technical knowledge that is covered in the *Medium/Heavy Truck tests*. After performing a thorough review, it should be easier to select additional reference material that will assist you with the test preparation needs.

ASE voluntary certification is a means by which technicians can prove their abilities to themselves, to their employers, and to their customers. By passing ASE tests you will earn the most valuable credential available to truck technicians. Because the tests are tough, you'll have the satisfaction of proving to yourself that you are among the elite in your profession. What's more, these credentials are recognized throughout the nation.

Certified technicians promote customer trust and improve the image of the industry. And trust and professionalism are the first steps to a better, more prosperous business.

ASE encourages you to take the tests and to join the proven pros who wear The ASE Blue Seal of Excellence.[®]

How Do I Become Certified?

There are currently eight tests in the Medium/Heavy Truck Technician certification series. Class 4 through Class 8 trucks are covered. Medium duty Class 4–6 is 14,001 to 26,000 lbs. gross vehicle weight (GVW). Heavy duty Class 7–8 is 26,001 and above gross vehicle weight (GVW).

If you pass one or more tests and have at least two years of relevant hands-on work experience, you will become certified as an ASE Medium/Heavy Truck Technician. If you pass the Diesel Engines Test (T2) and tests T3, T4, T5, T6, and T7 you will earn the certificate of Master Medium/Heavy Truck Technician.

If you are currently certified in Diesel Engines (A9, H2, S2, or T2) and Electrical/Electronic Systems (A6, H6, S6, or T6), you are eligible to take the L2 Electronic Diesel Engine Diagnosis Specialist test.

OVERVIEW (CONTINUED)

If you fail a test, you may take it again during any scheduled test administration in which it is offered. And remember, you are the only one who will receive your tests scores; results will not be given over the phone nor will they be released to anyone without your written permission.

Medium/Heavy Truck Tests

ASE tests and certifies technicians in the following truck areas:

- Gasoline Engines (Test T1)
- Diesel Engines (Test T2)
- Drive Train (Test T3)
- Brakes (Test T4)
- Suspension and Steering (Test T5)
- Electrical/Electronic Systems (Test T6)
- Heating, Ventilation, and Air Conditioning (HVAC) Systems (Test T7)
- Preventive Maintenance Inspection (PMI) (Test T8)

ASE also offers certification in Automobile, Truck Equipment, Transit Bus, School Bus, Collision Repair/Refinish, Parts Specialist, and Advanced Level specialties.

For full information on ASE testing as well as downloadable *Study Guides*, *Registration Booklets*, and more, visit www.ase.com. You may also request *Registration Booklets* by mailing the coupon located on the back cover of this booklet or by calling ASE at 703-669-6600, ext. 400.

Who Writes the Questions?

The questions, written by service industry experts familiar with all aspects of medium/heavy truck repair, are entirely job-related. They are designed to test the skills that you need to know in servicing trucks; theoretical knowledge is not covered.

Each question has its roots in an ASE “item-writing” workshop where service representatives from medium/heavy truck manufacturers, aftermarket parts and equipment manufacturers, working technicians and technical educators get together in a workshop setting to share ideas and translate them into test questions. Each test question written by these experts must survive review by all members of the group. The questions are written to deal with practical problems of diagnosis and repair experienced by technicians in their day-to-day work.

From there, all questions are pre-tested and quality-checked on a national sample of technicians. Those questions that meet ASE standards of quality and accuracy are included in the tests; the “rejects” are sent back to the drawing board or discarded altogether.

Each certification test is made up of between 40 and 55 multiple-choice questions. The testing sessions are 4 hours and 15 minutes, allowing plenty of time to complete several tests.

Note: Each test could contain up to fifteen additional questions that are included for statistical research purposes only. Your answers to these questions will not affect your score, but since you do not know which ones they are, you should answer all questions in the test. The five-year Recertification Test will cover the same content areas as those listed above. However, the number of questions in each content area of the Recertification Test will be reduced by about one-half.

How Do I Prepare for the ASE Tests?

Become familiar with test content and question format: The Test Specifications for each of the tests covered in this booklet contain a summary description of the content covered by each test. The Lists describe the actual work performed by technicians in each specialty area. Together, these form a “blueprint” for writing and assembling the ASE tests.

Please note that each question on the test is keyed or linked to a particular or set of tasks in the list. Therefore, a review of the lists, with an eye to judging whether you know how to perform each listed, will provide valuable information to prepare for the tests.

There are five types of multiple-choice questions on the tests, each of which is included in the sample questions in this booklet. Note the different instructions for some questions.

Be sure to read each question carefully, (twice, if necessary) so that you understand exactly what is being asked. *Each question tests a specific diagnostic or repair problem and has only one best answer.*

To summarize, we suggest the following steps to be taken to prepare for the tests:

- Step 1.** Study the content list for each test you will attempt.
- Step 2.** Carefully read the list for each area.
- Step 3.** Go over the sample questions to become familiar with each question type. *This is very important.*
- Step 4.** Review steps 1 through 3 above, and identify the skill areas where you need additional study.

OVERVIEW (CONTINUED)

Types of Knowledge Measured by the Tests

The types of knowledge and skills you will need to know to pass the tests are as follows:

- **Basic technical knowledge:** Tests your knowledge of what is in a system and how the system works, and what are the proper procedures and/or precautions to be followed in making repairs and adjustments.
- **Service or repair knowledge and skill:** Tests your understanding and ability to apply generally accepted repair procedures and precautions in assembly, disassembly, and reconditioning operations; and in making major inspections and adjustments. Also tests ability to use shop manuals and precision tools of the trade.
- **Testing and diagnostic knowledge and skill:** Tests your ability to recognize problems and to use generally available measurement and testing equipment to make a diagnosis. Also tests your ability to trace the effects of a particular condition and find the cause of a particular set of symptoms.

If you are an experienced and competent technician, a careful review of this booklet, and additional brush-up on those areas in which you are weakest, is all you should need to pass the ASE tests.

Before The Tests

Try to be well-rested for the test so you will be alert and efficient. If you are taking the written versions, please bring several sharpened soft-lead (#2) pencils and an eraser with you; pencils will not be furnished at the test center. If you wish to pace yourself, bring a watch; some testing rooms may not have clocks. Finally, be sure to bring along your test center admission ticket and a current photo I.D.

At the Test Center—Some Tips

Arrive early enough to find the building and testing room. When you reach the location, wait in the assigned area until the proctor begins the test administration. He or she will instruct you in filling out the answer booklet (if taking written tests) or logging on to the computer (if taking computer-based tests).

Once testing has begun, keep track of time. Do not spend too long on any single question. Be sure to read each question carefully so that you understand exactly what is being asked. Do not mark answers in the test booklet; they must be marked on the answer booklet. Your test will not be scored if your answers are not on your answer booklet.

If a question is difficult, mark the answer that you think is correct and put a check by it in the test book. (Computer-based tests allow you to do this on screen.) Then go on to the next question. If you finish before time is up, you may go back to the questions that you checked.

It is to your advantage to answer every question. Do not leave any answers blank. Your score will be based only on the number of correct answers that you give.

Test Content and Sample Questions

The following material is designed to help technicians prepare for ASE certification tests.

Each of the sections begins with the Test Specifications, which list the main categories covered on that particular test and the number of test questions and percentage of the test devoted to each topic.

The List describes the work activities a technician should be able to perform in each technical area covered on that test. This list was developed by working technicians and technical experts from across the country and will provide a valuable check list of what to study for the test.

It should be noted that the number of questions in each content area may not equal the number of tasks listed. Some of the tasks are complex and broad in scope and may be covered by several questions. Other tasks are simple and narrow in scope and one question may cover several tasks. The main objective in listing the tasks is to describe accurately what is done on the job, not to make each correspond to a particular test question.

Sample questions follow. Although these same questions will not appear on actual tests, they are in the same format as actual test questions. All five types of multiple-choice questions used on the ASE tests are represented here. Note the different instructions for some questions. ■

TEST SPECIFICATIONS

GASOLINE ENGINES (TEST T1)

Content Area	Questions in Test	Percentage of Test
A. General Diagnosis	1	28%
B. Cylinder Head and Valve Train Diagnosis and Repair	4	8%
C. Engine Block Diagnosis and Repair	4	8%
D. Lubrication and Cooling Systems Diagnosis and Repair	3	6%
E. Ignition System Diagnosis and Repair	6	12%
F. Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair	6	12%
G. Emissions Control Systems Diagnosis and Repair	5	10%
H. Computerized Engine Controls Diagnosis and Repair	8	16%
Total	50	100%

A. General Diagnosis (14 questions)

1. Verify the complaint and/or road test vehicle; review driver/customer interview and past maintenance documents (if available); determine further diagnosis.
2. Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, technical service bulletins, and service campaigns/recalls.
3. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine needed action.
4. Diagnose noises and/or vibration problems related to engine performance; determine needed action.
5. Diagnose the cause of unusual exhaust color, odor, and sound; determine needed action.
6. Perform engine manifold vacuum or pressure tests; determine needed action.
7. Perform cylinder power balance test; determine needed action.
8. Perform cylinder compression test; determine needed action.
9. Perform cylinder leakage/leak-down test; determine needed action.

10. Diagnose engine mechanical, electrical, electronic, fuel, and ignition problems with an oscilloscope, engine analyzer, digital multimeter (DMM), and/or scan tool; determine needed action.
11. Inspect engine compartment wiring harness, connectors, seals, locks, vacuum hoses; check for proper routing and condition; determine needed repairs.
12. Observe and interpret instrument panel gauge readings.
13. Read and interpret electrical schematic diagrams and symbols.
14. Test and diagnose emissions or driveability problems caused by battery condition, connections, or excessive key-off battery drain; determine needed repairs.
15. Perform starter current draw test; determine needed action.
16. Perform starter and charging circuit voltage drop tests; determine needed action.
17. Inspect, test, and repair or replace components, connectors, and wires in the starter and charging control circuits.
18. Differentiate between electrical and mechanical problems that cause a slow crank, no crank, extended cranking, or a cranking noise condition.
19. Test and diagnose engine performance problems resulting from an undercharge, overcharge, or a no-charge condition; determine needed action.
20. Inspect, adjust, and replace alternator (generator) drive belts, pulleys, tensioners, and fans.

B. Cylinder Head and Valve Train Diagnosis and Repair (4 questions)

1. Remove, inspect, disassemble, and clean cylinder head assembly(s).
2. Inspect threaded holes, studs, and bolts for serviceability; service/replace as needed.
3. Measure cylinder head thickness; check mating surfaces for warpage and surface finish; inspect for cracks/damage; check condition of passages; inspect core and gallery plugs; determine serviceability and needed repairs.
4. Inspect valves, guides, seats, springs, retainers, locks, and seals; determine serviceability and needed repairs.
5. Reassemble, check, and install cylinder head assembly(s) and gasket(s) as specified by the manufacturer.
6. Inspect pushrods, rocker arms, rocker arm shafts, electronic wiring harness, and brackets; repair/replace as needed.
7. Inspect, install, and adjust valve lifters and retainers; adjust valve clearance.
8. Inspect, measure, and replace/reinstall overhead camshaft and bearings; measure and adjust endplay.

C. Engine Block Diagnosis and Repair (4 questions)

1. Remove, inspect, service, and install pans, covers, ventilation systems, gaskets, seals, and wear sleeves.
2. Disassemble, clean and inspect engine block for cracks; check mating surfaces and related components for damage or warpage and surface finish; check deck height; check condition of passages, core, and gallery plugs; inspect threaded holes, studs, dowel pins and bolts for serviceability; service/replace as needed.
3. Inspect and measure cylinder walls for wear and damage; determine serviceability and needed repairs.
4. Inspect in-block camshaft bearings for wear and damage; replace as needed.

T1 LIST (CONTINUED)

5. Inspect, measure, and replace/reinstall in-block camshaft; measure/and correct end play; inspect, replace/reinstall, and adjust valve lifters.
6. Clean and inspect crankshaft and journals for surface cracks and damage; check condition of oil passages; check passage plugs; measure journal diameters; check mounting surfaces; determine needed repairs.
7. Diagnose piston, connecting rod bearing, and main bearing wear patterns that indicate connecting rod and crankshaft alignment or bearing bore problems; check bearing bore and bushing condition; determine needed repairs.
8. Determine the proper select-fit components such as pistons, connecting rods, and main bearings.
9. Inspect and replace main bearings; check cap fit and bearing clearances; check and correct crankshaft end play.
10. Remove and/or replace the timing chain and gears; ensure correct timing.
11. Inspect, measure, or replace pistons, pins, and retainers.
12. Measure piston-to-cylinder wall clearance.
13. Check ring-to-groove fit and end gaps; install rings on pistons. Assemble pistons and connecting rods and install in block; install rod bearings and check clearances.
14. Inspect and/or replace crankshaft vibration damper.
15. Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks, wear, and runout; determine needed repairs.

D. Lubrication and Cooling Systems Diagnosis and Repair (3 questions)

1. Diagnose engine lubrication system problems; perform oil pressure tests; determine needed repairs.
2. Disassemble and inspect oil pump (includes gears, rotors, housing, and pick-up assembly); measure oil pump clearance; inspect pressure relief devices and pump drive; determine needed repairs.
3. Inspect, clean, test, reinstall/replace oil cooler, by-pass valve, lines and hoses.
4. Change engine oil and filter(s); add proper type, viscosity, and rating of oil.
5. Inspect and reinstall/replace pulleys, tensioners, and drive belts; adjust drive belts and check alignment.
6. Diagnose engine cooling system temperature and pressure problems; determine needed repairs.
7. Inspect, test, and replace thermostat, coolant by-pass, and thermostat housing, seals, hoses, and fittings.
8. Inspect and test coolant; drain, flush, and refill cooling system with recommended coolant; bleed air from cooling system as required.
9. Inspect and replace water pump, housing, and hoses.
10. Inspect and replace radiator, pressure cap, expansion tank, and coolant recovery system.
11. Inspect, test, and repair/replace fan (both electrical and mechanical), fan clutch, fan shroud, air dams, and cooling fan electrical circuits.
12. Verify proper operation of engine related gauges and warning indicators; determine needed repairs.

E. Ignition System Diagnosis and Repair (6 questions)

1. Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor driveability, spark knock, power loss, reduced fuel economy, and emissions problems; determine root cause; determine needed repairs.
2. Interpret ignition system related diagnostic trouble codes (DTCs); determine needed repairs.
3. Inspect, test, repair, or replace ignition primary circuit wiring and components.
4. Inspect, test, repair, or replace ignition system secondary circuit wiring and components.
5. Inspect, test, and replace ignition coil(s).
6. Inspect, test, and replace ignition system sensors; adjust as necessary.
7. Inspect, test, and/or replace ignition control module (ICM)/powertrain/engine control module (PCM/ECM); reprogram as needed.

F. Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair (6 questions)

1. Diagnose fuel system related problems such as no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, reduced fuel economy, and emissions problems; determine root cause; determine needed repairs.
2. Interpret fuel or induction system related diagnostic trouble codes (DTCs); analyze fuel trim and other scan tool data; determine needed repairs.
3. Inspect fuel tank, filler neck, and fuel cap; inspect and replace fuel lines, fittings, and hoses; check fuel for contaminants and quality.
4. Inspect, test, and replace fuel pump(s) and/or fuel pump assembly; inspect, service, and replace fuel filters.
5. Inspect and test electric fuel pump control circuits and components; determine needed repairs.
6. Inspect, test, and repair or replace fuel pressure regulation system and components of fuel injection systems; perform fuel pressure/volume test.
7. Inspect, remove, service or replace throttle body assembly and controls, including electronic throttle actuator control (TAC) systems; make related adjustments.
8. Inspect, test, clean, and replace fuel injectors and fuel rails.
9. Inspect, service, and repair or replace air filtration system components.
10. Inspect air induction system, intake manifold, and gaskets for air/vacuum leaks.
11. Remove, clean, inspect, test, and repair or replace fuel system vacuum and electrical components and connections.
12. Inspect, service, and replace exhaust manifold, gaskets, exhaust pipes, oxygen sensors, mufflers, catalytic converters, resonators, tailpipes, and heat shields.
13. Test for exhaust system restriction or leaks; determine needed repair.

T1 LIST (CONTINUED)

G. Emissions Control Systems Diagnosis And Repair (5 questions)

1. Test and diagnose emissions or driveability problems caused by positive crankcase ventilation (PCV) system.
2. Inspect, service, and replace positive crankcase ventilation (PCV) filter, valve, tubes, orifice/metering device, and hoses.
3. Test and diagnose driveability problems caused by the exhaust gas recirculation (EGR) system.
4. Interpret exhaust gas recirculation (EGR) related scan tool data and diagnostic trouble codes (DTCs); determine needed repairs.
5. Inspect, test, service, and replace components of the exhaust gas recirculation (EGR) system, including EGR valve, tubing, passages, vacuum/pressure controls, filters, hoses, electrical/electronic sensors, controls, solenoids, and wiring of EGR systems.
6. Test and diagnose emissions or driveability problems caused by the secondary air injection or catalytic converter systems.
7. Interpret secondary air injection system related scan tool data and diagnostic trouble codes (DTCs); determine needed repairs.
8. Inspect, test, service, and replace mechanical components and electrical/electronically-operated components and circuits of secondary air injection system.
9. Inspect catalytic converter. Interpret catalytic converter related diagnostic trouble codes (DTCs); analyze related scan tool data to determine root cause of DTCs; determine needed repairs.
10. Test and diagnose emissions or driveability problems caused by the evaporative emissions control system.
11. Interpret evaporative emissions-related scan tool data and diagnostic trouble codes (DTCs); determine needed repairs.
12. Inspect, test, and replace canister, lines, hoses, mechanical, and electrical components of the evaporative emissions control system.

H. Computerized Engine Controls Diagnosis And Repair (8 questions)

1. Research OBD II system operation to determine the enable criteria for setting and clearing diagnostic trouble codes (DTCs) and malfunction indicator lamp (MIL) operation. Perform appropriate drive cycle to determine system condition and verify repair effectiveness.
2. Interpret OBD II scan tool data stream, diagnostic trouble codes (DTCs), freeze frame data, system monitors, monitor readiness indicators, and trip and drive cycle information.
3. Read and interpret technical literature (service publications and information including wiring schematics).
4. Diagnose the causes of emissions or driveability problems with stored or active diagnostic trouble codes (DTCs).
5. Diagnose the causes of emissions or driveability problems without diagnostic trouble codes (DTCs).
6. Use a scan tool, digital multimeter (DMM), or digital storage oscilloscope (DSO) to inspect or test computerized engine control system sensors, actuators, circuits, and powertrain/engine control module (PCM/ECM); determine needed repairs.

T1 List (CONTINUED)

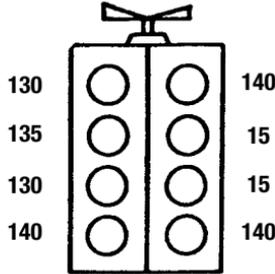
7. Measure and interpret voltage, voltage drop, amperage, and resistance using digital multimeter (DMM) readings.
8. Test, remove, inspect, clean, service, and repair or replace power and ground distribution circuits and connections.
9. Remove and replace the powertrain/engine control module (PCM/ECM); reprogram as needed.
10. Diagnose driveability and emissions problems resulting from failures of interrelated systems (for example: cruise control, security alarms/theft deterrent, torque controls, traction controls, torque management, A/C, and/or non-OEM installed accessories).
11. Clear diagnostic trouble codes (DTCs), run all OBD II monitors, and verify the repair.

SAMPLE QUESTIONS

GASOLINE ENGINES (TEST T1)

QUESTIONS:

**COMPRESSION
SPECS
140 PSI**

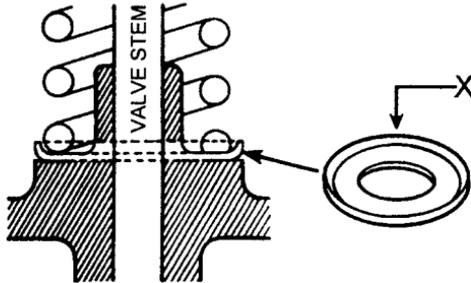


1. Technician A says that the compression test readings shown above could be caused by a blown cylinder head gasket.
Technician B says that the compression test readings shown above could be caused by wrong valve timing.

Who is right?

- * (A) A only
- (B) B only

- (C) Both A and B
- (D) Neither A nor B



2. Technician A says that part X shown above is used to improve valve spring rotation.
Technician B says that part X shown above is used to correct installed spring height.

Who is right?

- (A) A only
- * (B) B only

- (C) Both A and B
- (D) Neither A nor B

T1 SAMPLE QUESTIONS (CONTINUED)

8. Which of these can cause a catalytic converter to overheat?
- (A) A broken air pump drive belt
 - (B) A plugged canister purge vacuum hose
 - (C) A failed exhaust gas recirculation (EGR) valve
 - * (D) A disconnected spark plug wire

Question 9 is not like the ones above.

It has the word EXCEPT. Look for the choice that could NOT cause the described situation. Read the entire question carefully before choosing your answer.

9. Engine detonation (knock) could be caused by any of these EXCEPT:
- (A) a lean air fuel mixture.
 - * (B) retarded ignition timing.
 - (C) excess carbon in the combustion chambers.
 - (D) a stuck-closed exhaust gas recirculation (EGR) valve.

TEST SPECIFICATIONS AND TASK LIST DIESEL ENGINES (TEST T2)

Content Area	Questions in Test	Percentage of Test
A. General Engine Diagnosis	11	20%
B. Cylinder Head and Valve Train Diagnosis and Repair	4	7%
C. Engine Block Diagnosis and Repair	5	9%
D. Lubrication and Cooling Systems Diagnosis and Repair	6	11%
E. Air Induction and Exhaust Systems Diagnosis and Repair	6	11%
F. Fuel System Diagnosis and Repair	16	29%
G. Starting and Charging System Diagnosis and Repair	4	7%
H. Engine Brakes	3	5%
Total	55	100%

A. General Engine Diagnosis (11 questions)

1. Verify the complaint, and road/dyno test vehicle; review driver/customer interview and past maintenance documents (if available); determine further diagnosis.
2. Identify engine model and serial number to research applicable vehicle and service information, service precautions, and technical service bulletins; determine needed actions.
3. Inspect engine assembly and compartment for fuel, oil, coolant, exhaust, or other leaks; determine needed repairs.
4. Inspect engine compartment wiring harness, connectors, seals, and locks; check for proper routing and condition; determine needed repairs.
5. Isolate and diagnose engine noises; determine needed repairs.
6. Check engine exhaust for odor, smoke color, and density; determine needed repairs.
7. Perform fuel supply and return system tests; check fuel for contamination, quality, and consumption; determine needed repairs.
8. Perform air intake system restriction and leakage tests; determine needed repairs.
9. Perform intake manifold pressure tests; determine needed repairs.
10. Perform exhaust back pressure and temperature tests; determine needed repairs.
11. Perform crankcase pressure test; determine needed repairs.
12. Diagnose no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed repairs.

T2 TASK LIST (CONTINUED)

13. Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed repairs.
14. Isolate and diagnose engine related vibration problems; determine needed repairs.
15. Check cooling system for freeze point, level, contamination, coolant type, temperature, pressure, circulation, conditioner concentration, filtration, and fan operation; determine needed repairs.
16. Check lubrication system for contamination, oil level, temperature, pressure, filtration, and oil consumption; interpret oil analysis information; determine needed repairs.
17. Check and record electronic diagnostic codes and trip/operational data; monitor electronic data; verify customer programmable parameters; clear codes; determine further diagnosis.
18. Perform visual inspection for physical damage and missing, modified, or tampered components; determine needed repairs.

B. Cylinder Head and Valve Train Diagnosis and Repair (4 questions)

1. Remove, inspect, disassemble, and clean cylinder head assembly(s).
2. Inspect threaded holes, studs, and bolts for serviceability; service/ replace as needed.
3. Measure cylinder head thickness, and check mating surfaces for warp and surface finish; inspect for cracks/damage; check condition of passages; inspect core and gallery plugs; determine serviceability and needed repairs.
4. Inspect valves, guides, seats, springs, retainers, rotators, locks and seals; determine serviceability and needed repairs.
5. Inspect and/or replace injector sleeves and seals; pressure test to verify repair (if applicable); measure injector tip or nozzle protrusion where specified by manufacturer.
6. Inspect, and/or replace valve bridges (crossheads) and guides; adjust bridges (crossheads) if applicable.
7. Clean components; reassemble, check, and install cylinder head assembly.
8. Inspect pushrods, rocker arms, rocker arm shafts, electronic wiring harness, and brackets for wear, bending, cracks, looseness, and blocked oil passages; repair/ replace as needed.
9. Inspect, install, and adjust cam followers and retainers.
10. Adjust valve clearance and injector settings.
11. Inspect, measure, and replace/reinstall overhead camshaft and bearings; measure and adjust endplay and backlash.

C. Engine Block Diagnosis and Repair (5 questions)

1. Remove, inspect, service, and install pans, covers, ventilation systems, gaskets, seals, and wear rings.
2. Disassemble, clean and inspect engine block for cracks; check mating surfaces and related components for damage or warp and surface finish; check deck height; check condition of passages, core, and gallery plugs; inspect threaded holes, studs, dowel pins and bolts for serviceability; service/replace as needed.
3. Inspect cylinder sleeve counterbore and lower bore; check bore distortion; determine needed service.

T2 TASK LIST (CONTINUED)

4. Inspect and measure cylinder walls or liners for wear and damage; determine needed service.
5. Replace/reinstall cylinder liners and seals; check and adjust liner height/protrusion.
6. Inspect in-block camshaft bearings for wear and damage; replace as needed.
7. Inspect, measure, and replace/reinstall in-block camshaft; measure/adjust end play; inspect, replace/reinstall, and adjust cam followers (if applicable).
8. Clean and inspect crankshaft and journals for surface cracks and damage; check condition of oil passages; check passage plugs; measure journal diameters; check mounting surfaces; determine needed service.
9. Inspect and replace main bearings; check cap fit and bearing clearances; check and correct crankshaft end play.
10. Inspect, reinstall, and time the drive gear train. (Includes checking engine position and speed indicator components, gear wear, and backlash of crankshaft, camshaft, auxiliary, drive, and idler gears; service shafts, bushings, and bearings.)
11. Clean, inspect, measure, or replace pistons, pins, and retainers.
12. Measure piston-to-cylinder wall clearance.
13. Check ring-to-groove fit and end gaps; install rings on pistons.
14. Identify piston, connecting rod bearing, and main bearing wear patterns that indicate connecting rod and crankshaft alignment or bearing bore problems; check bearing bore and bushing condition; determine needed repairs.
15. Assemble pistons and connecting rods and install in block; check piston height/protrusion; replace rod bearings and check clearances; check condition, position, and clearance of piston cooling jets (nozzles).
16. Inspect and measure crankshaft vibration damper; replace as needed.
17. Inspect, install, and align flywheel housing.
18. Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks, wear, and runout; determine needed repairs.

D. Lubrication and Cooling Systems Diagnosis and Repair (6 questions)

1. Verify engine oil pressure and check operation of pressure sensor/switch and pressure gauge; verify engine oil temperature and check operation of temperature sensor.
2. Inspect, measure, and repair/replace oil pump, housing, drives, pipes, and screens; adjust drive gear clearance if applicable.
3. Inspect and repair/replace oil pressure regulator valve(s), and by-pass valve(s).
4. Inspect, clean, test, and reinstall/replace oil cooler, by-pass valve, oil thermostat; lines and hoses.
5. Inspect turbocharger lubrication and cooling systems; repair/replace as needed.
6. Change engine oil and filters; add proper type of oil.
7. Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment.
8. Verify coolant temperature and check operation of temperature and level sensors/switch, and temperature gauge.
9. Inspect and replace thermostat(s), by-passes, housing(s), and seals.
10. Flush and refill cooling system; bleed air from system; recover coolant.
11. Inspect and repair/replace coolant conditioner/filter, valves, lines, and fittings.
12. Inspect and repair/replace water pump, housing, hoses, and idler pulley or drive gear.

T2 TASK LIST (CONTINUED)

13. Inspect radiator, pressure cap, and tank(s); determine needed service.
14. Inspect and repair/replace fan hub, fan, fan clutch, fan controls, fan thermostat, and fan shroud.
15. Pressure test cooling system and radiator cap; determine needed repairs.

E. Air Induction and Exhaust Systems Diagnosis and Repair (6 questions)

1. Inspect and service/replace air induction piping, air cleaner, and element; check for air restriction.
2. Inspect, test, and replace turbocharger(s) (including variable ratio/geometry VGT), pneumatic, hydraulic, and electronic controls and actuators; inspect, test, and replace wastegate and wastegate controls.
3. Inspect and repair/replace intake manifold, gaskets, temperature and pressure sensors, and connections.
4. Inspect, test, clean, replace charge air cooler and piping system.
5. Inspect and repair/replace exhaust manifold, gaskets, piping, mufflers, exhaust after treatment devices, (including three-way and oxidation catalyst and diesel particulate filters DPF) and mounting hardware.
6. Inspect, test, and repair/replace preheater/inlet air heater, or glow plug system and controls.
7. Inspect, test, and replace exhaust after treatment regeneration system and controls.
8. Inspect, test, service, and replace exhaust gas recirculation (EGR) system components; including EGR valve, cooler, piping, filter, sensors, controls, and wiring.

F. Fuel System Diagnosis and Repair (16 questions)

1. Inspect, test, and repair/replace fuel system tanks, vents, caps mounts, valves, single/dual supply and return lines, and fittings.
2. Inspect, clean, test, and repair/replace fuel transfer (supply) pump, pump drives, strainers, fuel/water separators/indicators, filters, heaters, coolers, ECM cooling plates, and mounting hardware. (Protect fuel system components from contamination),
3. Check fuel system for air; determine needed repairs; prime and bleed fuel system; check, repair/replace primer pump.
4. Inspect, test, and repair/replace low-pressure regulator systems (check valves, pressure regulator valves and restrictive fittings).
5. Inspect and reinstall/replace high-pressure injection lines, fittings, seals, and mounting hardware. (Protect high-pressure injection components from contamination).
6. Inspect, adjust, and repair/replace electronic throttle and PTO control devices, circuits, and sensors.
7. Perform on-engine inspections, tests, and adjustments on hydraulic electronic unit injectors (HEUI) and electronic controls (rail pressure control).
8. Perform on-engine inspections, tests and adjustments on electronic unit injectors (EUI) and electronic controls.
9. Perform on-engine inspections and tests, on high-pressure common rail fuel systems and electronic controls.
10. Inspect, test, and replace engine protection and automatic stop/restart system components.

T2 TASK LIST (CONTINUED)

11. Inspect and replace electrical connector terminals, pins, harnesses, seals, and locks.
12. Connect diagnostic tool to vehicle/engine; access and verify programmable parameters; change if applicable.
13. Use a diagnostic tool (hand-held or PC based) to inspect and test electronic engine control system, sensors, actuators, electronic control modules (ECMs), and circuits; determine further diagnosis.
14. Measure and interpret voltage, voltage drop, amperage, and resistance readings using a digital multimeter (DMM) or appropriate test equipment.

G. Starting and Charging System Diagnosis and Repair (4 questions)

1. Perform battery state-of-charge and load or capacitance tests; determine needed service.
2. Charge battery using slow or fast charge method, as appropriate.
3. Start a vehicle using jumper cables or a booster battery.
4. Inspect, clean, and repair/replace batteries, battery cables, and terminal connections.
5. Inspect, test, and reinstall/replace starter relays, safety switch(s), and solenoids.
6. Perform alternator voltage and amperage output tests; determine needed repairs.
7. Perform starter and charging circuit voltage drop tests; determine needed repairs.

H. Engine Brakes (3 questions)

1. Inspect, test, and adjust engine compression and exhaust brakes.
2. Inspect, test, adjust, and repair/replace engine compression and exhaust brake control circuits, switches, and solenoids.
3. Inspect and repair/replace engine compression and exhaust brake housing(s), valves, seals, springs, lines, and fittings.

SAMPLE QUESTIONS

DIESEL ENGINES (TEST T2)

QUESTIONS:

1. When a diesel engine is operated under a load, coolant continually comes out of the radiator overflow and there are bubbles in the radiator. Which of these is the most likely cause?
(A) Too much coolant in the cooling system
(B) A clogged radiator
(C) A stuck-open thermostat
* (D) Compression leakage into the cooling system
2. A diesel engine has excessive black smoke when started in the morning. Which of these could be the cause?
* (A) A bad fuel injection nozzle
(B) A restricted fuel filter
(C) A blocked fuel tank vent
(D) A leaking fuel return line
3. Which of these can cause a no-start condition on a HEUI engine?
(A) High fuel pressure
* (B) Low injection control pressure
(C) High boost pressure
(D) Low boost pressure
4. A diesel engine is hard to start, but runs good after it has been primed and run for a few minutes. The most likely cause is a:
(A) leaking injector line.
(B) leaking fuel return line.
(C) plugged fuel tank vent.
* (D) bad transfer pump check valve.
5. A diesel engine with wet liners has been running too hot, and there is coolant in the crankcase. The most likely cause is:
(A) a cracked block
(B) cracked liners
* (C) leaking liner seals.
(D) a leaking injector seal.

T2 SAMPLE QUESTIONS (CONTINUED)

6. Diesel engine cylinder liner protrusion (height) can be adjusted by selecting the correct size:
- (A) cylinder liner.
 - (B) head gasket.
 - * (C) liner shim.
 - (D) fire ring.
7. A diesel engine with EUI has a misfire and the check engine light is ON. Fault code S4 FMI 5 “cylinder 4 current below normal” is active. This could be caused by a:
- (A) failed engine position sensor.
 - (B) sticking #4 injection plunger.
 - * (C) broken #4 injection wire terminal.
 - (D) sticking throttle position sensor.
8. The cause of a logged fault code in an electronic diesel engine has just been repaired.
Technician A says that the codes should be cleared before releasing the vehicle.
Technician B says that the customer’s password should be reset before releasing the vehicle.
Who is right?
- * (A) A only
 - (B) B only
 - (C) Both A and B
 - (D) Neither A nor B
9. A diesel engine has low power and low turbocharger boost pressure is found.
Technician A says that a leaking exhaust manifold could be the cause.
Technician B says that a plugged turbocharger oil return line could be the cause.
Who is right?
- * (A) A only
 - (B) B only
 - (C) Both A and B
 - (D) Neither A nor B

TEST SPECIFICATIONS AND LIST

DRIVE TRAIN (TEST T3)

Content Area	Questions in Test	Percentage of Test
A. Clutch Diagnosis and Repair	11	28%
B. Transmission Diagnosis and Repair	13	33%
C. Driveshaft and Universal Joint Diagnosis and Repair	7	18%
D. Drive Axle Diagnosis and Repair	9	23%
Total	40	100%

A. Clutch Diagnosis and Repair (11 questions)

1. Diagnose clutch noise, binding, slippage, pulsation, vibration, grabbing, and chatter problems; determine cause of failure and needed repairs.
2. Inspect, adjust, repair, or replace clutch linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch (includes push and pull type assemblies); check pedal height and travel.
3. Inspect, adjust, repair, or replace hydraulic clutch slave and master cylinders, lines, and hoses; bleed system.
4. Inspect, or remove and install release (throw out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, fork rollers, shafts, and seals; measure and adjust release (throw out) bearing position.
5. Inspect, or remove and install single-disc clutch pressure plate and clutch disc; adjust free play and release bearing position.
6. Inspect, or remove and install two-plate clutch pressure plate, clutch disc, intermediate plate; determine proper clutch torque rating; adjust free play and release bearing position.
7. Inspect and replace clutch brake assembly; inspect and replace input shaft and bearing retainer.
8. Inspect, or remove and install self-adjusting/continuous-adjusting clutch assembly; perform initial and/or reset adjustment procedure.
9. Inspect and replace pilot bearing.
10. Inspect flywheel mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed repairs.
11. Inspect flywheel, starter ring gear, and measure flywheel face and pilot bore runout; determine needed repairs.
12. Inspect flywheel housing(s) to transmission housing/engine mating surface(s) and measure flywheel housing face and bore runout; determine needed repairs.

B. Transmission Diagnosis and Repair (13 questions)

1. Determine the cause of transmission component failure, both before and during disassembly procedures.
2. Diagnose transmission vibration/noise, shifting, lockup, slipping/ jumping out-of-gear, and overheating problems; determine needed repairs.
3. Inspect, adjust, repair, or replace transmission remote shift linkages, cables, brackets, bushings, pivots, and levers.
4. Inspect, test operation, adjust, repair, or replace air shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies.
5. Inspect, test operation, adjust, repair, or replace electronic shift controls, shift, range and splitter solenoids, shift motors, indicators, speed and range sensors, electronic/ transmission control units (ECU/TCU), neutral/in gear and reverse switches, and wiring harnesses.
6. Inspect, test operation, repair, or replace electronic shift selectors (in-cab controls), air and electrical switches, displays and indicators, wiring harnesses, and air lines.
7. Use appropriate diagnostic tools and software, procedures, and service information/flow charts to diagnose automated mechanical transmission problems; check and record diagnostic codes, clear codes, interpret digital multimeter (DMM) readings, determine needed repairs.
8. Diagnose automated mechanical transmission problems caused by data link/bus interfaces with related electronic control systems.
9. Remove and replace transmission; inspect and replace transmission mounts, insulators, and mounting bolts.
10. Inspect for leakage and replace transmission cover plates, gaskets, sealants, seals, vents, and cap bolts; inspect seal surfaces.
11. Check transmission fluid level, and condition; determine needed service, and add proper type of lubricant.
12. Inspect, adjust, and replace transmission shift lever, cover, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts.
13. Inspect and replace input shaft, gear, spacers, bearings, retainers, and slingers.
14. Inspect main shaft, gears, sliding clutches, washers, spacers, bushings, bearings, auxiliary drive gear/assembly, retainers/snap rings, and keys; determine needed repairs.
15. Inspect countershafts, gears, bearings, timing retainer/snap rings, and keys; check bearing preload/end play; verify multiple countershaft gear timing; determine needed repairs.
16. Inspect output shaft, gears, washers, spacers, bearings, retainers/snap rings, and keys; determine needed repairs.
17. Inspect reverse idler shaft(s), gear(s), bushings, bearings, thrust washers, and retainers/snap rings; check reverse idler gear end play; determine needed repairs.
18. Inspect synchronizer hub, sleeve, keys/inserts, springs, blocking rings, synchronizer plates, blocker pins, and sliding clutches; determine needed repairs.
19. Inspect transmission cases including mating surfaces, bores, bushings, pins, studs, vents, and magnetic plugs; determine needed repairs.
20. Inspect, service, or replace transmission lubrication system components, pumps, troughs, collectors, slingers, coolers, filters, and lines and hoses.
21. Inspect, test, replace, and adjust electronic speedometer drive components.

T3 LIST (CONTINUED)

22. Inspect, adjust, service, repair, or replace power take-off assemblies and controls.
23. Inspect and test operation of backup light, neutral start, and warning device circuits and switches; determine needed repairs.
24. Inspect and test transmission temperature sending unit/sensor and gauge; determine needed repairs.
25. Inspect, adjust, repair, or replace transfer case assemblies and controls.

C. Driveshaft and Universal Joint Diagnosis and Repair (7 questions)

1. Diagnose driveshaft and universal joint noise, vibration, and runout problems; determine cause of failure and needed repairs.
2. Inspect, service, or replace driveshaft, slip joints/yokes, yokes, drive flanges, universal joints, driveshaft boots and seals, and retaining hardware; properly phase/time yokes.
3. Inspect and replace driveshaft center support bearings and mounts.
4. Measure and adjust vehicle ride height; measure and adjust driveline slopes and angles (vehicle loaded and unloaded), including PTO driveshafts.
5. Use appropriate driveline analysis software to diagnose driveline problems.
6. Diagnose driveline retarder problems; determine needed repairs.

D. Drive Axle Diagnosis and Repair (9 questions)

1. Diagnose drive axle unit noise and overheating problems; determine needed repairs.
2. Check and repair fluid leaks; inspect and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs, and seals.
3. Check drive axle fluid level, and condition; determine needed service, add proper type of lubricant using correct fill procedure.
4. Remove and replace differential carrier assembly.
5. Inspect and replace differential case assembly including spider/pinion gears, cross shaft, side gears, thrust washers, case halves, and bearings.
6. Inspect and replace components of locking differential case assembly.
7. Measure ring gear backlash and runout; determine needed repairs.
8. Inspect ring and drive pinion gears, spacers, shims, sleeves, bearing cages, and bearings; determine needed repairs.
9. Check ring and pinion gear tooth contact pattern; interpret pattern and determine needed repairs.
10. Inspect and replace power divider (inter-axle differential) assembly.
11. Inspect, adjust, repair, or replace air operated power divider (inter-axle differential) lockout assembly including diaphragms, seals, springs, yokes, pins, lines, hoses, fittings, and controls.
12. Inspect and measure drive axle housing mating surfaces and alignment; determine needed repairs.
13. Inspect, service, or replace drive axle lubrication system components, pump, troughs, collectors, slingers, tubes, and filters.
14. Inspect and replace drive axle shafts.
15. Remove and replace wheel assembly; check drive axle wheel/hub seal and axle flange gasket for leaks; determine needed repairs.

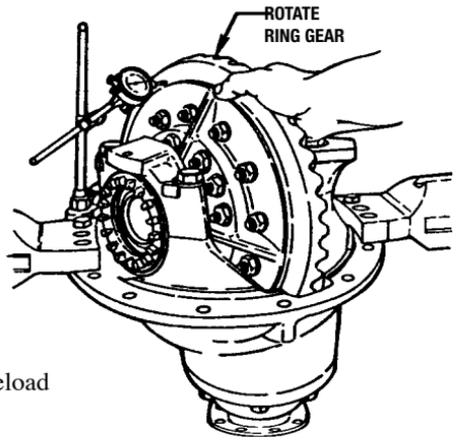
16. Diagnose drive axle wheel bearing noises and damage; determine needed repairs.
17. Clean, inspect, lubricate, and replace wheel bearings and races/cups; replace seals and wear rings; adjust drive axle wheel bearings (including one and two nut types) to manufacturers' specifications.
18. Inspect and test drive axle temperature sending unit/sensor and gauge; determine needed repairs.
19. Check, adjust, and/or replace wheel speed sensor(s).
20. Inspect or replace extended service (sealed, close-tolerance, and unitized) bearing assemblies; perform initial installation procedures to manufacturers' specifications. ■

SAMPLE QUESTIONS

DRIVE TRAIN (TEST T3)

QUESTIONS:

1. What operation is being performed in the setup shown above?
(A) Adjusting tooth contact
* (B) Checking ring gear runout
(C) Checking ring gear backlash
(D) Setting differential bearing preload



2. A truck does not move in any gear.
Technician A says that a broken shifter fork could be the cause.
Technician B says that a broken output shaft could be the cause.
Who is right?
(A) A only
* (B) B only
(C) Both A and B
(D) Neither A nor B
3. The shift lever on a 13-speed transmission is hard to move.
Which of these is the most likely cause?
(A) Bent shift rails
* (B) Galled sliding clutch gears
(C) Worn detent springs
(D) Too much mainshaft gear end play
4. The air pressure regulator for a transmission is being checked.
Technician A says that the tractor air pressure should be at maximum system pressure.
Technician B says that the regulator air filter should be cleaned and the system rechecked if the air pressure reading is below normal.
Who is right?
(A) A only
* (C) Both A and B
(B) B only
(D) Neither A nor B

T3 SAMPLE QUESTIONS (CONTINUED)

5. The driver of a truck says that a grinding noise can be heard when the clutch pedal is depressed. Which of these is the most likely cause?
- (A) Too little clutch pedal freeplay
 - * (B) A worn clutch release (throwout) bearing
 - (C) A low transmission lubricant level
 - (D) A worn clutch pressure plate
6. A two-plate pull-type clutch engages OK, but the transmission grinds when going into first gear from neutral. Technician A says that a worn clutch brake could be the cause. Technician B says that too little free play could be the cause. Who is right?
- * (A) A only
 - (B) B only
 - (C) Both A and B
 - (D) Neither A nor B
7. Which of these could be the cause of a driveshaft vibration on a truck that has just had a U-joint replaced?
- * (A) The driveshaft is out-of-phase
 - (B) The U-joint was installed backwards
 - (C) The U-joint was not lubricated
 - (D) There is dirt on the driveshaft
8. A truck with a single rear axle has too much rear axle noise only when the truck is pulling. Which of these is the most likely cause?
- (A) Worn axle shaft bearings
 - (B) Worn wheel bearings
 - (C) Worn differential pinion (spider) gears
 - * (D) Worn ring and pinion gears

TEST SPECIFICATIONS AND LIST BRAKES (TEST T4)

Content Area	Questions in Test	Percentage of Test
A. Air Brakes Diagnosis and Repair	28	56%
1. Air Supply and Service Systems (14)		
2. Mechanical/Foundation (10)		
3. Parking Brakes (4)		
B. Hydraulic Brakes Diagnosis and Repair	14	28%
1. Hydraulic System (6)		
2. Mechanical System (5)		
3. Power Assist Units and Miscellaneous (3)		
C. Air and Hydraulic Antilock Brake Systems (ABS), Automatic traction Control (ATC), and Electronic Stability Control Systems	5	10%
D. Wheel Bearings Diagnosis and Repair	3	6%
Total	50	100%

A. Air Brakes Diagnosis and Repair (28 questions)

1. Air Supply and Service Systems (14 questions)

1. Diagnose poor stopping, premature wear, brake noise, air leaks, pulling, grabbing, or dragging problems caused by supply and service system components; determine needed repairs.
2. Check air system build-up time; determine needed repairs.
3. Drain air reservoir tanks; check for oil, water, and foreign material; determine needed repairs.
4. Inspect, adjust, align, and replace compressor drive belts and pulleys.
5. Inspect and replace compressor drive gear and coupling.
6. Inspect, repair, or replace air compressor, oil supply, water lines, hoses, fittings and mounting brackets.
7. Inspect, test, adjust, and replace system pressure controls (governor/relief valve), unloader assembly, lines, hoses, and fittings.
8. Inspect, repair, or replace air system lines, hoses, fittings, and couplings; check for proper routing.
9. Inspect, test, clean, and replace air tank relief (pop-off) valves, one-way (single) check valves, drain cocks, automatic drain (spitter) valves, heaters, wiring, and connectors.

10. Inspect, test, clean, repair, or replace air drier systems, filters, valves, heaters, wiring, and connectors.
11. Inspect, test, repair, or replace brake application (foot) valve, fittings, and mounts; check pedal operation.
12. Inspect, test, and replace two-way (double) check valves and anti-compounding valves.
13. Inspect, test, repair, or replace stop and parking brake light circuit switches, wiring, and connectors.
14. Inspect, test, repair, or replace hand brake (trailer) control valve, lines, hoses, fittings, and mountings.
15. Inspect, test, and replace brake relay valves.
16. Inspect, test, and replace quick release valves.
17. Inspect, test, and replace tractor protection valve.
18. Inspect, test, and replace inversion/emergency (spring) brake control valve(s).
19. Inspect, test, and replace low pressure warning devices.
20. Inspect, test, repair or replace air pressure gauges, in-cab lines, hoses, fittings, and pressure sensors (transducers).
21. Determine if air brake system problem is caused by tractor or trailer supply or service system components.
22. Verify the complaint and road test vehicle; review driver/customer interview and past maintenance documents (if available); determine further diagnosis.

2. Mechanical/Foundation (10 questions)

1. Diagnose poor stopping, premature wear, brake noise, pulling, grabbing, or dragging problems caused by foundation brake components; determine needed repairs.
2. Inspect, test, repair, or replace service brake chambers, diaphragm, clamp, return spring, pushrod, clevis, and mounting brackets.
3. Inspect, service, or replace manual and automatic slack adjusters.
4. Inspect and replace S-cam brake rollers, bushings, camshafts, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs.
5. Inspect, clean, rebuild or replace, and adjust air disc brake caliper assemblies.
6. Inspect and replace brake shoes, or pads; determine needed repair.
7. Inspect and replace brake drums or rotors as needed.

3. Parking Brakes (4 questions)

1. Inspect and test parking (spring) brake chamber operation; replace parking (spring) brake chamber; dispose of removed chambers in accordance with local regulations.
2. Inspect, test, and replace parking (spring) brake check valves, lines, hoses, and fittings.
3. Inspect, test, and replace parking (spring) brake application and release valve.
4. Manually release (cage) and reset (uncage) parking (spring) brakes.

T4 LIST (CONTINUED)

B. Hydraulic Brakes Diagnosis and Repair (14 questions)

1. Hydraulic System (6 questions)

1. Diagnose poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems caused by hydraulic system components; determine needed repairs.
2. Pressure test hydraulic system and inspect for leaks.
3. Check and adjust brake pedal pushrod length.
4. Inspect, test, and replace master cylinder.
5. Inspect and replace brake lines, flexible hoses, and fittings.
6. Inspect, test, and replace metering (hold-off), load sensing/ proportioning, proportioning, and combination valves.
7. Inspect, test, repair, or replace brake pressure differential valve and warning light circuit switch, bulbs, wiring, and connectors.
8. Inspect and replace wheel cylinders.
9. Inspect, clean, and replace disc brake caliper assemblies.
10. Inspect/test brake fluid; bleed and/or flush system; determine proper fluid type for application.
11. Inspect, test, repair, or replace hydraulically-controlled parking brake components, systems, and warning devices.

2. Mechanical System (5 questions)

1. Diagnose poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or pedal feel problems caused by disc and drum brake mechanical components; determine needed repairs.
2. Inspect, resurface, or replace brake drums or rotors.
3. Inspect, adjust, and replace drum brake shoes, mounting hardware, adjuster mechanisms, and backing plates.
4. Inspect, service, and replace disc brake pads, hardware, and mounts.
5. Inspect, adjust, repair, or replace drive line parking brake drums, rotors, shoes, mounting hardware, and adjusters; burnish/seat replacement shoes as required.
6. Inspect, adjust, repair, or replace drive line parking brake application system pedal, cables, linkage, levers, pivots, and springs.

3. Power Assist Units and Miscellaneous (3 questions)

1. Diagnose poor stopping complaints caused by brake assist (booster) system problems; determine needed repairs.
2. Inspect, test, repair, or replace power brake assist (booster), hoses, control valves and filters; determine proper fluid type for application.
3. Test, adjust, and replace brake stop light switch, bulbs, wiring, and connectors.

C. Air and Hydraulic Antilock Brake Systems (ABS), Automatic Traction Control (ATC), and Electronic Stability Control Systems (5 questions)

1. Observe antilock brake system (ABS) warning light operation; determine if further diagnosis is needed; (includes dash mounted trailer ABS warning light).
2. Diagnose antilock brake system (ABS) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC based software); determine needed repairs.
3. Diagnose wheel lock-up caused by failure of the antilock brake system (ABS); determine needed repairs.
4. Inspect, test, and replace antilock brake system (ABS) air, hydraulic, electrical, and mechanical components.
5. Diagnose automatic traction control (ATC) electronic control(s) and components using self-diagnosis and/or specified test equipment (scan tool, PC based software); determine needed repairs.
6. Diagnose electronic stability control systems and components using self-diagnosis and/or specified test equipment (scan tool, PC based software); determine needed repairs.

D. Wheel Bearings Diagnosis and Repair (3 questions)

1. Remove and replace axle wheel assembly.
2. Clean, inspect, lubricate, and replace wheel bearings and races/cups; replace seals and seal wear rings.
3. Adjust steering and drive axle wheel bearings (including one and two nut types) to manufacturers' specifications.
4. Inspect or replace extended service (sealed, close-tolerance, and unitized) bearing assemblies; perform initial installation procedures to manufacturers' specifications. ■

SAMPLE QUESTIONS

BRAKES (TEST T4)

QUESTIONS:

1. The parking brakes fail to apply on a truck with air brakes.
Technician A says that low air pressure in the spring brake chamber could be the cause.
Technician B says that a ruptured spring brake diaphragm could be the cause.
Who is right?
(A) A only
(B) B only
(C) Both A and B
* (D) Neither A nor B
2. A truck has an uneven braking problem. Which of these could be the cause?
(A) A binding treadle (foot) valve
(B) Low brake line air pressure
* (C) A bad brake drum
(D) A bad governor
3. A service brake on a truck with an air brake system releases too slowly.
Technician A says that low air pressure could be the cause.
Technician B says that a kinked air line could be the cause.
Who is right?
(A) A only
(B) B only
(C) Both A and B
(D) Neither A nor B
4. A service brake chamber leaks when the brakes are applied. Which of these could be the cause?
(A) Excessive push rod travel
* (B) A bad chamber diaphragm
(C) A broken chamber return spring
(D) A misaligned push rod

T4 SAMPLE QUESTIONS (CONTINUED)

5. All the wheels on a truck with air brakes lock up when a small amount of pressure is applied to the treadle (foot) valve. Which of these could be the cause?
- * (A) The application valve is bad.
 - (B) The limiting valve is leaking.
 - (C) The compressor regulator is set too high.
 - (D) The brakes are adjusted too high.
6. When an air reservoir tank is drained, there is an excessive amount of moisture. This could be caused by a:
- (A) cracked air compressor bracket.
 - (B) clogged air compressor intake.
 - (C) failed one way check valve.
 - * (D) failed air dryer purge valve.
7. All the brakes drag on a truck with hydraulic brakes. Which of these could be the cause?
- (A) Air in the hydraulic system
 - (B) Too high vacuum supply to the power brake booster
 - (C) A leaking secondary cup in the master cylinder
 - * (D) No brake pedal free travel

Questions 8 and 9 are not like the ones above.

Each of these has the word **EXCEPT**. For each question, look for the choice that could **NOT** cause the described situation. Read the entire question carefully before choosing your answer.

8. A truck with hydraulic brakes pulls to one side when the brakes are applied. Any of these could be the cause **EXCEPT** a:
- (A) sticking wheel cylinder piston.
 - (B) grease contaminated brake lining.
 - (C) crimped hydraulic line.
 - * (D) plugged compensating port.
9. The driver of a truck with air brakes says it has poor stopping power. Any of these could be the cause **EXCEPT**:
- * (A) the quick release valve exhaust port is plugged.
 - (B) the air pressure is too low.
 - (C) the application line is restricted.
 - (D) the brakes are out of adjustment.

TEST SPECIFICATIONS AND LIST

SUSPENSION AND STEERING (TEST T5)

Content Area	Questions in Test	Percentage of Test
A. Steering System Diagnosis and Repair	12	24.0%
1. Steering Column (3)		
2. Steering Units (6)		
3. Steering Linkage (3)		
B. Suspension System Diagnosis and Repair	13	26.0%
C. Wheel Alignment Diagnosis, Adjustment, and Repair	13	26.0%
D. Wheels and Tires Diagnosis and Repair	9	18.0%
E. Frame Service and Repair	3	6.0%
Total	50*	100%

A. Steering System Diagnosis and Repair (12 Questions)

1. Steering Column (3 Questions)

1. Diagnose fixed and driver adjustable steering column and shaft noise, looseness, and binding problems; determine needed repairs.
2. Inspect and replace steering shaft U-joint(s), slip joints, bearings, bushings, and seals; phase shaft U-joints.
3. Check and adjust cab mounting and ride height.
4. Remove the steering wheel (includes steering wheels equipped with electrical/electronic controls and components); install and center the steering wheel.

2. Steering Units (6 Questions)

1. Diagnose power steering system noise, steering binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems; determine needed repairs.
2. Determine recommended type of power steering fluid; check level and condition; determine needed service.
3. Flush and refill power steering system; purge air from system.
4. Perform power steering system pressure, temperature, and flow tests; determine needed repairs.
5. Inspect, service, or replace power steering reservoir including filter, seals, and gaskets.

6. Inspect and reinstall/replace power steering pump drive belts, pulleys and tensioners; adjust drive belts and check alignment.
7. Inspect or replace power steering pump drive gear and coupling.
8. Inspect, adjust, or replace power steering pump, mountings, and brackets.
9. Inspect and replace power steering system cooler, lines, hoses, clamps/mountings, and fittings.
10. Inspect, adjust, or replace linkage-assist type power steering cylinder or gear (dual system).
11. Inspect, adjust, repair, or replace integral type power steering gear.
12. Adjust manual and automatic steering gear poppet/relief valves.

3. Steering Linkage (3 Questions)

1. Inspect, align, and replace pitman arm.
2. Inspect, adjust, or replace drag link (relay rod) and tie rod ends (ball and adjustable socket type).
3. Inspect and replace steering arms.
4. Inspect or replace clamps and retainers on cross tube/relay rod/center link/tie rod; position as needed.
5. Check and adjust wheel stops.

B. Suspension System Diagnosis and Repair (13 Questions)

1. Inspect and replace front axle beam and mounting hardware.
2. Inspect, service, adjust, or replace kingpin, bushings, locks, bearings, seals, and covers.
3. Inspect and replace shock absorbers, bushings, brackets, and mounts.
4. Inspect, repair, or replace (leaf and parabolic) springs, center bolts, clips, spring eye bolts and bushings, shackles, slippers, insulators, brackets, and mounts.
5. Inspect, adjust, or replace torque arms, bushings, and mounts.
6. Inspect, adjust, or replace axle aligning devices such as radius rods, transverse torque rods/track bars, stabilizer bars, and related bushings, mounts, shims, and cams.
7. Inspect or replace walking beams, center (cross) tube, bushings, mounts, load pads, brackets, caps, and mounting hardware.
8. Inspect, test, adjust, repair, or replace air suspension pressure regulator and height control valves, linkages, lines, hoses, and fittings.
9. Inspect, test, repair, or replace air suspension springs (bags), mounting plates, main support beams/springs, suspension arms (radius/torque, and transverse torque), and bushings.
10. Measure vehicle ride height; determine needed adjustments or repairs.
11. Verify and diagnose vehicle suspension complaints.
12. Torque U-bolts to manufacturers' specifications.
13. Check axle load distribution problems on rear suspensions; check axle seat planing angles and pinion angles.

T5 LIST (CONTINUED)

C. Wheel Alignment Diagnosis, Adjustment, and Repair (13 Questions)

1. Diagnose vehicle wandering, darting, pulling, shimmy, and steering effort problems; determine needed adjustments and repairs.
2. Check camber and KPI (king pin inclination); determine needed repairs.
3. Check and adjust caster.
4. Check and adjust toe.
5. Check rear axle(s) alignment (thrustline/centerline) and tracking (lateral offset, parallelism); adjust or determine needed repairs.
6. Check turning/Ackerman angle (toe-out-on-turns) and maximum turning radius (wheel cut); determine needed repairs.

D. Wheels and Tires Diagnosis and Repair (9 Questions)

1. Diagnose tire wear patterns; determine needed repairs.
2. Diagnose wheel end vibration, shimmy, pounding, hop (tramp) problems; determine needed repairs.
3. Inspect and replace wheels, spacers, rims, side flanges, locking rings, rim clamps, studs, and nuts.
4. Measure wheel and tire radial and lateral runout; determine needed repairs or adjustments.
5. Inspect tires; check and adjust air pressure to tire manufacturers' specifications.
6. Perform static balance of wheel and tire assembly.
7. Perform dynamic balance of wheel and tire assembly.
8. Measure tire diameter and match tires on axles.
9. Remove and replace steering and/or drive axle wheel assembly.
10. Clean, inspect, lubricate, and replace wheel bearings and races/cups; replace seals and wear rings; adjust steering and drive axle wheel bearings (including one and two nut types) to manufacturers' specifications.
11. Inspect or replace extended service (sealed, close tolerance, and unitized) bearing assemblies; perform initial installation procedures to manufacturers' specifications.

E. Frame Service and Repair (3 Questions)

1. Inspect, adjust, service, repair, or replace fifth wheel, pivot pins, bushings, locking jaw mechanisms, and mounting bolts.
2. Inspect, adjust, service, repair, or replace sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls.
3. Inspect frame and frame members for cracks, breaks, distortion, elongated holes, looseness, and damage; determine needed repairs.
4. Inspect, install, or repair frame hangers, brackets, and crossmembers in accordance with manufacturers' recommended procedures.
5. Inspect, install, repair or replace pintle hooks and draw bars. ■

SAMPLE QUESTIONS

SUSPENSION AND STEERING (TEST T5)

QUESTIONS:

- Which of these could cause the front tires of a truck to show a feathered edge wear pattern?
* (A) An incorrect toe setting
(B) An incorrect camber setting
(C) An incorrect caster setting
(D) Incorrect tire pressures
- The drive axles on a truck with a walking beam suspension are out of alignment. Technician A says that incorrect length torque rods could be the cause. Technician B says that worn walking beam bushings could be the cause. Who is right?
(A) A only (C) Both A and B
* (B) B only (D) Neither A nor B
- The driver of a truck that has just had its front springs and hangers replaced says that it is hard to keep in a straight ahead position. Technician A says that this could be caused by installing the caster shims backwards. Technician B says that this could be caused by installing forward spring hangers which are too short. Who is right?
* (A) A only (C) Both A and B
(B) B only (D) Neither A nor B
- The driver of a truck says that it is hard to steer and the steering return is poor. Technician A says that tight kingpins could be the cause. Technician B says that too much toe-in could be the cause. Who is right?
* (A) A only (C) Both A and B
(B) B only (D) Neither A nor B

T5 SAMPLE QUESTIONS (CONTINUED)

5. Rust streaks coming from around the stud holes of a disc wheel could be caused by:
- (A) an overloaded condition.
 - (B) overtorqued lug/cap nuts.
 - * (C) An out of balance condition.
 - (D) Loose lug/cap nuts.
6. A truck has a history of springs breaking at the center bolt holes. Technician A says that loose U-bolts could be the cause. Technician B says that loose spring shackles could be the cause. Who is right?
- * (A) A only
 - (B) B only
 - (C) Both A and B
 - (D) Neither A nor B
7. A constant buzzing noise comes from the power steering pump. Technician A says the cause could be air in the system. Technician B says the cause could be that the relief valve is stuck in the open position. Who is right?
- * (A) A only
 - (B) B only
 - (C) Both A and B
 - (D) Neither A nor B

8. The tandem rear axle air suspension ride height rises above normal as the vehicle is unloaded. Which of these could be the cause?
- (A) A kinked air spring (bag) supply line
 - (B) A leaking height control valve
 - * (C) A plugged height control valve exhaust port
 - (D) A leaking pressure protection valve

Question 9 is not like the ones above.

It has the word **EXCEPT**. For this question, look for the choice that could **NOT** cause the described situation. Read the question carefully before choosing your answer.

9. All of these should be checked before aligning the front wheels on a truck **EXCEPT**:
- (A) tire pressure.
 - (B) ride height.
 - (C) wheel bearing adjustment.
 - * (D) tire balance.

TEST SPECIFICATIONS AND LIST

ELECTRICAL/ELECTRONIC SYSTEMS (TEST T6)

Content Area	Questions in Test	Percentage of Test
A. General Electrical Diagnosis	14	28%
B. Battery Diagnosis and Repair	4	8%
C. Starting System Diagnosis and Repair	7	14%
D. Charging System Diagnosis and Repair	7	14%
E. Lighting Systems Diagnosis and Repair	6	12%
1. Headlights, Parking, Clearance, Tail, Cab and Dash Lights (3)		
2. Stoplights, Turn Signals, Hazard Light, and Backup Lights (3)		
F. Gauges and Warning Devices Diagnosis and Repair	4	8%
G. Related Systems	8	12%
Total	50	100%

A. General Electrical Systems Diagnosis (14 questions)

1. Check continuity in electrical/electronic circuits using appropriate test equipment.
2. Check applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using digital multimeter (DMM), or appropriate test equipment.
3. Check current flow in electrical/electronic circuits and components using a digital multimeter (DMM), clamp-on ammeter, or appropriate test equipment.
4. Check resistance in electrical/electronic circuits and components using a digital multimeter (DMM), or appropriate test equipment.
5. Find shorts, grounds, and opens in electrical/electronic circuits.
6. Diagnose key-off battery drain problems.
7. Inspect, test, and replace fusible links, circuit breakers, and fuses.
8. Inspect and test spike suppressions diodes/resistors and capacitors.
9. Inspect and test relays and solenoids.
10. Read and interpret electrical schematic diagrams and symbols.
11. Diagnose failures in the data communications bus network; determine needed repairs.

B. Battery Diagnosis and Repair (4 questions)

1. Perform battery tests (load and capacitance); determine needed service.
2. Determine battery state of charge by measuring terminal post voltage using a digital multimeter (DMM).
3. Inspect, clean, service, or replace battery and terminal connections.

4. Inspect, clean, repair and replace battery boxes, mounts, and hold downs.
5. Charge battery using slow or fast charge method as appropriate.
6. Jump start a vehicle using jumper cables and a booster battery or appropriate auxiliary power supply.
7. Diagnose low voltage disconnect (LVD) systems; determine needed repairs.

C. Starting System Diagnosis and Repair (7 questions)

1. Perform starting circuit voltage drop tests; determine needed repairs.
2. Inspect, test, and replace components and wires in the starter control circuit.
3. Inspect, test, and replace starter relays and solenoids/ switches.
4. Remove and replace starter; inspect flywheel ring gear or flex plate.
5. Inspect, clean, repair, and replace battery cables and connectors in the cranking circuit.
6. Differentiate between electrical and mechanical problems that cause a slow crank, no crank, extended cranking, or a cranking noise condition.
7. Test/monitor battery voltage during cranking. Determine needed repairs

D. Charging System Diagnosis and Repair (7 questions)

1. Diagnose dash mounted charge meters and/or indicator lights that show a no charge, low charge, or overcharge condition; determine needed repairs.
2. Diagnose the cause of no charge, low charge, or overcharge conditions; determine needed repairs (includes remote sense alternators)
3. Inspect, adjust, and replace alternator drive belts/gears, pulleys, fans, mounting brackets, and tensioners.
4. Perform charging system output tests; determine needed repairs.
5. Perform charging circuit voltage drop tests; determine needed repairs.
6. Remove and replace alternator.
7. Inspect, repair, or replace connectors and wires in the charging circuit.

E. Lighting Systems Diagnosis and Repair (6 questions)**1. Headlights, Daytime Running Lights, Parking, Clearance, Tail, Cab, and Dash Lights (3 questions)**

1. Diagnose the cause of brighter than normal, intermittent, dim, or no headlight and daytime running light (DRL) operation.
2. Test, aim and replace headlights.
3. Test, repair, and replace headlight and dimmer switches, wires, connectors, terminals, sockets, relays, and control components.
4. Inspect, test, repair, or replace switches, bulbs, sockets, connectors, terminals, relays, wires, and light-emitting diodes (LEDs) of lighting circuits on trucks and trailers.
5. Inspect, test, repair, or replace dash light circuit switches, bulbs, LEDs, sockets, connectors, terminals, wires, and printed circuits.
6. Inspect, test, repair, or replace interior cab light circuit switches, bulbs, LEDs, sockets, connectors, terminals, or wires.

2. Stoplights, Turn Signals, Hazard Lights and Backup Lights (3 questions)

1. Inspect, test, adjust, repair, or replace stoplight circuit switches, bulbs, LEDs, sockets, connectors, terminals, relays, and wires.
2. Diagnose the cause of turn signal and hazard flasher light malfunctions; determine needed repairs.

T6 LIST (CONTINUED)

3. Inspect, test, repair, or replace turn signal and hazard circuit flashers, switches, bulbs, LEDs, sockets, connectors, terminals, relays, and wires.
4. Inspect, test, adjust, repair, or replace backup light and warning devices, circuit switches, bulbs, LEDs, sockets, connectors, terminals, and wires.
5. Inspect and test trailer light cord connector and cable; determine needed repairs.

F. Gauges and Warning Devices Diagnosis and Repair (4 questions)

1. Diagnose the cause of intermittent, high, low, or no gauge readings; determine needed repairs. (Does not include charge indicators.)
2. Diagnose the cause of data bus driven gauge malfunctions; determine needed repairs.
3. Inspect, test, adjust, repair, or replace gauge circuit sending units, sensors, gauges, connectors, terminals, and wires.
4. Inspect, test, repair, or replace warning devices (lights and audible) circuit sending units, sensors, bulbs, audible component, sockets connectors, terminals, wires, and printed circuits/control modules.
5. Inspect, test, and replace electronic instrumentation systems; verify proper calibration for vehicle application.

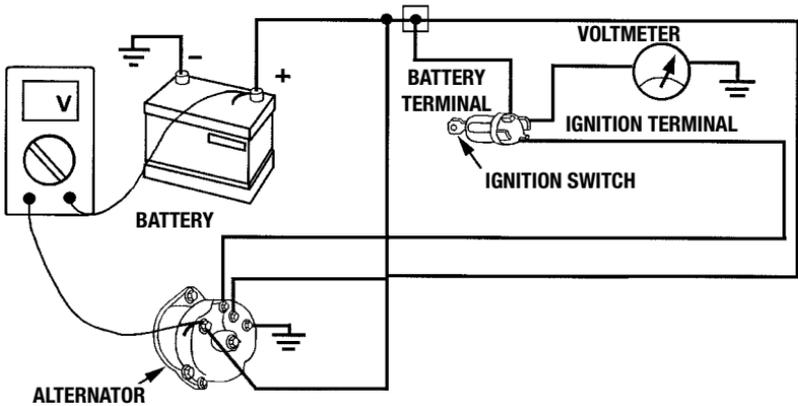
G. Related Systems (8 questions)

1. Diagnose the cause of constant, intermittent, or no horn operation.
2. Inspect, test, repair, or replace horn circuit relays, horns, switches, connectors, terminals, and wires.
3. Diagnose the cause of constant, intermittent, or no wiper operation; diagnose the cause of wiper speed control and/or park problems.
4. Inspect, test, repair, or replace wiper motor, resistors, park switch, relays, switches, connectors, terminals, and wires.
5. Inspect and replace wiper motor transmission mechanical linkage, arms, and blades.
6. Inspect, test, repair, or replace windshield washer motor or pump/relay assembly, switches, connectors, terminals, and wires.
7. Inspect, test, repair, or replace sideview mirror motors, heater circuit grids, relays, switches, connectors, terminals, and wires.
8. Inspect, test, repair, or replace heater and A/C electrical components including: A/C clutches, motors, resistors, relays, switches, controls, connectors, terminals, and wires.
9. Inspect, test, repair, or replace cigarette lighter and/or auxiliary power outlet case, integral fuse, connectors, terminals, and wires.
10. Diagnose the cause of slow, intermittent, or no power window operation.
11. Inspect, test, repair, and replace motors, switches, relays, connectors, terminals, and wires of power window circuits.
12. Diagnose inverter/shore power systems; determine needed repairs.
13. Diagnose the cause of poor, intermittent, or no operation of electric door locks.
14. Inspect, test, repair, and replace switches, relays, controllers, actuators/solenoids, connectors, terminals, and wires of electric door lock circuits.
15. Inspect, test repair and replace cruise control electrical components.
16. Inspect, test, repair, and replace engine cooling fan electrical control components.
17. Diagnose failures in the data communications bus network; determine needed repairs. ■

SAMPLE QUESTIONS

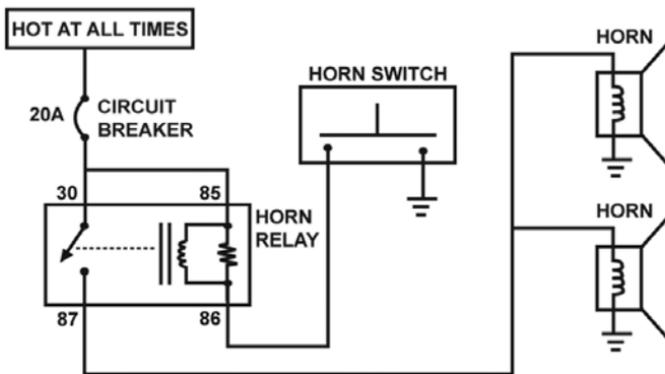
ELECTRICAL/ELECTRONIC SYSTEMS (TEST T6)

QUESTIONS:



1. In the charging system shown above, the meter reading will show:
 - (A) charging output voltage.
 - (B) regulator operating voltage.
 - * (C) charging circuit voltage drop.
 - (D) ignition switch voltage drop.
2. A truck's cab heater blower motor operates at low speed only. Which of these is the most likely cause?
 - (A) An open blower switch ground
 - * (B) A bad blower switch
 - (C) A binding blower cage
 - (D) A short to power at the blower motor

T6 SAMPLE QUESTIONS (CONTINUED)



3. The horns in the circuit shown above only blow when a jumper wire is connected between terminals 30 and 87 of the horn relay. Technician A says that a failed horn relay could be the cause. Technician B says that a short to ground in the circuit between the horn relay and the horn button could be the cause. Who is right?
- * (A) A only (C) Both A and B
(B) B only (D) Neither A nor B
4. A truck's battery discharges after sitting overnight. Technician A says that a bad alternator could be the cause. Technician B says that a bad starter could be the cause. Who is right?
- * (A) A only (C) Both A and B
(B) B only (D) Neither A nor B
5. A driver complains that the trailer marker lights are dim at night while braking. Which of these is the most likely cause?
- (A) Low battery voltage
(B) One burned out brake light bulb
* (C) A poor ground in the trailer light cord
(D) Too much grease on the 5th wheel

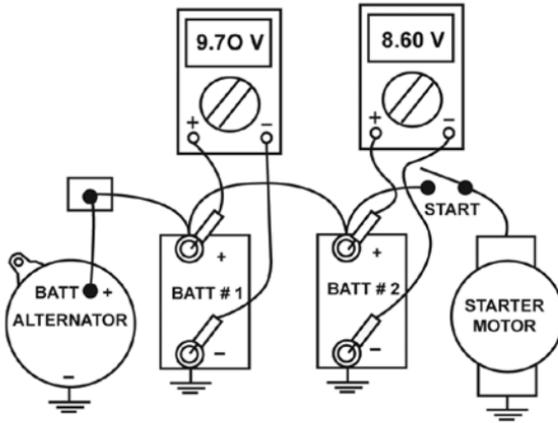
T6 SAMPLE QUESTIONS (CONTINUED)

6. Both headlights on a vehicle are dim in high beam and normal in low beam. Technician A says that a poor headlight ground could be the cause. Technician B says that a shorted headlight switch could be the cause.

Who is right?

- (A) A only
(B) B only

- (C) Both A and B
* (D) Neither A nor B



7. The voltage readings shown above were taken while cranking the engine.

Which of these is indicated by the readings?

- (A) Battery #2 has resistance in the ground cable.
* (B) Battery #2 is weaker than battery #1.
(C) Battery #1 is low on electrolyte.
(D) Battery #2 should be replaced.

TEST SPECIFICATIONS AND TASK LIST

HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) SYSTEMS (TEST T7)

Content Area	Questions in Test	Percentage of Test
A. HVAC Systems Diagnosis, Service, and Repair	6	15%
B. A/C System and Component Diagnosis, Service, and Repair	16	40%
1. A/C System – General (6)		
2. Compressor and Clutch (5)		
3. Evaporator, Condenser, and Related Components (5)		
C. Heating and Engine Cooling Systems Diagnosis, Service, and Repair	6	15%
D. Operating Systems and Related Controls Diagnosis and Repair	8	20%
1. Electrical (5)		
2. Air/Vacuum/Mechanical (2)		
3. Constant/Automatic Temperature Control (1)		
E. Refrigerant Recovery, Recycling, Handling, and Retrofit	4	10%
Total	40	100%

A. HVAC Systems Diagnosis, Service, and Repair (6 questions)

1. Verify the complaint, road test the vehicle, review driver/customer interview and past maintenance documents (if available); determine further diagnosis.
2. Verify the need of service or repair of HVAC systems based on unusual operating noises; determine appropriate action.
3. Verify the need of service or repair of HVAC systems based on unusual visual, smell, and touch conditions; determine appropriate action.
4. Identify system type and components (cycling clutch orifice tube-CCOT, expansion valve, type of refrigerant) and conduct performance test(s) on HVAC systems; determine appropriate action.

B. A/C System and Component Diagnosis, Service, and Repair (16 questions)**1. A/C System. General (6 questions)**

1. Diagnose the cause of temperature control problems in the A/C system; determine needed repairs.
2. Identify refrigerant type and check for contamination; determine appropriate action.
3. Diagnose A/C system problems indicated by pressure gauge readings and sight glass/moisture indicator conditions (where applicable); determine needed service or repairs.
4. Diagnose A/C system problems indicated by unusual operating noise, visual, smell, and touch procedures; determine needed repairs.
5. Perform A/C system leak test; determine needed repairs.
6. Evacuate A/C system using appropriate equipment.
7. Internally clean contaminated A/C system components and hoses.
8. Charge A/C system with correct type and quantity of refrigerant.
9. Identify lubricant type needed for system application.

2. Compressor and Clutch (5 questions)

1. Diagnose A/C system problems that cause protection devices (pressure, thermal, and electronic) to interrupt system operation; determine needed repairs.
2. Inspect, test, and replace A/C system pressure, thermal, and electronic protection devices.
3. Inspect and replace A/C compressor drive belts, pulleys, idlers, and tensioners; adjust drive belts and check alignment.
4. Inspect, test, service, and replace A/C compressor clutch components or assembly.
5. Inspect and correct A/C compressor lubricant level.
6. Inspect, test, and replace A/C compressor.
7. Inspect, repair, or replace A/C compressor mountings and hardware.

3. Evaporator, Condenser, and Related Components (5 questions)

1. Correct system lubricant level when replacing the evaporator, condenser, receiver/drier or accumulator/drier, and hoses.
2. Inspect, repair, or replace A/C system hoses, lines, filters, fittings, and seals.
3. Inspect A/C condenser for proper air flow.
4. Inspect, test, and replace A/C system condenser and mountings.
5. Inspect and replace receiver/drier or accumulator/drier.
6. Inspect, test, and replace cab/sleeper refrigerant solenoid, expansion valve(s), thermostatic switch (thermistor); and check placement of thermal bulb (capillary tube).
7. Inspect and replace orifice tube.
8. Inspect, test, and replace cab/sleeper evaporator core.
9. Inspect, clean, and repair evaporator housing and water drain; inspect and service/replace evaporator air filter.
10. Identify, inspect, and replace A/C system service ports/valves (gauge connections).
11. Diagnose system failures resulting in refrigerant loss from the A/C system high pressure relief device.

T7 LIST (CONTINUED)

C. Heating and Engine Cooling Systems Diagnosis, Service, and Repair (6 questions)

1. Diagnose the cause of outlet air temperature control problems in the HVAC system; determine needed repairs.
2. Diagnose window fogging problems; determine needed repairs.
3. Perform engine cooling system tests for leaks, protection level, contamination, coolant level, temperature, coolant type, and conditioner concentration; determine needed repairs.
4. Inspect and replace engine cooling and heating system hoses, lines, fittings, and clamps.
5. Inspect and test radiator, pressure cap, and coolant recovery system (surge tank); determine needed repairs.
6. Inspect water pump and drive system; determine needed repairs.
7. Inspect and test thermostats, by-passes, housings, and seals; determine needed repairs.
8. Flush and refill cooling system; bleed air from system.
9. Inspect, test, and repair or replace fan, fan hub, fan clutch, fan controls, fan thermostat, and fan shroud.
10. Inspect, test, and replace heating system coolant control valve(s) and manual shut-off valves.
11. Inspect, flush, and replace heater core.

D. Operating Systems and Related Controls Diagnosis and Repair (8 questions)

1. Electrical (5 questions)

1. Diagnose the cause of failures in HVAC electrical control systems; determine needed repairs.
2. Inspect, test, repair, and replace A/C heater blower motors, resistors, switches, relays, modules, wiring, and protection devices.
3. Inspect, test, repair, and replace A/C compressor clutch relays, modules, wiring, sensors, switches, diodes, and protection devices.
4. Inspect and test A/C-related electronic engine control systems; determine needed repairs.
5. Inspect, test, repair, and replace engine cooling/condenser fan motors, relays, modules, switches, sensors, wiring, and protection devices.
6. Inspect, test, repair, and replace electric actuator motors, relays/modules, switches, sensors, wiring, and protection devices.
7. Inspect, test, repair, or replace HVAC system electrical control panel assemblies.

2. Air/Vacuum/Mechanical (2 questions)

1. Diagnose the cause of failures in HVAC air, vacuum, and mechanical switches and controls; determine needed repairs.
2. Inspect, test, repair, or replace HVAC system air/vacuum/mechanical control panel assemblies.
3. Inspect, test, adjust, or replace HVAC system air/vacuum/mechanical control cables and linkages.
4. Inspect, test, and replace HVAC system vacuum pumps, actuators (diaphragms/motors) and hoses.

5. Identify, inspect, test, and replace HVAC system vacuum reservoir(s), check valve(s), and restrictors.
6. Inspect, test, adjust, repair, or replace HVAC system ducts, doors, and outlets.

3. Constant/Automatic Temperature Control (1 question)

1. Diagnose constant/automatic temperature control system problems; determine needed repairs.
2. Inspect, test, and replace climate control temperature sensors.
3. Inspect, test, repair, and replace temperature blend door/power servo system.
4. Inspect, test, adjust or replace heater water valve and controls.
5. Inspect, test, and replace electric, air, and vacuum motors, solenoids, and switches.
6. Inspect, test and replace constant/automatic temperature control panels.
7. Inspect, test, and replace constant/automatic temperature control microprocessor (climate control computer/programmer).

E. Refrigerant Recovery, Recycling, Handling, and Retrofit (4 questions)

Note: Tasks 1 through 5 should be accomplished in accordance with published EPA and appropriate SAE “J” standards for R-12, R-134a, and EPA approved refrigerant blends.

1. Maintain and verify correct operation of certified equipment.
2. Identify and recover A/C system refrigerant.
3. Recycle refrigerant.
4. Handle, label and store refrigerant.
5. Test recycled refrigerant for non-condensable gases.
6. Retrofit A/C systems following industry/manufacturers’ accepted procedures and federal /local laws. ■

SAMPLE QUESTIONS

HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) SYSTEMS (TEST T7)

QUESTIONS:

1. A truck's A/C system does not cool properly due to an icing evaporator problem.
Technician A says that a stuck-closed cycling switch could be the cause.
Technician B says that a refrigerant overcharge could be the cause.
Who is right?
* (A) A only (C) Both A and B
(B) B only (D) Neither A nor B
2. The sleeper A/C unit is not cooling. A system check shows all pressures are normal. Which of these is the most likely cause?
(A) A plugged receiver drier
(B) A stuck-open expansion valve
(C) A shorted high pressure switch
* (D) A stuck-closed refrigerant solenoid valve
3. An A/C system has a low discharge pressure. which of these could be the cause?
* (A) A leaking compressor seal
(B) A restricted refrigerant flow in the condenser
(C) A restricted air flow over the condenser
(D) A compressor clutch that will not engage
4. During replacement, it is noticed that the tubes on the inlet and outlet of a heater core are ruptured. The most likely cause is:
(A) a low coolant level.
(B) air in the cooling system.
* (C) incorrect coolant protection.
(D) a bad heater control valve.

5. No air is flowing from a truck's HVAC ducts.
Technician A says that a failed blower motor could be the cause.
Technician B says that a stuck recirculation air door could be the cause.
Who is right?
- * (A) A only (C) Both A and B
(B) B only (D) Neither A nor B
6. A recovery/recycle machine has been used to recycle a vehicle's refrigerant.
The moisture indicator on the machine shows that moisture is present.
The most likely cause is a:
- (A) full refrigerant storage tank.
(B) faulty air purge valve.
* (C) saturated filter/drier.
(D) faulty storage tank pressure switch.

Question 7 is not like the ones above.

It has the word **EXCEPT**. For this question, look for the choice that could **NOT** cause the described situation. Read the entire question carefully before choosing your answer.

7. A truck's A/C system has just been repaired and filled with the proper amount of refrigerant. The system blows cool, but not cold air. The high-side pressure is 250 psi, and the low-side pressure is 50 psi. Any of these could be the cause **EXCEPT**:
- (A) the cooling fan is inoperative.
* (B) a partially restricted expansion valve.
(C) a system overcharged with oil.
(D) a missing radiator fan shroud.

TEST SPECIFICATIONS AND LIST PREVENTIVE MAINTENANCE AND INSPECTION (PMI) (TEST T8)

Content Area	Questions in Test	Percentage of Test
A. Engine Systems	10	20%
B. Cab and Hood	5	10%
C. Electrical/Electronics	10	20%
D. Frame and Chassis	22	44%
1. Brakes (10)		
2. Drivetrain (4)		
3. Steering, Tires, and Wheels (4)		
4. Suspension, Frame, and 5th Wheel (4)		
E. Road/Operational Test	3	6%
Total	50	100%

A. Engine Systems (10 questions)

1. Review past maintenance/repair documents, driver vehicle condition reports, and brake/tire wear report. Check and record electronic diagnostic codes and trip/operational data. Clear codes and data.
2. Check engine operation (including unusual noises, vibration, and excessive exhaust smoke); record idle rpm, governed rpm, and PTO rpm (if applicable).
3. Inspect vibration damper.
4. Inspect condition of belt(s), tensioner(s), and pulley(s); check and adjust belt tension.
5. Check engine for oil, coolant, air, and fuel leaks (Engine Off and Engine Running).
6. Inspect engine mounts for looseness and deterioration.
7. Check engine oil level and condition; check dipstick seal and fill cap seal.
8. Check engine compartment wiring, harnesses, connectors, and seals for damage, mounting, and proper routing.
9. Check fuel tanks, vents, mountings, lines, caps, and seals; check anti-siphon device (if applicable).
10. Inspect water separator/fuel heater; drain water from separator; replace fuel filter(s); prime and bleed fuel system.
11. Inspect crankcase ventilation system.
12. Check exhaust system mountings for looseness and damage.
13. Check engine exhaust system for leaks, excessive noise, proper routing, and missing or damaged components (heat shields and guards).
14. Check air induction system piping, charge air cooler, hoses, clamps, mountings, proper routing, and indicators; check for air restrictions and leaks.

15. Inspect turbocharger(s) for noise, oil and exhaust leaks; check mountings and connections; check wastegate, variable geometry turbocharger (VGT), linkages, and hoses.
16. Service or replace air filter(s) as needed.
17. Inspect diesel emission control systems, including exhaust gas recirculation (EGR), exhaust gas recirculation (EGR) cooler, diesel particulate filter (DPF), and/or catalytic converter.
18. Check fan clutch/hub operation, bearing condition and noise (including viscous/thermostatic, air, and electric fan types); inspect fan assembly and shroud for missing and damaged components.
19. Inspect radiator (including air flow restriction, missing/corroded fins, leaks, and damage) and mountings.
20. Pressure test cooling system and radiator cap.
21. Inspect coolant hoses and clamps for leaks, damage, and proper routing.
22. Inspect coolant recovery system.
23. Identify coolant type; check coolant for contamination, supplemental coolant additives (SCAs), and protection level (freeze point).
24. Service coolant filter/conditioner.
25. Drain and refill cooling system; bleed air from system; recover coolant.
26. Inspect water pump for leaks and bearing play.
27. Change engine oil and filters; visually check oil for coolant or fuel contamination; inspect and clean magnetic drain plugs.
28. Take an engine oil sample.

B. Cab and Hood (5 questions)

1. Inspect key condition and check operation of ignition switch.
2. Check operation of indicator lights, warning lights and/or alarms.
3. Check operation of instruments/gauges and panel lighting.
4. Check operation of electronic power take off (PTO) and engine idle speed controls (if applicable).
5. Check operation of defroster, heater, ventilation, and A/C (HVAC) controls.
6. Check operation of all accessories.
7. Use diagnostic tool or on-board diagnostic system to read current and historic diagnostic trouble codes from electronic modules (including engine, transmission, brake, supplemental restraint, traction control and body control systems).
8. Check operation of electric and air horns.
9. Check condition of safety equipment, including flares, spare fuses, reflective triangles, fire extinguisher, and all required decals.
10. Inspect seat belts, seat tethers, and sleeper restraints.
11. Check supplemental restraint system (SRS) for proper warning light operation and diagnostic trouble codes (if applicable).
12. Inspect wiper blades and arms.
13. Check wiper and washer operation.
14. Check for all required vehicle permits, registration, decals, and inspection papers.
15. Inspect windshield glass for cracks, chips, clarity, discoloration/glazing, or other damage; check sun visor operation.

T8 LIST (CONTINUED)

16. Check seat condition, operation, mounting, and suspension components.
17. Check door glass and window operation.
18. Inspect steps and grab handles.
19. Inspect mirror mountings, brackets, glass, heaters, and motors.
20. Inspect and record all observed physical damage.
21. Lubricate all cab and hood grease fittings.
22. Inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, linkages, and cables.
23. Inspect cab mountings, hinges, latches, linkages; service as needed.
24. Inspect tilt cab hydraulic pump, lines, and cylinders for leakage; inspect tilt cab safety devices; service as needed.
25. Check accelerator, clutch, and brake pedal operation and condition.
26. Check cab ride height; inspect cab air suspension springs, mounts, hoses, valves, shock absorbers, and fittings for leaks and damage.
27. Inspect front bumper, fairings, and mounts.
28. Inspect A/C condenser and lines for condition and visible leaks; check mountings.
29. Inspect A/C compressor and lines for condition and visible leaks; check clutch; check mountings.
30. Check A/C system condition and operation.
31. Check HVAC air inlet filters and ducts; service as needed.
32. Check auxiliary power unit (APU) operation and mounting; inspect for damage, leaks, and belt tension.

C. Electrical/Electronics (10 questions)

1. Inspect battery box(es), cover(s), and mountings.
2. Inspect battery hold downs, connections, cables, and cable routing; service as needed.
3. Check and record battery state of charge (open circuit voltage) and condition.
4. Perform battery test (load and capacitance).
5. Inspect starter, mounting, connections, cables, and cable routing.
6. Engage starter; check for unusual noises, starter drag, and starting difficulty.
7. Inspect alternator, mounting, wiring, and wiring routing.
8. Perform alternator current output test.
9. Perform alternator voltage output test.
10. Check operation of interior lights; service as needed.
11. Check all exterior lights, lenses, and reflectors; check headlight alignment; service as needed.
12. Inspect and test trailer power cord connector, cable, and holder; service as needed.

D. Frame and Chassis (22 questions)

1. Brakes (10 questions)

1. Check air parking brake operation.
2. Check and record air governor cut-in and cut-out settings (psi).
3. Service air drier as needed. Check air drier purge valve operation and air drier heater, if equipped.
4. Check air system for leaks (brakes released).
5. Check air system for leaks (brakes applied).
6. Drain air tanks; test one-way and double-check valves.

7. Check low air pressure warning devices.
8. Check spring brake inversion/emergency (spring) brake control valve, if equipped.
9. Check tractor protection valve, if equipped.
10. Test air pressure build-up time.
11. Check condition and operation of hand brake (trailer) control valve, if equipped.
12. Perform antilock brake system (ABS) operational system self-test. Perform automatic traction control (ATC) operational system self-test, if equipped.
13. Inspect coupling air lines, holders, and gladhands.
14. Check brake chambers and air lines for secure mountings, damage, and missing caging plugs.
15. Inspect and record front and rear brake lining/pad condition and thickness.
16. Inspect condition of front and rear brake drums/rotors.
17. Check operation and adjustment of front and rear brake automatic slack adjusters.
18. Check S-camshaft and bushing condition.
19. Lubricate all air brake component grease fittings.
20. Check master cylinder for leaks and damage; check fluid level and condition.
21. Inspect hydraulic brake lines, fittings, flexible hoses, and valves for leaks and damage.
22. Check hydraulic parking brake operation; inspect parking brake application and holding devices.
23. Check operation of hydraulic system; pedal travel, pedal effort, and pedal feel (drift).
24. Inspect calipers and/or wheel cylinders for leaks and damage.
25. Inspect power brake booster(s), hoses, and control valves.
26. Check and/or adjust hydraulic drum brakes.
27. Check operation of hydraulic assist back-up system and warning devices.

2. Drivetrain (4 questions)

1. Check operation of release/throw out bearing and clutch brake.
2. Check clutch linkage/cable and levers for looseness or binding; lubricate release/throwout bearing as required.
3. Check clutch master cylinder fluid level; check clutch master cylinder, slave cylinder, lines, and hoses for leaks and damage.
4. Check and/or adjust clutch.
5. Check transmission and/or transfer case housing, fasteners, seals, filter, cooler, and cooler lines for cracks, leaks, and proper routing, if equipped.
6. Check transmission wiring, connectors, seals, and harnesses for damage and proper routing.
7. Inspect transmission breather, service as needed.
8. Inspect transmission mounts for looseness and deterioration.
9. Check transmission oil/fluid level and condition.
10. Inspect U-joints, yokes, driveshafts, and center bearings for looseness, damage, and proper phasing.
11. Inspect axle housing(s) for cracks and leaks.
12. Inspect axle breather(s); service as needed.
13. Lubricate all drivetrain grease fittings.
14. Check drive axle(s) oil level.
15. Change drive axle(s) oil and filter; check and clean magnetic plugs.

T8 LIST (CONTINUED)

16. Check power take off (PTO) unit operation and mounting; check PTO U-joints and driveshaft for looseness, damage, and proper phasing, if equipped.
17. Change transmission oil/fluid and filters; check and clean magnetic plugs.
18. Take transmission oil sample.
19. Take drive axle(s) oil sample.

3. Steering, Tires, and Wheels (4 questions)

1. Check steering wheel and column operation for free play and binding.
2. Check power steering pump and hoses for leaks and mounting; check fluid level and condition.
3. Change power steering fluid and filter.
4. Inspect steering gear(s) or rack-and-pinion for leaks and mounting.
5. Inspect steering shafts and U-joints condition and for proper phasing; inspect pinch bolts, splines, Pitman arm-to-steering sector shaft, drag link, tie rod ends, cross tube, and wheel stops.
6. Check kingpin and thrust bearing wear.
7. Check front and rear wheel bearings/hub assemblies for looseness and noise, including extended service (sealed, close tolerance, and unitized) assemblies.
8. Check oil level and condition in all non-drive axle hubs; check for leaks.
9. Adjust wheel bearings as needed (including one and two nut types) in accordance with manufacturer's specifications.
10. Inspect tires for irregular wear patterns and proper mounting of directional tires.
11. Inspect tires for cuts, cracks, bulges, and sidewall damage.
12. Inspect valve caps and stems.
13. Measure and record tire tread depth; probe for imbedded debris.
14. Check and record tire air pressure; adjust as needed.
15. Check for loose lugs and/or slipped wheels; check mounting hardware condition; service as needed.
16. Retorque lugs/nuts in accordance with manufacturers' specifications.
17. Inspect wheels and spacers for cracks or damage.
18. Check tire matching (diameter and tread) on dual tire installations.
19. Lubricate all steering grease fittings.

4. Suspension, Frame, and 5th Wheel (4 questions)

1. Inspect front and rear suspension components (springs, hangers, shackles, spring U-bolts, insulators, radius rods, torque rods, load pads, walking beams, and equalizers); check U-bolt torque in accordance with manufacturers' specifications.
2. Inspect shock absorbers for leaks and mounting.
3. Inspect air suspension components (air springs/bags, mounts, arms, hoses, valves, linkage, and fittings) for leaks and damage; check suspension ride height.
4. Inspect operation of tag/pusher axle and components for mounting and damage.
5. Lubricate all suspension grease fittings.
6. Check tandem axle spacing.
7. Inspect fifth wheel mount, bolts, slider, air lines, locks, pivot pins, bushings, and stops.
8. Test operation of fifth wheel locking device; adjust as needed.
9. Check mud flaps, brackets, and reflective devices.
10. Check pintle hook assembly, mounting bolts, and locks.

11. Clean and inspect fifth wheel plate for cracks and damage; lubricate fifth wheel plate and all grease fittings.
12. Inspect frame and frame members for cracks and damage.
13. Inspect body attaching hardware.
14. Inspect cargo ramps. Inspect lift gates, cylinders, controls, hoses, wiring, and warning decals; check fluid level, service as needed.
15. Inspect rear (ICC/DOT) impact guard.

E. Road/Operational Test (3 questions)

1. Check operation of clutch and gear shift.
2. Check operation of all instruments, gauges, and lights.
3. Check steering wheel for play, binding, and centering.
4. Check operation of automatic or automated mechanical transmission.
5. Check road speed limiter.
6. Check cruise control.
7. Observe exhaust for excessive smoke.
8. Test service brakes.
9. Verify engine/exhaust brake or retarder operation.
10. Check operation of backup warning devices. ■

SAMPLE QUESTIONS

PREVENTIVE MAINTENANCE INSPECTION (PMI)

(TEST T8)

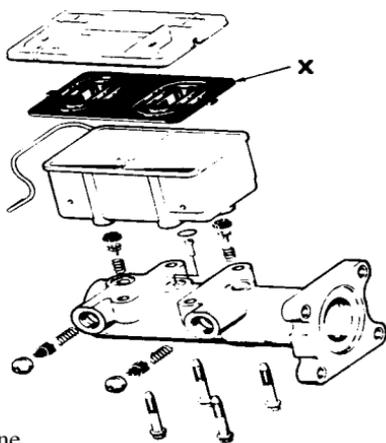
QUESTIONS:

1. Which of these is the minimum tire tread depth permitted by federal DOT standards on all steer axle tires on trucks, tractors, or buses?
(A) 1/32 in.
(B) 2/32 in.
* (C) 4/32 in.
(D) 5/32 in.
2. Technician A says that the low air brake pressure warning lamp should be lit when the supply system pressure is below 60 psi.
Technician B says that the parking brakes should automatically apply when the supply system air pressure falls below 45 psi.
Who is right?
(A) A only
(B) B only
* (C) Both A and B
(D) Neither A nor B
3. The driver of a tractor/trailer reports that the engine's fan hits the shroud when accelerating under a load. The most likely cause is:
(A) overspeeding the engine.
(B) improper vehicle shifting.
(C) excessive fan blade flexing.
* (D) a loose engine mount.
4. A drive axle lubricant is a milky color. The most likely cause is:
(A) metal contamination.
(B) mixing lubricant types.
(C) gasket sealer contamination.
* (D) water contamination.

T8 SAMPLE QUESTIONS (CONTINUED)

5. The PM inspector notices that part "X" is missing. This could cause:

* (A) fluid contamination.
(B) loss of static pressure.
(C) excessive pedal effort.
(D) brake warning lamp illumination.



6. When pressure testing a cooling system, the technician should apply:

(A) 5 pounds of pressure with the engine running.
* (B) the amount of pressure listed on the radiator cap.
(C) pressure not to exceed the danger zone on the pressure gauge.
(D) 5 pounds more pressure than listed on the radiator cap.

7. When performing a battery load test on a multiple battery vehicle:

(A) connect the load test clamps to any positive battery post and ground.
(B) disconnect the ground cable(s) from the frame.
(C) connect the load test amps clamp around a negative vehicle battery cable.
* (D) disconnect the batteries from each other.

Question 8 is not like the ones above.

It has the word **EXCEPT**. For this question, look for the choice that could **NOT** cause the described situation. Read the entire question carefully before choosing your answer.

8. A zero reading on an air restriction dash gauge could be caused by all of these **EXCEPT**:

(A) a bad restriction gauge.
* (B) a plugged air filter.
(C) an opening in the intake system.
(D) a torn air filter.

INDUSTRY TRAINING

The following sources of information provide comprehensive listings of training resources available to working technicians:

Delmar Cengage Learning

P.O. Box 6904
Florence, KY 41022
1-800-487-8488
www.autoed.cengage.com
www.cengage.com/delmar

Motor Age Training for Certification

131 West First Street
Duluth, MN 55802
800-240-1968
www.motorage.com

In Canada

Thomson Learning Nelson Canada

1120 Birchmount Road
Scarborough, Ontario M1K 5G4
1-800-268-222
E-mail: inquire@nelson.com

Spanish Language Training Resources

For a listing of training providers who offer training, or training materials in Spanish go to www.ase.com; once there, enter the “Service Professionals” area and click on “Spanish Language Training Resources.”

CASE: ASE Certification for Training Providers of Continuing Automotive Service Education. Visit www.natef.org/case/case_certified.cfm for periodic updates to this list.

The National Institute for Automotive Service Excellence (ASE) and its educational foundation, the National Automotive Technicians Education Foundation (NATEF), offer a voluntary certification program for institutions and organizations providing continuing automotive service education. ASE seeks to improve the quality of continuing automotive education and help automotive technicians identify appropriate training sources and activities by evaluating and certifying providers of continuing automotive service education against CASE Standards.

The CASE program differs from ASE’s existing entry-level training program certification in that it addresses the training provider’s process of developing and delivering training as opposed to prescribing specific program content. Elements of organization, structure and methods which appear to contribute significantly to the development and delivery of high quality automotive service education, have been identified and incorporated into the CASE Standards.

The following training providers have achieved CASE certification. Please note that * indicates a proprietary program unavailable to all technicians.

MD Publications

Undercar Digest, July Issue
Transmission Digest, September Issue
P.O. Box 2210
Springfield, MO 65801
1-800-274-7890

Motor Source Guide

Hearst Business Publishing, Inc.
645 Stewart Ave.
Garden City, NY 11530
www.motor.com

Fleet Equipment, April Issue

P.O. Box 7605
Mt. Prospect, IL 60056-7605
www.truklink.com

Recursos de Educación en Español

Para obtener acceso a la lista de proveedores de educación, ó materiales educativos en Español diríjase a www.ase.com; una ves allí, entre en la sección “Español” y prosiga al área “Lista de Educadores y Materiales Didácticos.”

3M Industrial and Transportation Business Services Training and Development

3M Center Building 225-1N-01
St. Paul, MN 55144
651-737-0141
www.3m.com/automotive

ACDelco Service Training

6200 Grand Point Dr., MC#2-316
Grand Blanc, MI 48439
800-825-5886 prompt 1
www.acdelcotechconnect.com

Affinia Under Vehicle Group

Technical Services Department
4400 Prime Parkway
McHenry, IL 60050
815-363-9000 – ask for technical
www.raybestos.com

**AKZO NOBEL Coatings Inc.,
Car Refinishes**

5555 Spalding Dr.
Norcross, GA 30092
770-242-5760
www.akzonobelcarrefinishes.net

American Automobile Association, Inc.

1000 AAA Dr.
Heathrow, FL 32746
407-444-7169 or 407-444-8041
Allan Stanley, astanley@national.aaa.com
Len Johannes, ljohnannes@national.aaa.com
www.aaa.com

***American Honda Automobile Service Training**

1919 Torrance Blvd.
Torrance, CA 90501
310-783-3557
www.honda.com

Automotive Spray Equipment Technologies (ASET)

3703 West Parkway Blvd.
Salt Lake City, UT 84120
801-964-6646
www.asetusa.com

ATech Training, Inc

12290 Chandler Dr.
PO Box 297
Walton, KY 41094
859-485-7229 ext. 109
www.atechtraining.com

BASF Automotive Refinish Division

26701 Telegraph Rd.
Southfield, MI 48034
248-304-5200
www.basfrefinish.com

BP Global Fuels Technology

150 W. Warrenville Rd.
800 Building
Naperville, IL 60563
312-729-4212
www.fuelcertification.com

Chief Automotive Systems

996 Industrial Dr.
Madison, IN 47250
800-445-9262
www.chiefautomotive.com

CARQUEST Technical Institute

4401 Atlantic Ave.
Raleigh, NC 27604
919-573-3000
www.CARQUEST.com/CTI

Collision Management Services Inc.

2040R Lord Baltimore Dr.
Baltimore, MD 21244
410-944-3383
www.ineedcms.com/Training.html

Delphi Integrated Service Solutions

5820 Delphi Dr.
Troy, MI 48098
800-545-2220
Customer Support
www.delphi-iss.com

DuPont Performance Coatings

500 Eagleview Blvd.
Exton, PA 19341
610-458-6323
www.pc.dupont.com

INDUSTRY TRAINING

EAST Training Inc.

4404 Sylon Blvd.
Hainesport, NJ 08036
609-267-2223
www.easttraining.com

Federal Mogul Technical Education Centers

6565 Wells Ave.
St. Louis, MO 63133
314-977-0684
www.federal-mogul.com

Fox Valley Technical College

1825 N. Bluemound Dr.
Appleton, WI 54912
920-993-5163
www.fvtc.edu/public

***General Motors Service Technical College**

30501 Van Dyke Ave., M/C 480-204-100
Warren, MI 48090
586-947-9704
www.gmstc.com

Hunter Engineering

11250 Hunter Dr.
Bridgeton, MO 63044
314-731-0000
www.hunter.com

I-CAR (Inter-Industry Conference on Auto Collision Repair)

5125 Trillium Blvd.
Hoffman Estates, IL 60192
800-422-7872
www.i-car.com

Iwata Medea

3703 West Parkway Blvd.
West Valley City, UT 87120
801-964-6646
www.asetusa.com

Jiffy Lube International

700 Milam, Room 24038PNT
Houston, TX 77002
713-546-3957
www.jiffylube.com

Kent Automotive

6200 Oak Tree Blvd., #350
Independence, OH 44131
216-642-5973
www.kent-automotive.com

Lawson State Community College

1100 9th Ave., SW
Bessemer, AL 35022
205-929-3521
www.lawsonstate.edu

Low Kinney & Associates

On-site Welding Training and Certifications
PO Box 511, 184 State Route 314
Centerburg, OH 43011
740-625-6342

***Lexus, A Division of Toyota Motor Sales, Inc., U.S.A.**

19001 S. Western Ave.
Torrance, CA 90509
Technical Training 310-468-4958
www.lexus.com

Martin Senour Automotive Finishes

7019 Highgrove Rd.
Burr Ridge, IL 60527
630-887-7516
www.martinsenour-autopaint.com

Megatech Corporation

525 Woburn St., Suite 3
Tewksbury, MA 01876
800-767-6342 (US)
978-937-9600 (Int'l)
www.megatechcorp.com

Melior, Inc.

200 Cahaba Park Circle West, Suite 250
Birmingham, AL 35242
205-298-8300
www.melioronline.com

National Automotive Parts Association (NAPA)

2999 Circle 75 Pkwy.
Atlanta, GA 30339
800-292-NIAT (6428)
www.niat-training.com

National Appraisal Institute

10150 Canoga Ave
Chatsworth, CA 91311
818-775-1370
www.nainstitute.com

Nationwide Training Organization

9243 Columbus Pike
Lewis Center, OH 43035
614-840-7169
www.nationwide.com

***Navistar, Inc.**

3033 Wayne Terrace
Fort Wayne, IN 46806
260-461-1951
www.navistar.com

***Nissan North America, Inc.**

Customer Loyalty and Training
P.O. Box 685001
Franklin, TN 37068
615- 725-8319
www.nissantechinfo.com

***Penske Truck Leasing**

Route 10 Pheasant Rd., PO Box 563
Reading, PA 19607
610-775-6479
www.gopenske.com

PPG Industries

19699 Progress Dr.
Strongsville, OH 44149
440-572-6784
www.ppg.com

Raytheon Professional Services L.L.C.

1919 Technology Dr.
Troy, MI 48083
248-837-6777
www.rps.com

Saint Gobain Abrasives

1 New Bond St.
Worcester, MA 01606
508-795-2774
www.nortonautomotive.com
www.aa.carborundumabrasives.com

SEM Products, Inc.

1685 Overview Dr.
Rock Hill, SC 29730
803-207-8231
www.semproducts.com

Sherwin-Williams Automotive Finishes Corp.

7019 Highgrove Rd.
Burr Ridge, IL 60527
630-887-7516
www.sherwin-automotive.com

Solera, Inc.

P.O. Box 151376
Altamonte Springs, FL 32715
858-724-1600
www.training.audatex.us

Specialty Products Company

4045 Specialty Place
Longmont, CO 80504
303-772-2103
www.spalignment.com

Technical Training, Inc. (TTI)

2750 Product Dr.
Rochester Hills, MI 48309
248-853-5550 or 800-837-5222
www.ttinao.com

***Toyota Motor Sales, USA, Inc.**

19001 S. Western Ave.
Torrance, CA 90509-2991
310-468-7171
www.toyota.com

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