PRACTICE EXAM 20: ASE T6 SIMULATION

1. A technician performs a voltage drop test across a truck's battery positive cable during cranking and reads 0.9 volts. The specification maximum for the entire positive side is 0.5 volts. The technician then tests each connection individually. The battery post-to-clamp reads 0.6 volts, the cable reads 0.1 volts, and the clamp-to-solenoid terminal reads 0.2 volts. What does this breakdown reveal?

A. The cable itself has developed internal corrosion and should be replaced entirely

B. The battery post-to-clamp connection is the primary source of the excessive voltage drop at 0.6 volts — this single connection exceeds the entire positive-side specification and must be cleaned or replaced

C. All three sections contribute equally and the entire cable assembly should be replaced as a unit

D. The solenoid terminal connection at 0.2 volts is the most critical fault requiring immediate attention

2. A heavy-duty truck's scan tool shows the ECM commanding the engine cooling fan on. The fan clutch solenoid has 12.2 volts at its power terminal and 0.03 volts at its ground terminal. The solenoid measures 14 ohms — within the 10 to 18 ohm specification. The fan does not engage. What does the complete set of electrical test results tell the technician?

A. The solenoid ground has excessive resistance preventing current flow through the coil

B. The ECM output driver is not delivering adequate current despite showing correct voltage at the solenoid

C. The solenoid wiring has an intermittent open that only manifests under operating temperature conditions

D. The solenoid circuit is electrically complete and functioning — power is delivered, the ground is solid, and the solenoid should be energizing, so the fault is mechanical, not electrical — the air clutch mechanism, air supply, or linkage has failed

3. A commercial vehicle's left front headlight has a perfectly focused beam with a sharp cutoff line. The right front headlight produces a scattered, diffused pattern with no defined cutoff. Both bulbs are the same type installed at the same time. What is the most likely cause of the right headlight's poor pattern?

A. A voltage drop on the right headlight circuit causing the filament to operate at reduced wattage

B. The right headlight bulb has shifted slightly in its socket, moving the filament away from the reflector focal point

C. The right headlight housing has internal reflector degradation from moisture, oxidation, or contamination that has destroyed the precise mirrored surface needed to focus light into a controlled beam

D. The right headlight lens has micro-scratches from road debris that scatter the beam as it exits the housing

4. Technician A says that when testing a relay, applying 12 volts to the coil terminals should produce an audible click as the contacts change position. Technician B says that after energizing the coil, the technician should measure resistance across the normally open load terminals — a near-zero reading confirms the contacts have closed. Who is correct?

A. Both Technician A and Technician B

B. Technician A only

C. Technician B only

D. Neither Technician A nor Technician B

5. A truck's electronic instrument cluster displays "NO DATA" on the driver information display. All gauges read zero. The engine runs normally. What is the most likely cause?

A. A failed ECM that has stopped broadcasting all parameters on the J1939 bus

B. A body controller module that has disabled the cluster output as a diagnostic protection measure

C. Multiple simultaneous sensor failures preventing any data from reaching the cluster through the bus

D. A CAN bus communication fault at the instrument cluster's connection point that isolates the cluster from all bus data while other modules continue communicating normally on the backbone

6. A heavy-duty truck's battery bank reads 12.62 volts at rest. During a load test at 475 amps for 15 seconds, the bank voltage holds at 9.9 volts at 70°F. The technician then tests each battery individually. Three batteries hold between 9.7 and 9.9 volts. The fourth battery drops to 8.5 volts. What does this individual testing reveal?

A. All four batteries pass because the bank test showed 9.9 volts, proving the system works as a unit

B. The fourth battery at 8.5 volts has failed the load test — it is well below the 9.6-volt minimum and was masked during the bank test by the three healthy batteries compensating for its weakness

C. The fourth battery needs only recharging since it was at 12.62 volts before the test

D. The load tester malfunctioned during the individual test of the fourth battery

7. A commercial vehicle's windshield washer pump activates when the wiper switch is turned to any speed, even without pressing the washer button. The wipers operate correctly on all speeds and the park function works normally. What is the most likely cause?

A. A short between the wiper motor power feed wire and the washer pump power feed wire in the harness, causing both circuits to energize simultaneously whenever the wiper switch delivers power

B. A body controller module fault that links the wiper output to the washer output

C. A faulty washer pump relay with contacts welded closed

D. The wiper switch has an internal cross-connection between the wiper contacts and the washer contacts

8. A truck's scan tool retrieves a DTC from the ECM: "Barometric Pressure Sensor — Reading Too Low." The truck is operating at sea level where barometric pressure should be approximately 101 kPa. The ECM reports 87 kPa. What driveability symptom will this cause?

A. The engine will run lean because the ECM believes the air is denser than it actually is

B. The engine will experience excessive turbo boost because the ECM compensates for perceived low altitude

C. The engine will run rich because the ECM calculates a lower air density than actually exists and adds fuel to compensate for the perceived thinner air

D. No driveability symptom will occur because the ECM uses the MAP sensor, not the barometric sensor, for fuel calculations

9. A heavy-duty truck's starter motor was recently rebuilt with new brushes and bushings. After installation, the starter cranks the engine but draws 250 amps compared to the 200-amp specification. All cables and connections pass voltage drop testing. What is the most likely cause of the elevated current draw?

A. The engine has developed increased compression resistance since the last time the starter was tested

B. The batteries are overcharged, delivering higher-than-normal voltage to the starter and increasing current flow

C. The rebuilt starter has reversed field winding polarity causing the armature to fight against the intended rotation direction

D. The new bushings are slightly too tight, creating friction drag on the armature that forces the motor to draw additional current to overcome the mechanical resistance

10. A commercial vehicle's right rear marker light glows at approximately half brightness. A DMM measures 12.1 volts at the socket power terminal with the lights activated. The ground terminal voltage drop test between the socket ground and battery negative reads 2.4 volts. What do these combined readings confirm?

A. The power side has adequate voltage and the bulb has increased internal resistance causing dim output

B. The ground path has excessive resistance — the 2.4-volt drop far exceeds the 0.3-volt maximum, consuming voltage that should be available to the bulb and reducing it to approximately half brightness

C. The alternator is not producing adequate voltage to support the right-side marker circuit

D. The body controller module is commanding a reduced duty cycle to the right rear marker output

11. A truck driver reports that the HVAC blower motor runs at full speed regardless of the speed setting selected on the switch. Low, medium, and high all produce the same high-speed output. What is the most likely cause?

A. The blower motor resistor block has shorted internally, creating a direct path from power to the motor that bypasses all resistance elements — or the wiring has a short that feeds power directly to the motor, bypassing the resistor block and switch speed selection

B. A body controller module that overrides the switch and commands maximum blower speed

C. The blower motor has an internal fault causing it to run at maximum speed regardless of voltage

D. The blower switch has failed with all speed contacts closed simultaneously

12. A heavy-duty truck's alternator output tests at 14.2 volts and 150 amps against a 160-amp rating. The AC ripple at the B+ terminal reads 0.3 volts. The charging circuit output-side voltage drop is 0.3 volts and the ground-side drop is 0.2 volts. What is the overall assessment?

A. The ground-side voltage drop is borderline at 0.2 volts and should be monitored

B. The alternator output at 150 amps is below the 160-amp rating and indicates a developing stator fault

C. All parameters are within specification — voltage is in the 13.5 to 14.5 range, output is above the 80% minimum capacity, AC ripple is below 0.5 volts, output-side drop is below 0.5 volts, and ground-side drop is below 0.3 volts

D. The AC ripple at 0.3 volts indicates a diode beginning to fail that will worsen over time

13. A truck's power window on the passenger door operates very slowly in the up direction but at normal speed going down. The motor draws 8 amps in both directions — within the 6 to 10 amp specification. What is the most likely cause?

A. A voltage drop in the up-direction power feed that reduces motor current for upward travel

B. A mechanical resistance issue — a binding window channel, deteriorated weatherstrip, or worn regulator mechanism that creates more friction during upward travel where the motor must also overcome gravity

C. A body controller module that limits upward window speed as an anti-pinch safety feature

D. A failing window motor with a worn brush that only contacts the commutator properly in one direction

14. A commercial vehicle's scan tool retrieves a DTC from the ABS module: "System Configuration Error." The ABS module was recently replaced. What is the most likely cause?

A. The replacement module's firmware is incompatible with the vehicle's wheel speed sensor type

B. The CAN bus configuration has changed since the original module was removed

C. The ABS module connector has a different pinout than the original module

D. The replacement ABS module has not been programmed with the vehicle-specific parameters — axle configuration, tire size, sensor type, and valve assignments — required for it to correctly process speed data and control brake modulation

15. A truck driver reports that the electric door locks work from the key fob and the driver switch, but do not auto-lock when the truck reaches highway speed. The driver expects this feature based on experience with other trucks in the fleet. What should the technician check?

A. Whether the auto-lock feature is enabled in the body controller module's configuration — the feature may be disabled on this specific truck, or may have been reset during a previous BCM service event

B. The vehicle speed sensor signal to the BCM

C. The door lock actuators for a partial failure that responds to direct commands but not to automatic triggers

D. The CAN bus for a delay in speed data reaching the BCM that prevents the auto-lock from triggering

16. A heavy-duty truck's headlights produce a visible flicker at idle that disappears above 1,200 RPM. The alternator output reads 13.5 volts at idle. The batteries test good. What is the most likely cause?

A. A failing headlight relay with contacts that bounce at the vibration frequency of idle

B. Worn headlight bulbs with thinning filaments that are more visible at the lower idle voltage

C. The alternator's idle-speed output of 13.5 volts is at the lower edge of the acceptable range, and the minor voltage fluctuation inherent in the alternator's output at this marginal level produces visible headlight flicker that resolves at the higher voltage produced above 1,200 RPM

D. An engine misfire causing torsional vibration in the belt drive that momentarily slows the alternator

17. A truck's scan tool shows the ECM receiving a coolant temperature of 195°F. The instrument cluster displays approximately 170°F on the temperature gauge. An infrared thermometer confirms the engine is at 195°F. What is the most likely cause of the cluster discrepancy?

A. A CAN bus scaling error that reduces the temperature value during transmission

B. The instrument cluster's temperature gauge stepper motor or its internal calibration has an offset error, displaying approximately 25°F lower than the bus data it receives

C. The ECM coolant sensor is reading high due to localized hot spots near the sensor location

D. The cluster receives temperature data from a separate analog sending unit that reads differently than the ECM sensor

18. A commercial vehicle's trailer ABS warning light on the tractor dash illuminates intermittently during driving. The trailer ABS module has no active DTCs. The tractor ABS system shows no faults. What should the technician investigate?

A. The trailer ABS module firmware for a compatibility issue with the tractor's warning light circuit

B. The tractor's instrument cluster for a faulty warning light driver

C. The CAN bus for intermittent data packet corruption between the trailer and tractor ABS modules

D. The trailer ABS power feed and communication circuit — the blue wire in the J560 connector, the trailer cord, and the tractor-side wiring — for an intermittent connection that briefly drops power or signal to the trailer ABS module during driving

19. Technician A says that when performing a parasitic draw test, the technician should connect the DMM in series with the battery negative cable and wait for all modules to enter sleep mode before recording the draw. Technician B says that opening a door during the test wakes modules and invalidates the reading, requiring the technician to wait for all modules to return to sleep before retesting. Who is correct?

A. Both Technician A and Technician B

B. Technician A only

C. Technician B only

D. Neither Technician A nor Technician B

20. A heavy-duty truck's scan tool retrieves identical "System Voltage Low" DTCs from the ECM, TCM, and ABS module simultaneously. Battery terminal voltage reads 14.1 volts with the engine running. What single fault could cause all three modules to report low voltage despite normal battery terminal readings?

A. A failing alternator that produces momentary voltage spikes between the test measurements

B. A CAN bus communication fault broadcasting incorrect voltage data to all modules

C. Excessive resistance in the main power distribution path between the battery and the fuse panel where these modules receive their power — voltage drops below each module's minimum threshold despite normal voltage at the battery terminals

D. A weak battery cell that produces brief voltage dips under transient load conditions

21. A truck's right turn signal and right brake light are both inoperative on the tractor. The left side works normally. The hazard flashers work on all four corners. What does the hazard test tell the technician?

A. The turn signal flasher module has failed on the right-side output

B. The right-side fuse has blown, affecting both turn and brake but not hazards

C. The right rear combination light bulb has a selective fault responding only to hazard voltage

D. The right-side bulbs, wiring, and ground are all proven functional by the hazards — the fault is in the power path used during normal operation, most likely the multifunction switch's right turn contact or its dedicated output wiring

22. A commercial vehicle's fuel gauge reads one-quarter tank but the driver filled the tank 30 minutes ago and has driven only 10 miles. The technician grounds the sending unit wire at the tank connector. The gauge reads full. What has this test confirmed?

A. The gauge mechanism responds correctly to a known input, so the fault is in the fuel level sending unit

B. The gauge mechanism and the wiring between the cluster and the tank are both functional — grounding the wire simulates a full-tank reading, and the gauge responding correctly confirms the entire path from cluster to tank is intact, isolating the fault to the sending unit itself

C. The instrument cluster requires a fuel tank recalibration

D. The sending unit wire has high resistance that only allows full-scale signal when directly grounded

23. A heavy-duty truck's batteries have been replaced. Before connecting the negative cable to complete the circuit, the technician notices a small spark when the cable end approaches the battery post. The ignition is off and all switches are off. What causes the spark?

A. Electronic modules drawing standby keep-alive current create an immediate current path when the ground circuit is completed, producing the small spark as the gap closes between the cable and the post

B. Static electricity from the technician's clothing discharging through the cable

C. Residual magnetism in the starter motor creating a phantom voltage on the ground circuit

D. A short-to-ground in the vehicle wiring that requires immediate investigation

24. A truck's electronic cruise control engages and holds speed on flat roads but disengages every time the driver activates the windshield wipers. No DTCs are stored. What is the most likely cause?

A. A data bus conflict between the wiper control module and the cruise control module

B. A faulty wiper motor that generates electromagnetic interference disrupting the cruise module

C. A voltage drop caused by the wiper motor current draw that momentarily pulls the cruise control module's supply voltage below its minimum operating threshold, causing it to reset

D. A body controller module configuration error that links wiper activation to cruise disengage

25. A fleet technician discovers that several trucks have aftermarket LED marker lights that cause the body controller module to set "open circuit" DTCs for each LED position. The LEDs work correctly. What solution eliminates the false codes?

A. Reprogram the BCM with LED-compatible current monitoring thresholds if a software update is available for this vehicle

B. Replace the LEDs with incandescent bulbs to restore normal BCM current detection

C. Disconnect the BCM's current monitoring wire for each affected circuit

D. Install load resistors in parallel with each LED assembly to increase the total current draw above the BCM's minimum detection threshold, preventing the module from interpreting the low LED current as an open circuit

26. A heavy-duty truck's alternator produces 14.3 volts at the B+ terminal. The battery positive terminal reads 13.7 volts. The ground-side voltage drop between the alternator case and battery negative reads 0.1 volts. What does the output-side drop of 0.6 volts indicate?

A. The output cable or its connections between the alternator B+ terminal and the battery positive post have excessive resistance, exceeding the 0.5-volt maximum specification and reducing the effective charging voltage reaching the batteries

B. Normal voltage drop for a heavy-duty charging circuit under load conditions

C. The alternator's internal voltage regulator is producing inconsistent output

D. The battery is accepting excessive current that creates the apparent voltage difference

27. A commercial vehicle's scan tool shows the transmission control module receiving a turbine speed signal that intermittently drops to zero during highway driving. Each dropout lasts one to two seconds. The transmission shifts harshly during each event before recovering. What is the most likely cause?

A. A failing TCM processor that cannot maintain continuous signal processing

B. An intermittent open in the turbine speed sensor circuit — a loose connector, a cracked wire, or a heat-sensitive sensor that briefly loses continuity under operating conditions, causing the TCM to lose speed data momentarily

C. A CAN bus communication error between the TCM and the sensor that corrupts the speed data intermittently

D. The torque converter lockup solenoid creating electromagnetic interference that disrupts the turbine speed signal during engagement

28. A truck driver reports that the dome light stays on at all times regardless of door position or the manual dash switch setting. The technician disconnects the body controller module connector and the light turns off. What does this test confirm?

A. The dome light relay is mechanically stuck closed and bypassing the BCM

B. A door jamb switch is providing a phantom ground signal to the BCM

C. The BCM is the source of the continuous dome light activation — either its internal output driver has failed in the on state, or it is responding to an input signal that commands the light to stay on

D. The dome light wiring has a short-to-power that the BCM is unable to override

29. A heavy-duty truck has a no-crank condition. Battery voltage reads 12.65 volts. When the key is turned to start, the solenoid does not click. The technician jumps 12 volts to the solenoid S terminal and the starter cranks normally. What has this bypass test confirmed?

A. The solenoid pull-in winding is intermittently faulty

B. The batteries have adequate voltage but cannot deliver cranking current through the normal control path

C. The starter relay has failed and is the only possible cause

D. The solenoid, starter motor, batteries, and main cables are all functional — the fault is in the starter control circuit between the ignition switch and the solenoid S terminal

30. A truck's scan tool shows the ECM receiving a throttle position signal that reads 4.8 volts at all pedal positions. The reference voltage at the sensor connector is 5.0 volts. The ground terminal reads 0.02 volts. What does the fixed 4.8-volt signal indicate?

A. An open in the sensor's ground circuit that prevents current from flowing through the variable resistance element, causing the signal wire to float to near-reference voltage regardless of pedal position

B. A throttle position sensor stuck at the full-throttle position

C. A short-to-power on the signal wire holding it at 4.8 volts

D. The reference voltage overpowering the sensor's signal output

31. A commercial vehicle's left rear combination light housing has two separate ground paths — one for tail/marker and one for brake/turn. The tail/marker lights work at full brightness. The brake/turn filament does not illuminate despite 12.2 volts at the power terminal and a confirmed good bulb. What is the fault?

A. A multifunction switch that does not pass brake signal voltage to the left rear circuit

B. A body controller module output fault limiting current to the left brake/turn channel

C. The dedicated brake/turn ground path is open or has near-total resistance, preventing current from completing the circuit through the brake/turn filament despite adequate power-side voltage

D. A faulty brake light switch that only sends voltage to the right side

32. A heavy-duty truck's batteries are being tested with an electronic conductance tester. The tester reports: Battery 1 — "GOOD, 95%." Battery 2 — "GOOD, 91%." Battery 3 — "CHARGE AND RETEST." Battery 4 — "REPLACE, 42%." What action should the technician take?

A. Charge Battery 3 to full state of charge and retest it, replace Battery 4 which has clearly failed at 42% of rated CCA, and evaluate whether all four should be replaced as a matched set

B. Replace only Battery 4 and return the others to service

C. Replace Batteries 3 and 4 since both show abnormal results

D. Slow-charge all four batteries and retest the entire bank before making any replacement decisions

33. A truck's electronic engine brake activates correctly during highway deceleration but produces a noticeable exhaust bark when the driver transitions from braking back to acceleration. The exhaust system has no leaks. What is the most likely cause?

A. A faulty engine brake solenoid that releases too abruptly, creating an exhaust pressure spike

B. An exhaust brake valve leak that allows exhaust gas to escape during the transition

C. Normal turbocharger surge during the transition from engine braking to positive power

D. The exhaust brake butterfly valve sticking momentarily in the closed position during the transition — when positive exhaust flow resumes against the partially closed valve, the sudden rush of exhaust past the releasing valve produces the bark

34. A commercial vehicle's scan tool shows the ECM broadcasting a fuel rail pressure of 28,500 PSI during highway cruise. The specification is 25,000 to 30,000 PSI. The engine runs normally. Is this reading a concern?

A. Yes — 28,500 PSI is near the upper specification limit and indicates a developing pressure control fault

B. Yes — the pressure should remain at exactly the middle of the specification range during steady-state operation

C. No — 28,500 PSI falls within the specified 25,000 to 30,000 PSI range and confirms the high-pressure fuel system is operating correctly under the current load and speed conditions

D. No — but only if the fuel temperature is also within specification

35. A truck's left headlight dims when the left turn signal is activated and returns to full brightness between flashes. The right headlight is unaffected. What is the most likely cause?

A. A multifunction switch with an internal crossover between the left headlight and turn signal circuits

B. A high-resistance shared ground connection on the left side that causes current interaction — the turn signal's pulsing current through the shared ground creates voltage drop that reduces the headlight's effective voltage during each flash

C. A body controller module that reduces headlight output during turn signal activation as a designed feature

D. A failing left headlight bulb with a thin filament that is more sensitive to voltage variation

36. A heavy-duty truck's starter cranks the engine at varying speed — fast for three revolutions, then slow for one, repeating in a pattern. Batteries and cables test good. What is the most likely cause?

A. A starter motor with an intermittent brush-to-commutator fault that loses contact every fourth revolution

B. An alternator engaging its field during cranking, periodically adding load to the engine

C. A weak battery cell that cannot sustain voltage during the high-compression events of certain cylinders

D. An engine with one cylinder significantly lower in compression than the others — the starter cranks faster through the low-compression cylinder and slower through the normal-compression cylinders, producing the rhythmic speed variation

37. A commercial vehicle's windshield wiper system works on all speeds but does not park when turned off. The blades stop at random positions in the wipe arc. What is the most likely cause?

A. A failed wiper motor park switch or open park switch circuit that does not maintain the motor running signal needed to complete travel to the park position after the main switch is turned off

B. A worn wiper motor gear that cannot complete the final park stroke

C. A binding wiper linkage that prevents the arms from reaching the park position

D. A faulty wiper switch that does not transition to the park mode correctly

38. A truck's scan tool shows the ABS module receiving valid wheel speed data from all four corners. The ABS warning light is off. During a panic stop on dry pavement, the driver reports the left front wheel locks up briefly before the ABS intervenes. All other wheels modulate correctly. What is the most likely cause?

A. A contaminated left front brake pad that generates more initial friction than the other corners

B. A slow-responding ABS modulator valve on the left front channel that cannot reduce brake pressure quickly enough to prevent the momentary lockup before it catches up and begins modulating

C. Normal ABS behavior where the system requires a brief initial lockup to detect the condition before intervening

D. A worn left front tire with less traction than the other three corners

39. A heavy-duty truck's four batteries are tested individually. All four read 12.6 volts at rest. Load test results: Battery 1: 9.8V, Battery 2: 9.7V, Battery 3: 9.1V, Battery 4: 9.6V. All tests at 70°F. What action should be taken?

A. Replace only Battery 3 since it is the only one clearly below the 9.6-volt threshold

B. Recharge Battery 3 and retest since its resting voltage was adequate at 12.6 volts

C. Return all four to service and retest in 30 days

D. Replace Battery 3 which has failed at 9.1 volts, note that Battery 4 at 9.6 volts is at the absolute minimum threshold, and strongly consider replacing all four as a matched set to ensure balanced bank performance

40. A truck driver reports that the power outlet in the sleeper cab works intermittently. The technician discovers the outlet functions only with the ignition on and goes dead with the ignition off. The driver expects continuous availability. What should the technician determine?

A. Whether the body controller module has disabled the sleeper outlet during key-off to conserve battery

B. Whether the outlet is designed for ignition-off operation on this model but has a blown always-hot fuse

C. Whether this is the factory design for this vehicle or whether a previous repair connected the outlet to a switched ignition feed instead of a constant battery feed — checking the wiring diagram determines if the behavior is by design or an installation error

D. Whether the low voltage disconnect system is cutting power during key-off periods

41. A commercial vehicle's scan tool retrieves a DTC from the body controller module: "Right Front Clearance Light — Short to Battery." The light stays on at full brightness at all times, even with the headlight switch off. What does "short to battery" mean?

A. The BCM output driver has failed in the permanently on state

B. The right front clearance light wire has contacted a constant battery voltage source in the harness — providing power to the bulb independently of the BCM output or headlight switch, keeping it illuminated continuously regardless of any switch or module command

C. The clearance light fuse has been bypassed with a direct battery connection

D. The headlight switch has an internal fault feeding constant power to the clearance circuit

42. A heavy-duty truck's alternator belt tensioner arm visibly oscillates — bouncing approximately twice per second at idle. The belt is new and the alternator charges normally. What does the visible oscillation indicate?

A. The tensioner's internal dampener mechanism has failed or the spring has weakened, allowing the arm to bounce instead of holding steady tension — a healthy tensioner absorbs belt vibration without visible movement

B. Normal tensioner behavior caused by engine firing pulses creating torsional vibration in the drive system

C. The belt is the wrong width for the pulleys, causing it to ride up and down in the groove

D. The alternator's internal bearing is producing a periodic resistance that makes the tensioner pulse

43. A truck's electronic instrument cluster displays "CHECK ELECTRICAL SYSTEM." The battery voltage reads 12.2 volts with the engine running at 2,000 RPM. The alternator belt is intact and the pulley spins. What should the technician check first?

A. The battery bank for a deeply discharged condition pulling the voltage below the charging threshold

B. The engine speed sensor to verify adequate RPM is being delivered to the alternator

C. The instrument cluster for a false warning triggered by a calibration error

D. The alternator field circuit — the field connector, sense wire, and voltage regulator — since the alternator is spinning mechanically but producing no output above battery rest voltage

44. A commercial vehicle's right rear backup light does not illuminate when the transmission is in reverse. The left backup light works. The fuse is good. The technician measures 12.1 volts at the left backup socket and 0 volts at the right backup socket with reverse selected. What is the most likely cause?

A. A faulty reverse switch that only powers the left-side circuit

B. A failed right backup bulb with an invisible broken filament

C. An open in the wire between the backup circuit branch point and the right rear socket — power reaches the left side but a broken wire, disconnected connector, or corroded splice in the right-side path prevents voltage from reaching the right socket

D. A body controller module that has disabled the right backup output

45. Technician A says that a truck's charging system should be tested under maximum electrical load to verify the alternator can produce its full rated output. Technician B says that a no-load voltage test at 2,000 RPM confirms the alternator is functioning correctly and no further testing is needed. Who is correct?

A. Technician A only — a no-load voltage test confirms the alternator produces voltage but does not verify it can sustain voltage while delivering its rated amperage, which requires a full-load output test

B. Technician B only

C. Both Technician A and Technician B

D. Neither Technician A nor Technician B

46. A truck's left side identification lights — the three red lights on the upper left cab corner — are all inoperative. All other left-side lights work normally. The fuse is good. What does the ID lights failing independently while everything else works indicate?

A. A body controller module output driver failure on the left ID light channel

B. A headlight switch internal fault disconnecting the ID light output

C. A voltage drop on the left-side main power feed that affects only the lowest-current circuits

D. An open in the dedicated wire, connector, or splice that feeds the three left-side ID lights after the point where that circuit branches from the shared left-side lighting distribution

47. A heavy-duty truck's battery disconnect switch has been cycled nightly for two years. The driver reports increasingly slow cranking on morning starts. Battery tests show adequate capacity. Cable voltage drops are within specification during cranking. What should the technician investigate?

A. The alternator for a developing output fault that leaves the batteries progressively less charged

B. The battery disconnect switch itself for contact resistance that has increased from two years of nightly cycling — the switch carries hundreds of cranking amps, and progressive contact deterioration from repeated engagement and disengagement introduces resistance that reduces voltage to the starter

C. The starter motor for developing internal wear after two years of service

D. The engine oil viscosity for a change that increases cranking resistance

48. A commercial vehicle's scan tool shows the ECM commanding an intake air heater relay on during cold startup. The relay clicks. The relay output terminal reads 12.1 volts. The air heater does not warm. What is the most likely cause?

A. The relay contacts have excessive resistance limiting current to the heater element

B. The ECM is commanding the relay for too short a duration to produce detectable heat

C. The intake air heater element has failed open — the relay circuit functions correctly from the BCM through the relay contacts to the output terminal, but the heater element's internal conductor has broken and cannot conduct current

D. The intake air temperature is already above the heater activation threshold

49. A truck's power window motor runs but produces a grinding noise during operation. The window moves but slowly. What is the most likely cause?

A. Worn or damaged gears in the window regulator mechanism that skip or mesh improperly, producing the grinding noise while reducing the effective transfer of motor rotation to window movement

B. A failing motor with worn bushings allowing the armature to contact the field poles

C. A corroded window channel creating excessive friction against the glass

D. A body controller module reducing motor speed and producing the noise through pulse-width modulation

50. A fleet of trucks experiences a pattern where the nine-pin diagnostic connector pins corrode, causing intermittent ELD communication faults. The connectors are located near the cab floor. What long-term solution should the fleet technician implement?

A. Apply dielectric grease to the connector pins monthly as a preventive maintenance item

B. Replace the nine-pin connectors with sealed waterproof aftermarket units

C. Install wireless Bluetooth ELD devices that do not require physical connector contact

D. Relocate the diagnostic connectors to a higher, more protected position inside the cab and install protective dust caps when ELD devices are not plugged in, addressing the root cause of floor-level moisture and contamination exposure

PRACTICE EXAM 20: ANSWER KEY

1. B — Breaking down the total 0.9-volt positive-side drop into its individual components reveals the battery post-to-clamp connection at 0.6 volts is the dominant source. This single connection alone exceeds the 0.5-volt maximum specification for the entire positive cable. The cable at 0.1 volts and the solenoid terminal at 0.2 volts are within acceptable limits — cleaning or replacing the post-to-clamp connection resolves the primary fault.

2. D — The electrical circuit is fully verified: 12.2 volts at the power terminal, 0.03 volts at the ground (near-perfect), and the solenoid resistance within specification. Current should be flowing through the solenoid and energizing it. Since the electrical path is proven complete and the solenoid should be activating, the fault is mechanical — the air clutch engagement mechanism, air supply to the clutch, or the mechanical linkage has failed.

3. C — Both bulbs are identical and were installed simultaneously, eliminating bulb differences. The left headlight producing a proper focused beam proves the technology is capable. The right headlight scattering light without a defined cutoff indicates its internal reflector surface has degraded — moisture intrusion, oxidation, or chemical contamination has destroyed the precise mirrored geometry needed to focus light into a controlled beam pattern.

4. A — Both technicians describe valid steps in a complete relay bench test. Technician A correctly states that applying 12 volts to the coil should produce an audible click as the electromagnetic field pulls the contact arm from its rest position. Technician B correctly identifies the follow-up test — measuring near-zero resistance across the normally open terminals with the coil energized confirms the contacts have physically closed and are making solid connection.

5. D — The engine running normally proves the ECM and other modules are communicating on the bus. A "NO DATA" display with all gauges at zero while other systems function isolates the fault to the cluster's connection to the bus. A localized fault at the cluster's bus stub wire, connector, or internal bus receiver prevents it from receiving any broadcast data, while the backbone continues serving all other modules normally.

6. B — The bank load test showed 9.9 volts — apparently passing — because the three healthy batteries compensated for the weak fourth unit during the combined test. Individual testing exposed Battery 4 at 8.5 volts — well below the 9.6-volt minimum. This demonstrates exactly why individual battery testing is essential in parallel banks — a weak battery hides behind its stronger partners during a bank-level test.

7. A — The wiper motor and washer pump sharing power feed wires in the same harness section creates the opportunity for a short between them. A chafed wire where both conductors' insulation has worn through bridges the two circuits, causing both to energize whenever the wiper switch delivers power.

The wipers operating correctly on all speeds confirms the wiper circuit itself is functional — the washer pump is simply receiving power from the wiper feed through the unintended connection.

8. C — The ECM uses barometric pressure to calculate air density for fuel delivery calculations. A sensor reading 87 kPa when actual sea-level pressure is 101 kPa tells the ECM the air is thinner (higher altitude) than it actually is. The ECM compensates by adding fuel to maintain the perceived air-fuel ratio, resulting in a rich-running condition with increased fuel consumption and potentially excessive exhaust smoke.

9. D — All cables and connections pass voltage drop testing, eliminating the delivery path. The rebuilt starter drawing 250 amps against a 200-amp specification indicates the motor is consuming more energy than designed to overcome internal mechanical resistance. New bushings that are slightly too tight create friction drag on the armature, forcing the motor to draw additional current to spin against the resistance until the bushings wear in.

10. B — Voltage of 12.1 volts at the power terminal confirms adequate power delivery. The ground terminal voltage drop of 2.4 volts between the socket ground and battery negative far exceeds the 0.3-volt maximum specification. This excessive ground-side resistance consumes 2.4 volts that should be available to the bulb, leaving only approximately 9.7 volts across the filament and reducing brightness to approximately half.

11. A — The blower running at maximum speed regardless of switch position means the motor receives full, unresisted battery voltage on every setting. The blower motor resistor block has shorted internally — collapsing all resistance elements into a direct connection — or the wiring has a short that feeds power directly to the motor bypassing the resistor block entirely. Either condition delivers full voltage to the motor regardless of which speed the switch selects.

12. C — Every parameter falls within specification. Voltage at 14.2 is within 13.5 to 14.5 volts. Output at 150 amps is 94% of the 160-amp rating — well above the 80% minimum. AC ripple at 0.3 volts is below the 0.5-volt maximum. Output-side voltage drop at 0.3 volts is below the 0.5-volt maximum. Ground-side voltage drop at 0.2 volts is below the 0.3-volt maximum. The charging system is healthy on all parameters.

13. B — The motor drawing identical current in both directions eliminates electrical faults. The window moving slowly upward but normally downward indicates directional mechanical resistance. Upward travel requires the motor to simultaneously lift the glass weight against gravity and overcome friction from a binding channel, deteriorated weatherstrip, or worn regulator mechanism. Downward travel benefits from gravity assistance, reducing the net resistance.

14. D — A "System Configuration Error" after a module replacement indicates the new module does not have the vehicle-specific parameters it needs to operate. The ABS module must know the axle configuration, tire size, sensor type, and modulator valve assignments to correctly interpret wheel speed data and manage brake pressure. Without this programming, the module defaults to a fault state and cannot function.

15. A — The auto-lock-at-speed feature is typically a configurable parameter in the BCM's software. The door locks working correctly from the fob and switch proves all hardware is functional. The feature may have been disabled on this specific truck during a previous BCM service event, software update, or module replacement that reset the configuration to defaults. Checking and enabling the parameter restores the feature.

16. C — The alternator producing 13.5 volts at idle is at the very bottom of the acceptable 13.5 to 14.5 volt range. At this marginal output level, the minor voltage fluctuations inherent in the alternator's output modulate the headlight filament brightness enough to be visible. Above 1,200 RPM, the higher alternator speed produces more voltage, comfortably sustaining the headlights without visible flicker.

17. B — The ECM broadcasts 195°F and the infrared thermometer confirms 195°F, proving the actual temperature. The cluster displaying 170°F despite receiving 195°F from the bus isolates the fault to the cluster's internal processing of the temperature parameter. The temperature gauge stepper motor or the cluster's software mapping between the received bus value and the needle position has approximately a 25°F offset error.

18. D — The trailer ABS module having no active DTCs and the tractor ABS showing no faults eliminate both modules as causes. The intermittent nature of the warning light during driving points to a physical connection fault that is exacerbated by driving conditions. The blue wire circuit — through the J560 connector, trailer cord, and tractor-side wiring — is the most likely location for an intermittent connection that briefly drops power or signal during vehicle movement.

19. A — Both technicians describe essential elements of a proper parasitic draw test. Technician A correctly states the procedure: connect the DMM in series and wait for all modules to enter sleep mode. Technician B correctly identifies that opening a door wakes multiple modules that draw active current, invalidating the reading. The technician must wait the full 20 to 45 minutes for all modules to complete shutdown after any door event.

20. C — Battery terminal voltage of 14.1 volts confirms the alternator produces adequate output at the battery. All three modules reporting low voltage simultaneously means the voltage reaching the fuse panel where they receive power has dropped below their minimum thresholds. Excessive resistance in the main power distribution path between the battery and the fuse panel drops voltage below each module's operating requirement.

21. D — The hazard flashers illuminating all four corners proves the right-side bulbs, sockets, wiring, and ground connections are functional. The hazard circuit bypasses the multifunction switch and brake switch path, powering both sides through the hazard flasher directly. The fault is in the normal-operation power path — the multifunction switch's right turn output contact or the dedicated wiring between the switch and the right-side lights.

22. B — Grounding the sending unit wire simulates a full-tank reading (zero resistance) and the gauge responds by reading full. This confirms two things: the gauge mechanism correctly interprets resistance changes, and the wire between the cluster and the tank has continuity. Both the gauge and

wiring are proven functional. The only remaining component in the circuit — the fuel level sending unit — is the source of the incorrect reading.

23. A — Even with the ignition off and all switches off, multiple electronic modules draw standby current for memory, clocks, security monitoring, and keep-alive functions. When the negative cable approaches the post, these modules' combined standby current demand creates an immediate potential difference that produces a small spark as the gap closes. This is normal behavior and does not indicate a vehicle wiring fault.

24. C — The wiper motor draws significant current when activated — particularly on high speed. This sudden current demand creates a momentary voltage drop across the vehicle's power distribution system. If the cruise control module's supply voltage drops below its minimum operating threshold during this transient, the module resets and disengages cruise. The consistent correlation between wiper activation and cruise disengage confirms the voltage interaction.

25. D — LED assemblies draw 60 to 80% less current than the incandescent bulbs the BCM was calibrated to detect. The dramatically lower current falls below the BCM's minimum detection threshold for each output, causing the module to interpret each LED-equipped circuit as open. Load resistors connected in parallel with each LED increase the total current draw above the detection threshold, restoring normal BCM monitoring.

26. A — The voltage difference between the alternator B+ terminal (14.3V) and the battery positive terminal (13.7V) is 0.6 volts. This drop exceeds the 0.5-volt maximum specification for the output side. The ground side at 0.1 volts is fine. The excessive resistance is in the output cable or its connections between the alternator and battery, reducing the effective charging voltage reaching the batteries by 0.6 volts.

27. B — An intermittent signal dropout causing harsh shifts that recover after one to two seconds is characteristic of a physical connection fault under dynamic operating conditions. A loose connector pin, a cracked wire, or a sensor with a heat-sensitive internal defect intermittently loses signal under vibration or temperature changes. The TCM loses turbine speed data, defaults to a protective harsh shift, then resumes normal operation when continuity restores.

28. C — Disconnecting the BCM connector and the dome light turning off proves the light receives its power through the BCM's output circuit. The BCM is the source of the continuous activation — either its internal output driver transistor has failed in the permanently on state, or it is correctly responding to an input signal (such as a stuck door jamb switch) that commands the light to stay on. Further diagnosis of the BCM's input signals determines the root cause.

29. D — Jumping 12 volts to the solenoid S terminal bypasses the entire control circuit — ignition switch, safety switches, relay, and all control wiring. The starter cranking normally proves every component from the solenoid forward is functional: the solenoid engages, the motor spins, the batteries deliver cranking amps, and the cables carry the current. The fault is confirmed to be in the control circuit upstream of the S terminal.

30. A — The reference voltage reads 5.0 volts and the ground reads 0.02 volts — both are within specification. The signal wire reading a fixed 4.8 volts at all pedal positions indicates no current is flowing through the sensor's variable resistance element. An open ground circuit prevents the current path from completing, and the signal wire floats to near-reference voltage through the ECM's internal pull-up. The signal cannot change because no current flows.

31. C — The tail/marker working at full brightness through its own separate ground proves power delivery to the housing is adequate. Voltage of 12.2 volts is present at the brake/turn power terminal, and the bulb is confirmed good. With power and a good bulb, the only remaining element is the dedicated brake/turn ground path. An open or near-total resistance in this separate ground wire prevents current from completing the circuit through the brake/turn filament.

32. A — Battery 4 at 42% CCA has clearly failed and must be replaced. Battery 3's "CHARGE AND RETEST" message means its state of charge is too low for an accurate capacity reading — it must be charged and retested before condemnation. After determining Battery 3's actual condition, the technician should evaluate whether replacing all four as a matched set is appropriate to prevent the bank imbalance caused by mixing new and aging units.

33. D — The engine brake uses an exhaust butterfly valve that closes during deceleration to create backpressure. When the driver accelerates and the brake disengages, the valve should open fully. If the valve sticks momentarily in the closed position during the transition, the engine's positive exhaust flow surges against the restriction and the sudden rush of exhaust past the releasing valve produces the audible bark before the valve fully opens.

34. C — Fuel rail pressure of 28,500 PSI falls within the specified 25,000 to 30,000 PSI range for highway cruise conditions. The ECM commands fuel pressure based on engine load, speed, and operating conditions. The engine running normally with no driveability concerns confirms the high-pressure fuel system is delivering the correct pressure for the current demand. No action is needed.

35. B — The left headlight dimming in sync with the left turn signal and only on the left side is the classic symptom of a high-resistance shared ground. When the turn signal pulses current through the shared ground, the voltage drop across the resistance reduces the effective voltage available to the headlight. Each flash increases the ground-side voltage drop, dimming the headlight. Each off-cycle releases the ground, restoring full brightness.

36. D — The starter cranking faster through certain engine positions and slower through others in a repeating pattern indicates the engine presents varying resistance to the starter during rotation. An engine with one cylinder significantly lower in compression requires less torque for the starter to push through, causing faster cranking during that cylinder's compression stroke. The normal cylinders require full compression effort, producing the slower cranking portions of the pattern.

37. A — The wiper motor park switch maintains the motor circuit after the main switch is turned off, allowing the motor to continue running until the arms reach the park position. When the main switch opens, the park switch sustains power until the park cam reaches the off position. A failed park switch

or an open in its circuit breaks this sustaining path immediately, stopping the motor at whatever random position the blades occupy.

38. B — The ABS module receiving valid wheel speed data and having no warning light confirms the detection system is functional. One wheel locking briefly before ABS intervention while the other three modulate correctly indicates a delayed pressure-release response on that specific channel. A slow-responding modulator valve on the left front cannot reduce brake pressure quickly enough to prevent the initial lockup, though it eventually activates.

39. D — Battery 3 at 9.1 volts has clearly failed the load test — well below the 9.6-volt minimum at 70°F. Battery 4 at exactly 9.6 volts sits at the absolute threshold — technically passing but with zero margin. Replacing only Battery 3 creates a bank with one new unit paired with three aging batteries, including one at the minimum threshold. Replacing all four as a matched set ensures balanced performance.

40. C — The outlet working with the ignition on but dying when the ignition is off means it is connected to a switched power source. The technician must determine whether this is the factory design for this specific vehicle model or the result of a previous repair that connected the outlet to a switched feed instead of a constant battery source. Checking the wiring diagram provides the definitive answer.

41. B — "Short to battery" means the clearance light wire has contacted a constant battery voltage source somewhere in the harness. This provides power to the bulb independently of the BCM output and the headlight switch. The light stays on at all times because it receives continuous battery voltage through the damaged insulation contact point, completely bypassing the normal control circuit.

42. A — Normal tensioner behavior involves minor vibration absorbed internally by the dampener mechanism — the arm should appear steady to the naked eye even though it processes belt vibration continuously. Visible oscillation of the arm indicates the internal dampener has failed or the spring has weakened, allowing the arm to bounce in response to engine firing pulses rather than smoothly absorbing that energy.

43. D — Battery voltage of 12.2 volts with the engine running at 2,000 RPM is essentially resting battery voltage — the alternator contributes nothing. The belt is intact and the pulley spins, confirming mechanical drive. The alternator's field circuit — field connector, sense wire, brushes, and voltage regulator — is not providing the field current needed for the rotor to generate a magnetic field and produce output.

44. C — The left backup socket reading 12.1 volts with reverse selected proves the reverse switch, fuse, and common wiring to the branch point are functional. Zero volts at the right socket means power reaches the left side but cannot travel to the right. An open in the dedicated right-side wire — a broken conductor, a disconnected connector, or a corroded splice — prevents voltage from reaching the right backup socket.

45. A — Technician A is correct. A no-load voltage test confirms the alternator produces voltage — but it does not verify the alternator can sustain that voltage while simultaneously delivering its full rated amperage under the maximum electrical demands the vehicle will encounter. An alternator with a failing stator phase may produce correct no-load voltage but collapse under heavy demand. A full-load output test is required.

46. D — All other left-side lights working eliminates the headlight switch, main fuse, and common power distribution. The three left ID lights failing together while everything else works isolates the fault to the dedicated circuit branch feeding those three lights. An open in the wire, connector, or splice after the point where the ID light circuit branches from the shared distribution prevents power from reaching the ID lights.

47. B — Battery tests show adequate capacity and cable voltage drops are within specification, eliminating those as causes. The battery disconnect switch is cycled nightly — approximately 730 times over two years. Each engagement and disengagement of the switch contacts creates a small arc that progressively pits and corrodes the contact surfaces. This accumulated contact deterioration introduces increasing resistance that reduces voltage to the starter during cranking.

48. C — The relay clicking confirms the coil energizes. The relay output reading 12.1 volts confirms the contacts close and deliver power. Every component from the ECM command through the relay contacts to the output terminal is proven functional. Voltage is delivered to the heater element's power terminal, but the element does not warm. The heating element has failed open — its internal conductor has broken and cannot conduct current to generate heat.

49. A — The motor running confirms adequate electrical power. A grinding noise with slower-than-normal window movement indicates a mechanical fault in the drive mechanism. Worn, damaged, or stripped teeth in the window regulator's gear mechanism skip or mesh improperly during each revolution, producing the grinding noise and reducing the effective transfer of motor rotation to window movement.

50. D — Relocating the diagnostic connectors to a higher, protected position inside the cab addresses the root cause — floor-level moisture and contamination exposure. Installing protective dust caps prevents debris from accumulating on the pins when ELD devices are not connected. This two-part solution eliminates the environmental exposure that causes the recurring corrosion while maintaining the standard connector interface required for regulatory compliance.