PRACTICE EXAM 10: ASE T6 SIMULATION

1. A technician is diagnosing a truck with an inoperative right rear marker light. The technician measures 12.3 volts at the marker light socket power terminal with the lights activated. The technician then measures between the socket ground terminal and a known good chassis ground and reads 12.1 volts. What does this test reveal?

A. The socket power feed is functioning normally and the bulb has burned out

B. The power side has excessive voltage drop requiring repair of the feed wire connections

C. The charging system is undercharging, causing low voltage at the marker light location

D. The ground path at the marker light socket is open or has near-total resistance, preventing current flow through the bulb

2. A commercial vehicle's scan tool retrieves DTCs from three separate modules — the ECM, the TCM, and the ABS module — all indicating "Reference Voltage 1 Circuit Low." All three modules share the same 5-volt reference voltage supply from the ECM to their sensors. What single fault could cause all three codes?

A. A short-to-ground on the shared 5-volt reference circuit, pulling the reference voltage below the normal operating range for all sensors connected to that supply

B. Three simultaneous sensor failures each loading down its own reference voltage circuit

C. A failing ECM internal processor that miscalculates the reference voltage for each outgoing supply

D. A CAN bus communication fault that is corrupting the reference voltage data in transit between modules

3. A fleet technician observes that a truck's battery cables have been repaired with household-grade wire nuts instead of proper crimp terminals and heat shrink. The circuit currently functions. Why should this repair be replaced with a proper crimp and heat shrink connection?

A. Wire nuts cannot carry the amperage of a battery cable circuit and will overheat under high-current loads

B. Wire nuts add approximately 2 volts of drop per connection, exceeding the circuit's total voltage budget

C. Wire nuts provide an unreliable connection in a high-vibration environment, are not sealed against moisture, and are not rated for the high current that battery cables carry

D. Wire nuts are only rated for AC circuits and do not function correctly on DC automotive circuits

4. A heavy-duty truck's starter cranks the engine at varying speeds — fast for two seconds, then slow for one second, then fast again in a repeating pattern. Batteries are fully charged and cable connections are clean and tight. What is the most likely cause?

A. An alternator that intermittently engages its field winding during cranking, adding and removing load from the engine

B. A flywheel ring gear with an uneven wear pattern — sections with normal tooth height alternate with sections of worn-down teeth, causing varying engagement resistance

C. An engine with one cylinder that has significantly lower compression than the others

D. A loose engine ground strap that makes intermittent contact during the vibration of cranking

5. Technician A says that a truck's headlight circuit uses a relay so that the relatively small headlight switch does not have to carry the full headlight current. Technician B says that without a relay, the full headlight current would flow through the dash switch, the steering column wiring, and the multifunction switch contacts, causing overheating and premature switch failure. 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

6. A truck's HVAC blower motor was recently replaced. The new motor operates on all speed settings, but the technician notices the blower motor resistor block is extremely hot to the touch after 10 minutes of low-speed operation. Is this normal?

A. Yes — resistor blocks always run extremely hot because they dissipate the voltage drop as heat

B. No — the replacement motor has a higher current draw than the original, causing the resistor to overheat

C. No — while resistor blocks generate heat during normal operation, they are designed to be cooled by HVAC airflow and should not be dangerously hot to the touch if airflow is adequate

D. Yes — the resistor block reaches thermal equilibrium after approximately 30 minutes and then cools down

7. A commercial vehicle's scan tool retrieves a stored DTC from the ECM indicating an intermittent open circuit on the intake air temperature sensor. The sensor currently reads a valid temperature. The technician clears the code, and it does not return during a stationary test. What is the recommended next step?

A. Replace the intake air temperature sensor as a preventive measure since the code indicates impending failure

B. Replace the ECM because it is storing false intermittent codes

C. Disregard the code since it cleared and has not returned during the stationary test

D. Inspect the sensor connector, pins, and wiring for signs of corrosion, looseness, or damage that could cause an intermittent open under driving conditions such as vibration, heat cycling, or moisture exposure

8. A heavy-duty truck's battery load test is performed at 450 amps for 15 seconds on a battery rated at 900 CCA. The voltage at the end of 15 seconds reads 9.4 volts. The ambient temperature is 70°F. What is the test result?

A. The battery passes because 9.4 volts is above the minimum 9.0-volt threshold at 70°F

B. The battery fails because the voltage dropped below the 9.6-volt minimum threshold at 70°F

C. The test is inconclusive because the load was applied at less than the required 50% of CCA

D. The battery passes because any voltage above 9.0 volts during a load test indicates acceptable capacity

9. A technician discovers a wire splice in a truck's engine harness that was made by twisting two wires together and wrapping them with vinyl electrical tape. The connection has been in service for approximately two years. Why should this splice be replaced even though it currently works?

A. Twisted-and-taped splices deteriorate over time — the tape adhesive breaks down from heat and vibration, moisture infiltrates the exposed conductor, corrosion builds at the contact points, and the twisted connection loosens under vibration, creating a progressive high-resistance fault

B. Twisted-and-taped splices are only acceptable for circuits drawing less than 1 amp

C. Vinyl electrical tape conducts electricity when wet, creating a direct short-to-ground at the splice

D. Twisted-and-taped splices are acceptable repairs for interior circuits but not for engine harness applications

10. A truck's electronic instrument cluster displays the correct engine RPM, but the tachometer needle bounces rapidly between 1,780 and 1,820 RPM while the engine sounds smooth and steady at what appears to be exactly 1,800 RPM. What is the most likely cause?

A. A crankshaft position sensor producing a noisy signal that the ECM broadcasts as fluctuating RPM data

B. An engine misfire that is inaudible but detectable by the crankshaft position sensor's precise timing measurement

C. Normal stepper motor behavior — the small needle oscillation around the target value is within the stepper motor's resolution and is a characteristic of digital gauge displays

D. A data bus message timing conflict that causes the RPM value to fluctuate by a few counts between consecutive broadcast updates

11. A driver reports that the truck's CB radio produces a loud popping noise every time the turn signals flash. The noise occurs in rhythm with the flash rate. All other radio reception is clear. What is the most likely cause?

A. A defective CB antenna that picks up electromagnetic pulses from the turn signal flasher relay

B. The turn signal flasher or relay generating electrical noise on the power supply bus each time it opens and closes, and the noise is coupling into the CB radio through the shared power feed or inadequate radio power supply filtering

C. A faulty CB radio internal filter that has degraded and can no longer suppress normal vehicle electrical noise

D. The turn signal wire routed too close to the CB antenna cable inside the cab headliner

12. A truck has a trailer with LED tail lights that draw 0.5 amps total compared to the previous incandescent lights that drew 4 amps total. Since installing the LED lights, the trailer ABS warning light on the tractor dash illuminates intermittently. What is the most likely connection between the LED upgrade and the ABS warning?

A. The LED lights generate high-frequency electrical noise that interferes with the trailer ABS module's communication signal

B. The LED driver circuits are backfeeding voltage into the ABS power supply through a shared ground

C. The reduced current draw of the LED lights has lowered the voltage on the shared blue wire below the ABS module's minimum operating voltage threshold

D. The LED lights have changed the electrical characteristics of the trailer's ground return circuit, introducing a voltage offset that intermittently affects the ABS module's power supply sensing through the shared J560 connector ground pin

13. A commercial vehicle's power seat adjusts forward and backward, and the seat back reclines and returns, but the seat height does not adjust in either direction. All functions share the same fuse and main power connector. The fuse is good. What does the pattern of working and non-working functions tell the technician?

A. The shared fuse and main connector are proven functional by the working adjustments, isolating the fault to the height motor, its individual switch section, or the dedicated wiring between them

B. The height adjustment motor has a blown internal thermal fuse that protects it independently from the shared circuit fuse

C. The seat control module has disabled the height function due to a stored weight sensor fault code

D. The height adjustment mechanism is mechanically seized, preventing the motor from turning in either direction

14. A technician measures the parasitic draw on a truck at 180 milliamps with all modules confirmed in sleep mode. The specification is 50 milliamps. The technician removes fuses one at a time. Removing the fuse for the trailer ABS relay circuit drops the draw to 48 milliamps. The trailer is disconnected. What is the most likely cause?

A. A faulty trailer ABS relay coil that remains energized even with the trailer disconnected

B. The trailer ABS relay fuse also supplies power to another module that is not entering sleep mode

C. The trailer ABS relay coil is remaining energized through a wiring fault in the tractor's relay control circuit that provides a continuous ground path

D. A shorted trailer cord plug that provides a path to ground for the relay coil circuit at the disconnected trailer connector

15. A heavy-duty truck's alternator has been bench-tested and produces correct output voltage and amperage. After reinstallation, the charging system voltage at the battery reads only 13.1 volts at 2,000 RPM with no loads. What should the technician check?

A. The alternator's internal voltage regulator calibration, which may have shifted during bench testing

B. The drive belt for proper routing and alignment on the alternator pulley

C. The engine coolant temperature sensor, as some charging systems reduce voltage during warm-up

D. The alternator's sense wire connection and field wire connection to verify they are properly reconnected to the correct terminals after reinstallation

16. A truck's electronic instrument cluster intermittently resets — all gauges sweep, the display flashes the startup logo, and then everything returns to normal within three seconds. This occurs randomly while driving. What is the most likely cause?

A. A CAN bus communication dropout that triggers the cluster to re-initialize its data feeds

B. An intermittent power supply or ground connection to the instrument cluster that causes momentary power loss, forcing the module to restart and run its initialization sequence

C. A failing instrument cluster processor that periodically resets due to an overheating thermal protection circuit

D. A software bug in the cluster firmware that causes random restarts under specific data combinations from the bus

17. A technician is diagnosing a truck with a no-crank condition. The batteries are fully charged at 12.65 volts. When the key is turned to start, there is no click from the solenoid. The technician bypasses the starter relay by jumping 12 volts to the solenoid S terminal, and the starter cranks the engine normally. What does this test confirm?

A. The starter motor, solenoid, batteries, and cables are all functional — the fault is in the control circuit upstream of the solenoid, between the ignition switch and the relay

B. The starter relay is the only possible failed component in the control circuit

C. The solenoid pull-in winding requires more current than the control circuit can provide

D. The batteries have adequate voltage but insufficient CCA to energize the solenoid through the normal control path

18. A commercial vehicle's left rear combination light has two filaments — one for the tail light and one for the brake/turn signal. The tail light filament works, but the brake/turn filament does not illuminate. The right side works normally. What is the most likely cause?

A. A faulty brake light switch that only sends power to the right-side brake circuit

B. A failed multifunction switch that has an internal open on the left turn output contact

C. A burned-out brake/turn filament in the left rear bulb, a faulty socket contact for that filament, or an open in the wire feeding the left brake/turn circuit

D. A corroded ground at the left rear light housing affecting only the higher-current brake/turn filament

19. A truck's scan tool shows the body controller module commanding the horn relay on, but the horn does not sound. The technician checks the relay and finds it is not clicking even though the BCM scan tool command shows active. What should the technician check?

A. The horn for an internal fault that prevents it from producing sound even when powered

B. The CAN bus for a communication delay between the scan tool command and the BCM's output execution

C. The horn relay coil resistance to verify the coil is not open circuit

D. The wiring between the BCM output pin and the relay coil terminal, and the relay coil ground circuit, to verify the BCM's electrical command is actually reaching the relay

20. A heavy-duty truck's four batteries are tested individually after a slow-crank complaint. Three batteries test at 12.6 volts with CCA above 90% of rating. The fourth battery tests at 12.6 volts but only 55% of rated CCA. All batteries are two years old from the same installation. What action should be taken?

A. Replace only the weak battery since the other three are healthy and matched

B. Replace all four batteries as a matched set to ensure consistent internal resistance and capacity across the parallel bank

C. Recharge the weak battery and retest since the voltage is adequate but the CCA test may have been inaccurate

D. Return all four batteries to service and retest the entire bank in 30 days to monitor the weak battery's progression

21. A truck's windshield wiper system works on intermittent, low, and high speed, but the delay interval on the intermittent setting does not change when the delay control is adjusted. The wipers operate at a fixed short interval regardless of the control setting. What is the most likely cause?

A. A faulty intermittent wiper control — either the delay rheostat, the wiper module's delay input circuit, or the wiring between them — preventing the variable delay signal from reaching the control module

B. A body controller module software fault that has locked the intermittent delay at a fixed default value

C. A failing wiper motor park switch that overrides the delay setting by sending a premature ready signal

D. A wiper relay with contact bounce that triggers the next wipe cycle before the delay timer expires

22. A commercial vehicle's power outlet in the sleeper cab works intermittently. The technician discovers the outlet functions when the ignition is on but goes dead when the ignition is off. The driver expects it to work at all times. What is the most likely explanation?

A. A wiring fault in the outlet circuit that only allows power to flow when the ignition energizes a relay in the circuit path

B. A body controller module fault that de-energizes the sleeper outlet circuit during key-off operation

C. The sleeper power outlet is wired through a switched circuit that receives power only when the ignition is on — this may be the designed wiring configuration for this vehicle, or a previous technician may have connected it to a switched source instead of a constant power feed

D. The low voltage disconnect system is cutting power to the outlet when the ignition is off to protect battery reserves

23. A technician is testing the resistance of a wire in a trailer lighting harness. The DMM reads 0.8 ohms across a 30-foot wire run. Is this resistance value cause for concern?

A. Yes — any measurable resistance in a wire indicates a developing fault that will eventually become an open circuit

B. No — all conductors have some inherent resistance based on their material, gauge, and length, and 0.8 ohms across a 30-foot run is within the normal range for the typical wire gauge used in trailer lighting

C. Yes — the maximum acceptable resistance for any vehicle wiring circuit is 0.1 ohms regardless of length

D. No — but only if the wire is copper, since aluminum wire would show significantly higher resistance at this length

24. A heavy-duty truck's alternator passes all standard output tests — voltage, amperage, and AC ripple are within specification. However, the truck's batteries are chronically undercharged, and the condition worsens during cold weather. The alternator belt is good and the charging circuit voltage drop is within specification. What should the technician investigate?

A. The battery cable insulation material, as cold temperatures may cause the insulation to contract and pinch the conductor

B. The engine idle speed, as cold-weather idle enrichment may lower idle RPM below the alternator's effective output speed

C. Whether the alternator's rated capacity has been reached at its mounting location due to cold air reducing the alternator's heat tolerance

D. Whether the vehicle's total electrical load — including cold-weather accessories such as heated mirrors, heated windshield, block heater, and high-speed blower — exceeds the alternator's output capacity, leaving insufficient reserve to charge the batteries

25. Technician A says a truck's ground-side voltage drop test on the starter circuit should be performed between the battery negative post and the starter motor housing. Technician B says the maximum acceptable ground-side voltage drop during cranking is 0.3 volts. 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

26. A commercial vehicle's electronic throttle has no response — the engine idles normally but does not respond to pedal input. The scan tool shows the throttle position sensor reading 4.8 volts at all pedal positions. The reference voltage at the sensor connector is 5.0 volts. What does the 4.8-volt signal indicate?

A. A properly functioning sensor at near-full throttle position that the ECM is correctly reading but not acting upon

B. A faulty ECM that has disabled the throttle input circuit and is holding the signal at a default value

C. An open in the sensor's ground circuit, causing the signal voltage to float near the reference voltage because no current can flow through the sensor element to ground

D. A shorted sensor element that has collapsed to near-zero resistance, pulling the signal to reference voltage level

27. A driver complains that the truck's heated windshield works on the passenger side but not on the driver side. The heated windshield uses two separate heating zones with individual power feeds from the same fuse. The fuse is good. What is the most likely cause?

A. A faulty heated windshield controller that has disabled the driver-side zone due to a stored fault code

B. A cracked heating element within the windshield glass on the driver side that cannot be visually detected

C. A body controller module that intentionally staggers the two zones, activating the passenger side first

D. An open in the power feed wire, relay, or connector dedicated to the driver-side heating zone

28. A truck's scan tool retrieves a DTC indicating the engine coolant level sensor circuit is open. The driver has not reported any low-coolant warning, and the coolant level is verified as full. The technician inspects the sensor and discovers the connector is coated in dried coolant residue. What is the most likely explanation?

A. The coolant residue is coincidental and the sensor has failed internally due to age

B. A previous coolant leak contaminated the connector, and the dried residue has corroded the terminal pins, creating the open circuit the ECM detected

C. The sensor is designed to trigger an open-circuit code when coolant contacts the external connector housing as a leak detection feature

D. The dried coolant residue has changed the sensor's resistance characteristics, causing the ECM to misinterpret the signal as an open circuit

29. A heavy-duty truck's starter motor has been rebuilt with new brushes, bushings, and commutator resurfacing. After reinstallation, the starter cranks the engine but draws 280 amps — higher than the 200-amp specification. All connections pass voltage drop testing. What is the most likely cause?

A. The rebuilt starter has one or more new components that are slightly out of specification — the new bushings may be too tight, creating excessive friction, or the new brushes may have incorrect spring tension increasing drag on the commutator

B. The rebuilt starter has reversed field winding polarity causing the motor to work against itself

C. The engine has increased mechanical resistance from a problem unrelated to the starter rebuild

D. The commutator was resurfaced to an incorrect diameter, changing the armature-to-field clearance

30. A commercial vehicle driver reports that the dash voltmeter drops to 11 volts for approximately three seconds every time the engine's air compressor cycles on, then recovers to 14 volts. The truck has a single 130-amp alternator and heavy accessory usage. What does this recurring voltage dip indicate?

A. The starter circuit is energizing briefly each time the air compressor relay engages, creating a phantom cranking current draw

B. The air compressor has a shorted motor winding drawing excessive current that overloads the alternator momentarily

C. The air compressor's engagement creates a sudden mechanical load on the engine that momentarily slows the alternator, combined with the compressor clutch's electrical inrush current, briefly overwhelming the alternator's output capacity before the regulator compensates

D. The battery bank is failing and cannot absorb the voltage fluctuation caused by normal compressor engagement

31. A technician is diagnosing a truck with intermittent headlight failure. The headlights occasionally go out for one to two seconds while driving and then return to normal. The technician cannot reproduce the fault during a stationary test. A wiggle test on all accessible connectors produces no results. What alternative diagnostic approach should the technician use?

A. Replace the headlight relay, headlight switch, and multifunction switch as a set since the intermittent fault cannot be isolated

B. Install a test light in parallel with the headlight circuit and secure it in the driver's line of sight, then road test the vehicle to determine if the power interruption occurs at a specific vehicle speed, road condition, or environmental trigger

C. Disconnect the headlight circuit and measure resistance on every wire segment and connector individually

D. Connect a recording DMM or oscilloscope to the headlight power feed and road test the vehicle, allowing the instrument to capture the voltage dropout event with a timestamp that correlates to road conditions and vehicle operation

32. A truck equipped with a collision mitigation braking system has a radar sensor mounted behind the front bumper. After a minor front-end collision repair, the system sets a "radar misalignment" DTC. The sensor was not physically damaged. What must be done before returning the truck to service?

A. The radar sensor must be recalibrated using the manufacturer's specified aiming procedure after any collision that may have altered the sensor's mounting angle relative to the vehicle's centerline

B. The DTC should be cleared and the system monitored for recurrence during a road test

C. The radar sensor must be replaced since any collision event compromises its internal components

D. The front bumper must be replaced with OEM components since aftermarket bumpers alter the radar beam pattern

33. A commercial vehicle's license plate lights are wired in parallel from the same power feed. The technician measures 12.2 volts at the power feed junction where the circuit splits to each light. At Light A's socket, the reading is 12.1 volts. At Light B's socket, the reading is 9.8 volts. Both grounds test good. What does the voltage difference between the two sockets indicate?

A. Light B has a higher-wattage bulb drawing more current and creating a larger voltage drop

B. The power feed wire is undersized for the combined current draw of both license plate lights

C. The wire or connections between the junction and Light B have excessive resistance, dropping 2.4 volts before reaching the socket

D. Light B's socket has an internal fault that limits voltage delivery to any bulb installed in it

34. A driver reports that the truck's power locks operate normally from the key fob and the driver door switch, but the lock function does not respond to the passenger door switch. The unlock function works from the passenger switch. What is the most likely cause?

A. A faulty lock actuator in the passenger door that only responds to the unlock signal polarity

B. A failed lock contact inside the passenger door switch that does not make connection on the lock side while the unlock contact functions normally

C. A body controller module that has disabled the passenger lock function due to a stored child-lock fault code

D. A reversed polarity wire at the passenger door switch connector that sends an unlock signal when lock is pressed

35. A fleet technician discovers that a truck's aftermarket LED work lights are wired with a relay, but the relay coil circuit has no suppression diode. The LED light relay has been replaced twice in six months. What is the connection between the missing diode and the relay failures?

A. The LED driver circuits generate harmonic current that feeds back through the relay contacts and burns the contact surfaces

B. The LED lights draw high inrush current that welds the relay contacts closed during initial activation

C. Without a suppression diode, the relay coil lacks adequate magnetic force to fully close the contacts, causing arcing

D. Each time the relay de-energizes, the collapsing coil magnetic field generates a reverse voltage spike that arcs across the contacts, progressively burning and eventually welding or opening them

36. A commercial vehicle's scan tool retrieves a DTC from the transmission control module indicating "Vehicle Speed Signal — No Signal." The speedometer reads zero while driving. However, the ABS system is functioning normally and the ABS module reports valid wheel speed data. What does this tell the technician?

A. The transmission's dedicated vehicle speed sensor or its circuit has failed, while the ABS wheel speed sensors — which are separate sensors on separate circuits — continue to function and provide data to the ABS module independently

B. The ABS module is providing the speed signal to the TCM through the data bus, and a bus communication fault is preventing the data from reaching the TCM

C. The speedometer and TCM share a faulty speed sensor while the ABS uses its own independent wheel speed data

D. The TCM and speedometer receive their speed data from the same source as the ABS module, so the ABS data proves the speed signal is valid and the TCM has an internal processing fault

37. A truck's headlight lenses are visibly yellowed and hazy from UV degradation. The headlights appear dim at night despite new bulbs being installed. The voltage at the headlight sockets measures 12.1 volts — within acceptable range. What is the most likely cause of the perceived dim output?

A. The yellowed lenses have increased internal resistance, reducing current flow to the bulbs

B. The new bulbs are an incorrect lower-wattage specification for this headlight housing

C. The degraded, yellowed lens material is absorbing and scattering the light output, reducing the perceived beam intensity despite the bulbs operating at full electrical output

D. The headlight reflector bowls have tarnished behind the yellowed lenses, reducing reflective efficiency

38. A medium/heavy truck's engine starts and runs, but the entire instrument cluster is blank — no gauges, no warning lights, no display. All other electrical systems including headlights, wipers, and blower motor operate normally. What should the technician check first?

A. The CAN bus backbone for a communication fault that prevents the cluster from receiving data

B. The alternator for a voltage fault that has caused the cluster to enter a protective shutdown mode

C. The body controller module for a fault that has disabled the cluster output channel

D. The instrument cluster's dedicated fuse, power supply circuit, and ground connection, since the cluster losing all function while other systems operate normally points to a power supply or ground fault specific to the cluster

39. A commercial vehicle's ABS module sets a code for "left rear wheel speed sensor — signal erratic" only during heavy braking events. Normal driving and light braking produce no codes. What is the most likely cause?

A. A failing ABS control module that cannot process the left rear signal accurately during the rapid deceleration calculations required for heavy braking

B. Excessive wheel bearing play on the left rear that allows the reluctor ring to shift away from the sensor during the forces of heavy braking, producing a momentary signal disruption

C. A partially damaged reluctor ring that only affects the signal when the wheel decelerates rapidly

D. Brake fluid contamination on the left rear sensor face that only interferes with signal generation during high-temperature heavy braking events

40. A truck driver reports a burning smell from behind the instrument panel after using the headlights for approximately two hours during a nighttime drive. No fuses are blown and all lights work normally. What should the technician investigate?

A. The headlight switch or its connector for signs of heat damage from a high-resistance connection that generates heat under the sustained current load of extended headlight operation

B. The instrument cluster backlight LEDs for overheating during prolonged operation

C. The HVAC blower motor resistor for heat generation during concurrent headlight and blower operation

D. The alternator voltage regulator for an overcharging condition that is causing the headlight circuit wiring behind the dash to overheat

41. A technician performs a battery capacitance test on a truck battery. The tester reports "CHARGE AND RETEST." The battery's open circuit voltage is 12.15 volts. What does this message mean?

A. The battery has failed the capacitance test and should be replaced immediately without further testing

B. The tester has detected a defective cell and is recommending replacement disguised as a charge-and-retest message

C. The battery's state of charge is too low for the capacitance tester to produce an accurate result, and the battery must be charged to at least 12.4 volts before the test can provide valid capacity data

D. The capacitance tester is malfunctioning and needs recalibration before further use

42. A commercial vehicle's right turn signal works on the tractor, but when the trailer is connected, activating the right turn signal causes the trailer's right turn signal to remain on steadily instead of flashing. The left trailer turn signal flashes normally. What is the most likely cause?

A. A defective turn signal flasher module that has failed on the right-side output, providing steady voltage instead of pulsed

B. A short between the green (right turn) wire and the brown (tail light) wire in the trailer cord or harness, connecting the pulsed turn signal to the constant tail light feed and holding the right side on

C. A faulty J560 connector with crossed pins between the right turn and tail light circuits

D. A failed trailer-mounted diode that normally isolates the right turn signal from the tail light circuit

43. A technician is diagnosing a truck where the scan tool communicates with all modules except the instrument cluster. The cluster appears to function normally — all gauges read correctly and warning lights operate as expected. What could explain the cluster receiving bus data but not responding to scan tool queries?

A. The cluster's diagnostic communication function may be disabled or faulty while its data-receiving function continues to operate normally — the module can listen to bus broadcasts passively without actively responding to diagnostic requests

B. The scan tool software does not support the cluster protocol on this specific vehicle platform

C. A gateway module is blocking scan tool access to the cluster while allowing normal bus data to pass

D. The cluster requires a separate diagnostic connector that is not linked to the main nine-pin DLC

44. A truck's electric fuel transfer pump runs continuously when the ignition is on, even with the engine off. Normally, the pump should run for a few seconds during key-on to pressurize the system and then shut off until the engine starts. What is the most likely cause?

A. A leaking fuel return line that depressurizes the system and keeps the pump running to maintain pressure

B. A faulty fuel pressure sensor that reports low pressure regardless of actual pressure, keeping the pump energized

C. A stuck-closed fuel filter bypass valve that restricts return flow and prevents the system from reaching shutoff pressure

D. The fuel pump relay contacts are welded closed, keeping the pump circuit energized continuously regardless of the ECM's command

45. A heavy-duty truck's alternator drive belt is new and properly tensioned. The alternator output is 14.2 volts with no loads and 14.0 volts under full load. However, the technician notices a faint chirping noise from the belt area only during rapid engine acceleration. The noise disappears at steady RPM. What is the most likely cause?

A. A failing alternator bearing that generates noise only during the transitional speed changes of acceleration

B. The belt is the correct length but has an incorrect rib profile for the alternator pulley, causing a mismatch during speed transitions

C. A momentary belt slip during rapid acceleration when the alternator's rotational inertia resists the sudden speed increase, causing brief chirping before the belt catches up

D. An alternator decoupler pulley that is functioning but has a worn internal spring, producing noise during the acceleration-related compression of the decoupler mechanism

46. A commercial vehicle's body controller module log shows 47 door-open events in the past 24 hours. The driver reports that only four actual door openings occurred. What is the most likely cause of the phantom events?

A. A CAN bus communication error that is duplicating the door-open message broadcast

B. A faulty door jamb switch with worn or corroded contacts that intermittently closes and opens due to vibration, road conditions, or temperature changes, registering each contact closure as a door-open event

C. A body controller module software bug that multiplies door events by a factor in its logging algorithm

D. Electromagnetic interference from an aftermarket accessory that the BCM interprets as door switch signals

47. Technician A says that a voltage drop of 0.5 volts across a starter solenoid's main contacts during cranking is acceptable. Technician B says that any measurable voltage drop across the solenoid contacts during cranking indicates the contact disc needs replacement. Who is correct?

A. Neither Technician A nor Technician B — the maximum acceptable voltage drop across solenoid contacts during cranking is typically 0.2 volts, so 0.5 volts is excessive, but some measurable drop is normal and does not automatically require replacement

B. Technician A only

C. Technician B only

D. Both Technician A and Technician B

48. A fleet of trucks experiences intermittent gauge fluctuations in the instrument clusters during periods of heavy CB radio transmission from the drivers. The gauges return to normal when the CB is not transmitting. What is the most likely cause?

A. The CB radio antenna is picking up gauge sensor signals and feeding them back through the radio into the power supply

B. The CB radio draws excessive current during transmission, causing a voltage drop that affects the cluster's power supply

C. The CB radio's ground connection is shared with the instrument cluster, and the transmission current creates ground voltage fluctuations

D. The CB radio transmission generates radiofrequency interference that is coupling into the instrument cluster's sensor input wiring or data bus connections, causing the gauge fluctuations

49. A truck's marker lights turn off whenever the headlights are turned on. When the headlight switch is moved back to the parking light position, the markers come back on normally. What is the most likely cause?

A. An incorrectly wired headlight switch that disconnects the marker circuit when the headlight contacts close

B. A body controller module that intentionally disables markers when headlights are active to reduce total current draw

C. A wiring fault — likely a ground issue or miswired switch — where the headlight circuit's activation disrupts or interrupts the marker light circuit's power or ground path

D. An oversized headlight fuse that allows the headlight circuit to draw enough current to starve the marker circuit of voltage

50. A commercial vehicle's electronic parking brake releases normally, but when the driver presses the apply switch, there is a two-second delay before the brake engages. The delay is consistent and repeatable. The brake holds properly once applied. What should the technician investigate?

A. The parking brake air system for a slow exhaust leak that delays the pressure drop needed for spring brake application

B. The parking brake apply solenoid circuit for excessive resistance that delays the solenoid response, or the electronic control module for a programmed delay feature that may be functioning as designed for smooth brake application

C. The data bus for a communication delay between the parking brake switch and the control module

D. The parking brake switch for a worn contact that takes extra time to close the circuit when pressed

PRACTICE EXAM 10: ANSWER KEY

1. D — Measuring 12.3 volts at the power terminal confirms voltage is reaching the socket. Measuring 12.1 volts between the socket ground terminal and a known good chassis ground reveals that the ground path at the socket has near-total resistance — virtually no current is flowing because the ground is open or nearly open. A good ground would read near 0 volts in this test because it would be at the same potential as the chassis ground reference.

2. A — A single short-to-ground on the shared 5-volt reference circuit pulls the reference voltage down for every sensor connected to that supply. Since all three modules — ECM, TCM, and ABS — share this same reference feed, a single ground fault on the common wire simultaneously affects all sensors on all three modules, producing identical "reference voltage low" codes from each module.

3. C — Wire nuts are designed for stationary residential electrical installations and have no place in commercial vehicle applications. They rely on spring tension to maintain contact, which loosens under the constant vibration of a truck. They provide no seal against moisture, road salt, or chemicals. And they are not rated for the hundreds of amps that flow through battery cables during cranking, creating a high-resistance connection and fire hazard.

4. B — Cranking speed that alternates between fast and slow in a regular pattern indicates the starter pinion is encountering varying resistance as it meshes with the flywheel ring gear. Sections of worn-down teeth offer less resistance (fast cranking) while sections with normal tooth height engage properly (slower cranking due to correct mesh). This uneven wear pattern produces a rhythmic speed variation that repeats with each flywheel revolution.

5. A — Both technicians are correct and describe the same principle from different perspectives. A relay allows the headlight switch to control only the small coil current while the relay contacts carry the full headlight current. Without a relay, the full 10 to 15 amps of headlight current would flow through the dash switch, steering column wiring, and multifunction switch — components not designed for that current level, leading to overheating and premature failure.

6. C — Blower motor resistor blocks are specifically mounted in the HVAC airflow path so that the air being pushed by the blower motor passes over the resistors and dissipates their heat. If the resistor block is dangerously hot to touch after 10 minutes, the airflow may be inadequate — a clogged cabin filter, a blocked duct, or the replacement motor producing less airflow than the original could prevent sufficient cooling of the resistors.

7. D — An intermittent code that does not reproduce during a stationary test is likely caused by a physical condition that manifests only under driving conditions. Vibration can loosen a marginally seated connector pin, heat cycling can expand and contract a corroded terminal, and moisture from

road spray can penetrate a damaged wire section. Inspecting the sensor's connector, pins, and wiring for these conditions is the correct diagnostic follow-up.

8. B — The minimum acceptable battery voltage during a load test at 70°F is 9.6 volts. The battery reading 9.4 volts at the end of the 15-second test falls below this threshold, indicating the battery cannot sustain adequate voltage under the specified load. The battery has failed the load test and should be replaced. The load of 450 amps is correct — one-half of the 900 CCA rating.

9. A — Twisted-and-taped splices are unreliable in the high-vibration, high-temperature, moisture-exposed environment of a truck engine compartment. The electrical tape adhesive degrades from heat exposure, losing its grip and unwinding. Moisture infiltrates the exposed conductor, initiating corrosion at the contact point. The twisted connection progressively loosens under vibration, increasing resistance. The splice should be replaced with a proper crimp connection sealed with adhesive-lined heat shrink.

10. C — A stepper motor gauge displays data in discrete digital steps rather than as a continuously variable analog position. A small oscillation of the needle around the target value — bouncing between 1,780 and 1,820 RPM while the actual engine speed is a steady 1,800 — is a normal characteristic of the stepper motor's resolution and the digital rounding of the RPM data. The engine is running smoothly and the display behavior is within normal parameters.

11. B — The turn signal flasher or relay creates an electrical transient on the power bus each time it opens and closes the turn signal circuit. This transient couples into the CB radio's power supply through the shared vehicle electrical system. The radio's internal power supply filter may not fully suppress the noise impulse, allowing it to reach the audio amplifier and produce an audible pop synchronized with each flash cycle.

12. D — The LED lights draw dramatically less current than the incandescent units they replaced. This reduced current changes the voltage relationships in the shared trailer ground circuit. The altered ground-side voltage — even a small offset — can intermittently affect the trailer ABS module's power supply sensing, particularly if the J560 ground pin has marginal resistance that was tolerable at the higher incandescent current but becomes problematic at the lower LED current levels.

13. A — The forward/backward adjustment and seat back recline working correctly prove the shared fuse, main power connector, and common power feed are delivering current to the seat assembly. The height function not working in either direction isolates the fault to the components unique to that function — the height motor, the height section of the multi-function seat switch, or the dedicated wiring between them.

14. C — The trailer is disconnected, so the trailer cord and trailer ABS module cannot be the cause. The fuse for the trailer ABS relay circuit is supplying continuous current through the relay coil to ground. A wiring fault in the tractor's relay control circuit — such as a chafed wire grounding against the frame — provides a constant ground path to the relay coil, keeping it energized and drawing current continuously regardless of whether a trailer is connected.

15. D — The alternator bench-tested correctly, confirming its internal components are functional. Reduced output after reinstallation — 13.1 volts instead of the expected 13.5 to 14.5 volts — with no load suggests the voltage regulator is not receiving the feedback it needs. If the sense wire or field wire was not reconnected to the correct terminal during installation, the regulator cannot properly monitor system voltage or control field current.

16. B — The cluster performing its full initialization sequence — gauge sweep and startup logo — indicates it is going through a complete power-on restart. This confirms the module is losing power momentarily and rebooting. An intermittent power supply or ground connection specific to the cluster causes the brief power dropout. Since all other systems operate normally, the fault is in the cluster's dedicated power or ground circuit, not the vehicle's main electrical system.

17. A — Jumping 12 volts directly to the solenoid S terminal and the starter cranking normally proves the solenoid, starter motor, batteries, and cables are all functional. The fault is proven to be upstream of the solenoid — in the control circuit that normally delivers voltage to the S terminal through the ignition switch, safety switches, and starter relay. One of these components has an open that prevents the control signal from reaching the solenoid.

18. C — The tail light filament in the same housing working proves the socket, ground connection, and power feed up to the bulb are functional for that filament. The right side working normally eliminates the brake switch, multifunction switch, and flasher module as causes. The fault is isolated to the left rear brake/turn filament specifically — it has burned out, the socket contact for that particular filament is corroded, or the dedicated wire feeding that filament has an open.

19. D — The scan tool commanding the output on while the relay does not click means the BCM is internally processing the command but the electrical signal is not reaching the relay coil. The wiring between the BCM output pin and the relay coil terminal, and the relay coil ground return circuit, must be tested for opens or high resistance. If voltage is not present at the relay coil when the BCM commands it on, the fault is in the delivery path between the module and the relay.

20. B — Three healthy batteries and one at only 55% CCA creates a significant imbalance in a parallel bank. The weak battery's lower internal capacity causes uneven current sharing — the healthy batteries compensate by working harder, which accelerates their degradation. Replacing all four as a matched set ensures consistent internal resistance and capacity, maximizing the life of the entire bank and providing reliable starting performance.

21. A — The wipers operating on all modes confirms the wiper motor, relay, and main switch functions are healthy. The intermittent mode functioning at a fixed interval regardless of the delay control position isolates the fault to the variable delay input. The delay rheostat, the wiring between the rheostat and the wiper control module, or the module's delay input circuit has a fault that prevents the variable delay signal from being received and processed.

22. C — The outlet working with the ignition on but dying with it off indicates the outlet is connected to a switched power source rather than a constant battery feed. This may be the factory design for this

vehicle — some manufacturers wire sleeper outlets through switched circuits to prevent parasitic draw. Alternatively, a previous technician may have connected the outlet to a switched source during an earlier repair. Verifying the wiring diagram determines whether this is by design or an installation error.

23. B — All conductors have inherent resistance determined by their material, cross-sectional area, and length. A 30-foot copper wire of typical trailer lighting gauge (14 to 16 AWG) will have measurable resistance — 0.8 ohms across 30 feet is within the expected range. The important consideration is whether this resistance produces an acceptable voltage drop at the circuit's operating current, which is evaluated through a voltage drop test under load.

24. D — The alternator, belt, and charging circuit all test within specification under standard test conditions. Cold-weather operation adds significant electrical loads that are not present during warm-weather testing — heated mirrors, heated windshield, high-speed blower, heated seats, and engine block heater circuits. If the combined cold-weather load exceeds the alternator's output capacity, the batteries receive insufficient charging current and become chronically undercharged.

25. A — Both technicians are correct. The ground-side voltage drop test for the starter circuit is performed between the battery negative post and the starter motor housing, measuring all resistance in the ground return path including the cable, cable connections, engine ground strap, and the starter-to-engine mounting contact. The maximum acceptable reading is 0.3 volts during cranking — any reading above this indicates excessive ground-side resistance.

26. C — A throttle position sensor with an open ground circuit cannot complete the current path through its variable resistance element. With no current flowing, the signal wire floats up toward the reference voltage because the pull-up effect of the reference supply dominates. The 4.8-volt reading — near the 5.0-volt reference — is characteristic of an open ground on a potentiometer-type sensor, and the value does not change with pedal position because no current flows regardless of element position.

27. D — The passenger side heating confirms the fuse, main power supply, and control switch are functional. The two heating zones use individual power feeds from the common fuse. An open in the driver-side dedicated feed — a failed relay for that zone, a broken wire, or a disconnected connector in the driver-side circuit — prevents power from reaching the driver-side heating element while the passenger side operates independently.

28. B — The previous coolant leak deposited residue on the connector that has dried and left corrosive mineral deposits on the terminal pins. Over time, the corrosion built up between the pin and socket contacts, increasing resistance until the connection effectively opened. The ECM detected the open circuit and set the DTC. Cleaning the corroded terminals and applying dielectric grease after reconnection should restore the circuit.

29. A — All cable connections pass voltage drop testing, and the starter was professionally rebuilt — but the current draw exceeds specification by 80 amps. The most likely cause is an issue with the rebuilt components themselves. New bushings that are slightly too tight create friction drag on the armature.

New brush springs with excessive tension increase drag on the commutator. Either condition forces the motor to draw more current to overcome the additional internal resistance.

30. C — The air compressor clutch engagement creates a simultaneous mechanical and electrical demand spike. Mechanically, the compressor adds load to the engine, momentarily reducing RPM and alternator speed. Electrically, the clutch coil's inrush current adds to the system demand. Together, these briefly overwhelm the 130-amp alternator's ability to maintain voltage, especially when heavy accessory loads are already consuming most of the available output. The three-second recovery is the time the regulator needs to increase field current and compensate.

31. D — An intermittent fault that cannot be reproduced during stationary testing or wiggle testing requires a recording instrument that can capture the event during actual driving conditions. A recording DMM or oscilloscope connected to the headlight power feed logs voltage continuously during the road test. When the intermittent dropout occurs, the instrument captures the exact moment, duration, and characteristics of the voltage loss, which can be correlated with road conditions and vehicle operation to identify the failure mechanism.

32. A — Collision mitigation radar sensors require precise angular alignment relative to the vehicle's direction of travel. Even a minor front-end collision that does not visibly damage the sensor can shift the bumper, mounting bracket, or sensor position by a fraction of a degree — enough to misalign the radar beam. The manufacturer's specified calibration procedure uses targets at precise distances to verify and correct the sensor's aim before the system can be trusted for safety-critical braking decisions.

33. C — Both lights are fed from the same junction at 12.2 volts. Light A receives 12.1 volts — only 0.1 volts of drop, which is acceptable. Light B receives only 9.8 volts — a 2.4-volt drop in the wire between the junction and the socket. Since both grounds test good, the 2.4-volt loss is occurring in the power-side wire or its connections specific to Light B. A corroded splice, a damaged wire section, or a loose connector in Light B's dedicated feed is the source.

34. B — The key fob and driver door switch operating all locks correctly proves the fuse, power feed, BCM, and all actuators are functional. The passenger switch's unlock function working proves the switch connector and wiring are intact. The lock function failing from the passenger switch only isolates the fault to the lock-direction contact inside the switch — it has failed while the unlock contact continues to function normally.

35. D — Without a suppression diode across the relay coil, each de-energization produces a reverse voltage spike from the collapsing magnetic field. This spike — which can reach 50 to 200 volts momentarily — arcs across the relay contacts as they separate, eroding the contact surfaces with each cycle. Over thousands of on-off cycles across six months, the progressive erosion eventually causes the contacts to weld closed or burn open. Installing a suppression diode eliminates the voltage spike.

36. A — The ABS system functioning normally with valid wheel speed data proves the ABS wheel speed sensors and their circuits are healthy. The transmission's vehicle speed sensor is a separate sensor

mounted at a different location — typically the transmission output shaft. This independent VSS has failed while the ABS sensors continue to function on their own circuits, producing the zero-speed reading at the TCM and speedometer while ABS operates normally.

37. C — The headlight bulbs are receiving 12.1 volts — within specification — and are producing their full rated light output inside the housing. The yellowed, hazy lens material is degrading the light transmission by absorbing and scattering photons before they exit the housing. This is an optical problem, not an electrical one. Restoring or replacing the lens assemblies returns the perceived beam intensity to normal without any electrical repair.

38. D — All other electrical systems functioning normally confirms the battery, alternator, fuse panel, and main power distribution are healthy. A completely blank instrument cluster — no gauges, no warning lights, no display — while everything else works points to a power supply or ground problem specific to the cluster. The cluster's dedicated fuse, its power feed wire, and its ground connection are the most likely failure points.

39. B — The code appearing only during heavy braking events — not during normal driving or light braking — indicates the fault is triggered by the physical forces specific to hard deceleration. Excessive wheel bearing play allows the hub and reluctor ring to shift away from the sensor under the forward weight transfer forces of heavy braking. This momentary displacement moves the reluctor ring out of the sensor's detection range, producing the erratic signal that the ABS module flags.

40. A — A burning smell from behind the instrument panel during extended headlight operation points to a connection in the headlight circuit that is generating heat under sustained current flow. The headlight switch or its connector is the most likely location — a corroded or spread terminal creates resistance that produces heat proportional to the square of the current and the duration of operation. Two hours of sustained headlight current through a high-resistance connection generates enough heat to produce a noticeable smell.

41. C — The "CHARGE AND RETEST" message is the capacitance tester's way of indicating that the battery's state of charge is too low to produce a reliable capacity measurement. At 12.15 volts — approximately 50% state of charge — the battery does not meet the minimum charge threshold needed for accurate CCA determination. The battery must be charged to at least 12.4 volts (75% state of charge) before the capacitance test can produce valid results.

42. B — The right turn signal staying steadily on instead of flashing indicates the bulb is receiving constant voltage rather than the pulsed signal from the flasher. A short between the green (right turn) wire and the brown (tail light) wire connects the pulsed turn signal circuit to the constant tail light circuit. The constant tail light voltage overrides the pulsed turn signal, holding the right-side trailer lights on steadily whenever both circuits are active.

43. A — The CAN bus protocol allows modules to operate in two communication modes — passively receiving broadcast messages (listening) and actively responding to diagnostic requests (responding). A module can have a fully functional receive path that accepts all normal bus data while its diagnostic

response function is impaired. The cluster receives RPM, speed, temperature, and other data passively but cannot respond when the scan tool sends a diagnostic query.

44. D — The fuel pump relay contacts welded closed means the relay's internal contacts are permanently fused together, maintaining the circuit regardless of whether the ECM commands the relay on or off. With the contacts permanently bridged, battery power flows continuously to the fuel pump whenever the ignition is on. The relay must be replaced, and the cause of the welding — typically inductive kickback without suppression — should be addressed.

45. C — A faint chirp during rapid acceleration only — not at steady RPM — indicates a brief moment of belt slip during the transition. When the engine accelerates rapidly, the alternator's rotational inertia resists the sudden speed increase, creating a momentary mismatch between the belt's surface speed and the pulley's surface speed. The belt briefly slips until it catches up, producing the chirp. At steady RPM, there is no speed mismatch and no slip occurs.

46. B — The door jamb switch is a simple mechanical contact that closes to signal a door opening. Worn or corroded internal contacts that do not maintain a clean open state can intermittently make and break contact due to vehicle vibration, temperature cycling, or road impacts. Each momentary contact closure registers as a door-open event in the BCM's log, producing dozens of phantom events that far exceed the four actual door openings.

47. A — Neither technician is fully correct. Technician A is wrong because 0.5 volts across the solenoid contacts during cranking is excessive — the typical maximum acceptable drop across solenoid main contacts is approximately 0.2 volts. Technician B is wrong because some measurable voltage drop across any electrical connection carrying current is physically unavoidable — a reading of 0.05 to 0.1 volts is normal and does not warrant replacement.

48. D — CB radio transmission generates significant radiofrequency electromagnetic energy that radiates from the antenna and can couple into nearby wiring. The instrument cluster's sensor input wires and data bus connections act as unintentional antennas that pick up the RF energy. This induced voltage interferes with the low-voltage sensor signals and bus communications, causing gauge fluctuations that correspond directly to transmission events.

49. C — Marker lights turning off when headlights are turned on is not a normal design behavior — markers should remain on when headlights are activated. A wiring fault — likely a miswired headlight switch or a ground issue — where the headlight circuit's activation disrupts the marker circuit's power or ground path causes this interaction. Tracing the headlight switch wiring and verifying proper connection of the marker and headlight circuits identifies the specific fault.

50. B — A consistent two-second delay in parking brake application could be caused by excessive resistance in the apply solenoid circuit that delays the solenoid's response time, or it could be a designed feature where the electronic control module intentionally ramps the brake application for smooth engagement. Checking the solenoid circuit for resistance and reviewing the manufacturer's

service information for programmed delay specifications determines whether the behavior is a fault or normal operation.