PRACTICE EXAM 14: ASE T6 SIMULATION

1. A technician is diagnosing a heavy-duty truck with a parasitic draw of 180 milliamps. The specification is 50 milliamps. During fuse-pull isolation testing, removing any single fuse reduces the draw by only 10 to 15 milliamps, and no single fuse pull brings the draw within specification. What does this pattern indicate?

A. The DMM is malfunctioning and producing inaccurate readings that change randomly with each fuse removal

B. The parasitic draw is distributed across the vehicle's main power distribution bus and cannot be isolated with the fuse-pull method

C. Multiple modules are each contributing a small amount of excess draw, but the total exceeds specification when combined

D. One or more circuits drawing excessive current are powered upstream of the fuse panel — through unfused always-hot feeds from the battery such as main power feeds, fusible links, or direct-wired aftermarket accessories — and are not controlled by any fuse in the panel being tested

2. A truck's scan tool shows the ECM reporting engine coolant temperature at 195°F while the instrument cluster gauge displays approximately 180°F. An infrared thermometer aimed at the thermostat housing reads 193°F. What is the most likely cause of the cluster displaying lower than the ECM value?

A. A CAN bus message scaling error that reduces the temperature value by a fixed percentage during transmission

B. The instrument cluster's temperature gauge has an internal calibration offset — either a stepper motor error or a display mapping fault — that causes it to read approximately 15 degrees lower than the bus data it receives

C. The ECM coolant sensor and the infrared thermometer are both reading hot-side engine metal temperatures while the cluster reads cold-side coolant temperature from a separate sensor

D. Normal gauge display tolerance that is acceptable for dash-mounted analog indicators

3. A commercial vehicle has three batteries in parallel. The technician measures 12.55 volts across the bank. Battery 1 reads 12.60 volts, Battery 2 reads 12.58 volts, and Battery 3 reads 12.55 volts when each is measured individually with all three connected. Why does the bank voltage match Battery 3's voltage rather than the average of all three?

A. In a parallel configuration, the bank voltage is pulled toward the weakest battery because the stronger batteries attempt to charge the weaker one, equalizing the voltage to the lowest common level

B. The DMM probe placement on Battery 3 happens to be at the main output terminal where the vehicle draws its power

C. The inter-connect cables between Battery 1 and Battery 2 have higher resistance than those connecting to Battery 3

D. Battery 3 has a shorted cell that is actively pulling down the voltage of the entire bank

4. A truck driver reports that the windshield wipers work on low and high speed but the intermittent mode does not function at all — the wipers do not move when the switch is set to intermittent regardless of the delay setting. What is the most likely cause?

A. A failed wiper motor park switch that prevents the intermittent timer from detecting the arm rest position

B. A faulty wiper motor relay that cannot respond to the pulsed commands from the intermittent timer circuit

C. A failed intermittent wiper control module, a faulty delay timer circuit, or an open in the wiring between the wiper switch's intermittent output and the module that controls the delay function

D. A wiper switch with worn contacts that skip over the intermittent detent position

5. Technician A says that when soldering is required on a vehicle's electronic circuit, rosin-core flux solder must be used rather than acid-core flux solder. Technician B says that acid-core solder corrodes copper conductors and electronic component leads over time, causing progressive connection 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 heavy-duty truck's alternator belt has been squealing during cold starts. The squeal lasts approximately 10 seconds and then stops. The belt is six months old and properly tensioned. What is the most likely cause of the cold-start squeal?

A. A failing alternator front bearing that produces noise until the lubricant warms and distributes

B. An oversized belt that does not seat fully in the pulley grooves until it warms and contracts

C. A corroded alternator pulley surface that creates friction mismatch with the belt until running temperature is reached

D. Moisture or light frost condensation on the belt surface that reduces friction until the belt warms and dries, restoring normal grip on the pulleys

7. A truck's right front marker light flickers when the truck hits bumps but operates steadily on smooth roads. The technician wiggles the bulb in the socket and the light flickers. What has the technician identified?

A. A faulty body controller module output that reduces marker light current during vibration events

B. A poor connection between the bulb base and the socket contacts — either the socket contacts are spread and not gripping the bulb firmly, or corrosion on the contact surfaces creates intermittent connection under vibration

C. An intermittent open in the power feed wire to the marker light that manifests only during impact events

D. A failing marker light bulb with a loose filament that breaks and re-contacts under vibration

8. A commercial vehicle's scan tool retrieves a DTC from the ABS module: "Right Rear Wheel Speed Sensor — Air Gap Excessive." The technician inspects the sensor and finds it is fully seated in its mounting bore. What else should the technician check?

A. The ABS module's internal signal processing circuit for a calibration error specific to the right rear channel

B. The sensor wiring for electromagnetic interference that could reduce the apparent signal amplitude

C. The reluctor ring for damage, contamination, or excessive runout on the hub assembly that increases the effective distance between the ring teeth and the sensor face

D. The ABS module connector for a backed-out pin on the right rear sensor input channel

9. A heavy-duty truck's starter motor has been recently replaced. On the first start attempt, the starter engages and cranks normally but continues to run for approximately four seconds after the engine starts and the key is released from the start position. What is the most likely cause?

A. A faulty ignition switch that sticks in the start position for several seconds before returning to run

B. A starter relay with contacts that remain welded closed for a few seconds after the coil is de-energized, maintaining the solenoid circuit

C. A new solenoid with a stiff plunger return spring that requires several seconds to push the plunger back and break the main contacts

D. The replacement starter's overrunning clutch disengaging properly while residual magnetism in the solenoid holds the main contacts closed briefly

10. A technician measures voltage at a truck's headlight connector. With the headlights on low beam, the reading is 11.4 volts. The technician switches to high beam and the reading at the same connector changes to 12.0 volts. What explains the different voltage readings between low and high beam at the same connector?

A. The high-beam filament has lower resistance than the low-beam filament, drawing more current and less voltage

B. The alternator increases its output voltage when high beams are selected to compensate for the additional load

C. The high-beam circuit uses a different relay with lower contact resistance than the low-beam relay

D. The low-beam and high-beam circuits follow different wiring paths with different total resistance — the low-beam path has more voltage drop due to additional connections, longer wire runs, or higher-resistance components than the high-beam path

11. A fleet of trucks has been experiencing premature bulb failures specifically on the center-mounted high-mount stop light. All other bulbs last their normal lifespan. What should the technician investigate as the root cause?

A. The mounting location of the high-mount stop light for excessive vibration, heat exposure, or moisture intrusion that accelerates bulb failure — these center-mounted lights are often more exposed to environmental stresses than fender-mounted lights

B. The brake light switch for an intermittent contact that rapidly cycles the stop light on and off, reducing bulb life through thermal shock

C. The charging system for intermittent voltage spikes that selectively affect the highest-mounted light due to its position in the circuit

D. The body controller module for a software fault that applies excessive PWM frequency to the high-mount stop light output

12. A truck's power window on the driver's door operates very slowly in both the up and down directions. All other windows operate at normal speed. The window motor draws 8 amps — within the 6 to 10 amp specification. What is the most likely cause?

A. A failing power window motor with worn brushes that is losing torque despite drawing correct current

B. A voltage regulation fault reducing voltage to the driver door circuit while other doors receive full voltage

C. A binding window channel, a worn regulator mechanism, or deteriorated weatherstrip that creates excessive mechanical resistance against the glass movement in both directions

D. A body controller module that has reduced the driver window motor speed command due to a stored overcurrent fault

13. A commercial vehicle's scan tool shows the ECM broadcasting a valid throttle position signal at 22% with the driver's foot off the pedal and the engine at idle. The normal idle TPS reading should be 0% to 2%. What symptom would this incorrect idle TPS reading most likely produce?

A. The engine would not start because the ECM detects a pedal-stuck fault and disables the fuel system

B. Elevated idle speed because the ECM interprets the 22% throttle signal as a driver command for increased engine speed above normal idle

C. No noticeable symptom because the ECM's idle control strategy overrides the TPS signal at idle

D. The engine would immediately enter a full-power runaway condition at 22% commanded throttle

14. A heavy-duty truck's batteries have been replaced. The technician installs the positive cables and tightens them to the battery posts. Before connecting the negative cables, the technician notices a small spark when the negative cable end is brought near the battery negative post, even though the ignition is off and all accessories are turned off. What causes this spark?

A. Static electricity built up on the cable from handling during installation

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

C. A short-to-ground somewhere in the vehicle wiring that becomes evident during reconnection

D. Electronic modules that draw standby current even with the ignition off — the modules' capacitors and keep-alive circuits create a small current path that produces a spark when the ground circuit is completed

15. A truck's instrument cluster shows an engine oil temperature of 265°F. The scan tool confirms the ECM is broadcasting 265°F on the J1939 bus. The engine has been idling for 30 minutes in 95°F ambient heat. Is 265°F oil temperature a cause for concern?

A. Yes — 265°F exceeds the typical maximum normal oil temperature range of 210°F to 250°F for heavy-duty diesel engines and indicates a potential cooling system deficiency, excessive idle time without adequate airflow, or a failing oil cooler

B. No — 265°F is within normal operating range for a heavy-duty diesel engine at idle in hot ambient conditions

C. Yes — but only if the oil pressure has simultaneously dropped below 20 PSI at idle

D. No — the oil temperature sensor is likely reading high due to heat soak from the adjacent exhaust manifold

16. A technician is diagnosing a truck where the left tail light and left marker lights go out when the left turn signal is activated, but return to normal when the turn signal is turned off. The right side is unaffected. What is the most likely cause?

A. A faulty multifunction switch that disconnects the left tail and marker power feed when the turn signal contact closes

B. A body controller module that prioritizes the turn signal output over the tail and marker outputs on the left side

C. A high-resistance shared ground on the left side that cannot handle the combined current of the tail light, marker lights, and turn signal simultaneously — the added turn signal current creates enough voltage drop on the ground to effectively extinguish the lower-current tail and marker filaments

D. A short between the left turn signal wire and the left tail light wire that cancels out both circuits when the turn signal is active

17. A heavy-duty truck battery has been slow-charged for 12 hours. The charger indicates the battery has accepted a full charge. The technician disconnects the charger, waits 15 minutes, and measures open circuit voltage at 12.72 volts. What should the technician do before performing any capacity testing?

A. Proceed immediately with the load test since the charger confirmed the battery is fully charged

B. Remove the surface charge by applying a moderate load — such as turning on the headlights — for 60 seconds, then wait two minutes and remeasure the open circuit voltage for an accurate state-of-charge reading

C. Wait an additional four hours for the battery chemistry to fully stabilize before any testing

D. Perform an equalization charge to bring all cells to identical voltage before capacity testing

18. A truck's electronic instrument cluster has been replaced. After installation, all gauges and lights function correctly except the speedometer, which reads approximately 12% faster than actual vehicle speed at all speeds. What is the most likely cause?

A. A vehicle speed sensor that has drifted out of calibration since the original cluster was installed

B. A CAN bus message format difference between the replacement cluster and the vehicle's speed data protocol

C. A faulty speedometer stepper motor in the replacement cluster that over-rotates by a fixed percentage

D. The replacement cluster has not been programmed with the correct tire size, axle ratio, or speed pulse calibration for this specific vehicle

19. Technician A says that when testing an NTC coolant temperature sensor, high resistance at room temperature and low resistance at operating temperature is the expected pattern. Technician B says that if the sensor reads 5,000 ohms at room temperature and 200 ohms at operating temperature, both readings are consistent with a functioning NTC thermistor. 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 commercial vehicle's cab interior courtesy lights illuminate normally when the door is opened but remain on for approximately five seconds after the door is closed, even though the vehicle is not equipped with a light delay timer feature. The lights then shut off. What is the most likely cause?

A. A body controller module software update that has activated a previously disabled timer function

B. A capacitor in the dome light circuit that stores charge and slowly discharges through the light after the switch opens

C. A door jamb switch that takes several seconds to fully open its contacts after the door closes — the switch is slow to respond due to mechanical wear, contamination, or misadjustment that delays the plunger return

D. An aftermarket alarm system that momentarily holds the dome light circuit active as part of its arming sequence

21. A heavy-duty truck's starter motor draws 350 amps during a current draw test. The specification is 180 to 220 amps. Battery voltage during cranking is 8.8 volts. The engine cranks very slowly. All cables and connections pass voltage drop testing. What is the most likely cause?

A. The engine has seized accessories creating excessive mechanical resistance that the starter must overcome

B. The starter motor has a severe internal fault — shorted armature windings, worn bushings causing armature-to-field contact, or a grounded field coil — drawing nearly double the specified current while producing inadequate torque for normal cranking speed

C. The batteries have failed under load despite passing voltage drop testing on the cables

D. The starter solenoid contacts have excessive resistance, limiting current flow and causing the low cranking speed

22. A truck's right rear combination light assembly has been replaced after a collision. The right tail light and right turn signal work correctly. However, when reverse gear is selected, the right backup light does not illuminate. The left backup light works normally. The technician tests for voltage at the right backup socket with the transmission in reverse and reads 0 volts. What is the most likely cause?

A. A faulty reverse gear position switch inside the transmission that only sends voltage to the left backup circuit

B. A body controller module that has disabled the right backup light output due to a stored collision-related fault code

C. The reverse light bulb in the replacement assembly has a burned-out filament specific to the backup function

D. The backup light wire was not connected to the correct terminal on the replacement housing's connector during installation, leaving the backup socket with no power feed

23. A fleet technician discovers that identical trucks in the fleet have slightly different charging voltages — 13.9 volts on one truck and 14.3 volts on another. Both alternators are the same part number with internal regulators. Both belts are properly tensioned. Both battery banks are fully charged. What is the most likely explanation?

A. Normal manufacturing tolerance between individual voltage regulators — each regulator has a calibrated set point within the acceptable 13.5 to 14.5 volt range, and individual units may vary by 0.3 to 0.5 volts

B. The truck with lower voltage has a developing alternator fault that will progress to complete failure

C. The truck with higher voltage has an overcharging condition requiring immediate attention

D. The batteries in the two trucks have different CCA ratings, causing the alternators to produce different voltages

24. A truck's electronic throttle pedal produces a smooth voltage output when tested slowly at the connector, but the ECM intermittently stores a "TPS — Signal Erratic" code during driving. Static testing at the connector shows no fault. What is the most likely cause?

A. A developing ECM input channel fault that misreads the TPS signal under processor load during driving

B. A CAN bus interference pattern that corrupts the TPS data between the pedal module and the ECM

C. A wiring or connector fault in the TPS circuit that only manifests under the vibration and movement of actual driving conditions — a cracked solder joint, a partially backed-out pin, or a chafed wire that intermittently opens or shorts

D. A pedal return spring that bounces the TPS wiper at the idle-to-tip-in transition during actual throttle application

25. A heavy-duty truck's charging system produces 14.1 volts at idle with all loads off. When the technician turns on the headlights, blower on high, and heated mirrors, the voltage drops to 12.8 volts at idle. Increasing RPM to 1,500 brings the voltage back to 13.9 volts. What does this pattern indicate?

A. The alternator has a failing stator phase that limits output capacity at all RPMs

B. The alternator's output at idle speed is insufficient to support the combined electrical load — idle RPM does not spin the alternator fast enough to produce the current demanded by the heavy loads, but higher RPM increases output to meet the demand

C. The voltage regulator is failing and cannot maintain output under load at idle speed

D. The battery bank is weak and drawing excessive current from the alternator during the heavy load condition

26. A commercial vehicle's right front headlight housing has been replaced. After installation, the headlight aim appears correct visually, but the driver reports that oncoming vehicles flash their high beams at the truck at night. What should the technician check?

A. The headlight bulb for incorrect positioning within the housing that shifts the filament relative to the reflector focal point

B. The vehicle's ride height, as a loaded truck sits differently than an unloaded truck and changes headlight aim

C. The replacement housing's internal reflector geometry for an OEM defect that directs the beam too high

D. The headlight aim using the manufacturer's specified aiming procedure and equipment rather than relying on visual assessment, as the beam pattern may appear correct to the driver but may be aimed high enough to blind oncoming traffic

27. A truck's wiper motor operates normally, but during the return stroke to park position, the wipers hesitate and stutter for the last three inches of travel before reaching the rest position. What is the most likely cause?

A. A failing wiper motor with reduced torque that cannot complete the park stroke smoothly

B. A wiper switch that sends intermittent power during the park cycle, causing the hesitation

C. A wiper motor park switch with worn or dirty contacts that make and break connection erratically during the final portion of the park cam's rotation, creating hesitation as the motor receives intermittent power during the last few inches of travel

D. A binding wiper transmission linkage that creates increased resistance at the bottom of the wipe arc

28. Technician A says that a truck's main fusible link should be inspected by checking for voltage on both sides of the link with the circuit energized. Technician B says that a fusible link can appear completely intact externally while the internal conductor has melted and separated. 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

29. A heavy-duty truck's scan tool retrieves a DTC from the engine control module indicating "Battery Voltage — Above Normal" with a timestamp showing the fault occurred at 14:32 on the previous day. Current charging voltage reads 14.2 volts — within normal range. What does the historical code with a timestamp tell the technician?

A. The code is a false positive that was stored by a data bus transmission error at the recorded time

B. The alternator produced a momentary voltage spike at 14:32 yesterday that has since self-corrected

C. The voltage regulator has a progressive fault that only manifests under specific conditions that were present at 14:32

D. A high-voltage condition occurred at the recorded time but is not currently active — the technician should investigate what conditions were present at that time, check for intermittent regulator faults, and monitor the system for recurrence

30. A truck's right turn signal and right brake light are inoperative on the trailer, but both functions work correctly on the tractor. The trailer's left turn/brake, markers, tail lights, and clearance lights all function normally. What is the most likely cause?

A. A faulty turn signal flasher module that cannot send the right-side pulse signal to the trailer

B. An open or fault in the trailer's green wire circuit — between the J560 connector and the right-side lights — since the tractor-side right turn/brake functions are proven good and the trailer's other circuits operate normally

C. A corroded J560 connector ground pin that only affects the right side of the trailer

D. A body controller module output fault that disables the right turn/brake feed to the trailer connector

31. A technician discovers a wire splice in a truck's lighting harness made with a butt connector but no heat shrink tubing. The splice is located under the chassis near the rear axle. The connection currently functions. Why should this splice be reworked?

A. The exposed crimp joint will be subject to road salt, moisture, and debris, which will corrode the connection and create a progressive high-resistance fault over time

B. The butt connector does not provide adequate mechanical strength for a chassis-mounted application

C. An unsealed butt connector in an exposed under-chassis location will allow moisture intrusion that corrodes the crimp joint, introduces resistance, and eventually causes circuit failure — the splice should be reworked with a properly crimped connection sealed with adhesive-lined heat shrink tubing

D. The butt connector material is incompatible with the copper wire gauge used in lighting circuits

32. A heavy-duty truck's electronic cruise control maintains set speed accurately, but the driver reports a brief one to two second delay between pressing the set button and the system actually engaging. All other cruise functions — resume, cancel, and coast — respond immediately. What is the most likely cause?

A. A programmed engagement delay in the cruise control module that verifies vehicle speed, throttle position, and brake switch status are stable before confirming the set command — this is normal designed behavior, not a fault

B. A faulty set button contact that requires extra press time to close fully and send the set signal

C. A data bus latency issue between the steering wheel cruise switch module and the ECM that delays only the set command

D. An ECM processing delay caused by high computational load from other engine management functions

33. A truck's scan tool retrieves a DTC from the body controller module indicating "Trailer Marker Light Circuit — Overcurrent." No trailer is currently connected. The tractor's marker lights work normally. What does this code indicate?

A. A faulty BCM output driver that has failed with excessive current flowing through the trailer marker output even without a trailer load

B. The J560 connector has a bent or misaligned pin that contacts another pin when no trailer plug is inserted

C. A previous overcurrent event that occurred when a trailer was connected — such as a shorted trailer marker circuit — that stored the code and remains in memory from the last trailer hookup

D. A short-to-ground in the tractor's wiring between the BCM trailer marker output and the J560 connector that provides a current path to ground even without a trailer connected

34. A commercial vehicle has a dual-battery 12-volt system. The technician measures 12.6 volts at Battery 1 and 12.6 volts at Battery 2 individually. The inter-connect cable between the batteries feels warm to the touch after 30 minutes of engine-off time. What does the warm cable indicate?

A. Normal temperature for a heavy-gauge cable that retains heat from the engine compartment

B. Current is flowing through the inter-connect cable even with the engine off — a difference in internal resistance between the two batteries is creating a circulating current between them that generates heat in the cable

C. The inter-connect cable insulation is deteriorating and the warmth is caused by the breakdown of the cable jacket material

D. The cable is too small in gauge for the application and its inherent resistance generates heat during the parasitic draw of the vehicle's key-off electronics

35. A truck's headlights have been upgraded from sealed beam units to composite halogen housings with replaceable bulbs. Since the upgrade, the headlight fuse blows within approximately 30 minutes of operation but never immediately. What is the most likely cause?

A. The replacement halogen bulbs have a higher wattage rating than the original sealed beams, drawing more current through the existing circuit — the fuse rating was matched to the lower-draw sealed beam bulbs and is now undersized for the increased halogen current

B. The composite housings have an internal ground fault that develops as the housing heats up during operation

C. The headlight relay contacts are undersized for the halogen bulbs' current demand and are introducing resistance that heats the circuit

D. The halogen bulb capsules are expanding as they heat up, creating a loose fit in the housing that causes an intermittent short

36. A fleet technician discovers that all trucks in the fleet show slightly different parasitic draw readings — ranging from 35 to 55 milliamps — even though all trucks are identically equipped. The specification is a maximum of 50 milliamps. Why do the readings vary between identical trucks?

A. The DMMs used for testing have different calibration tolerances that produce varying readings

B. Each truck's tires are at slightly different pressures, affecting the wheel speed sensor standby current

C. Normal variation in individual electronic module quiescent current draw, connector contact resistance, and minor differences in wiring resistance produce slightly different total parasitic draws even across identical vehicles

D. The fleet's batteries are at different ages and states of charge, which affects the parasitic draw measurement

37. A truck's turn signal flasher module has been replaced with an electronic unit. The turn signals now flash at a much faster rate than normal on both sides. What is the most likely cause?

A. The electronic flasher module requires a minimum load resistance that the truck's turn signal bulbs exceed

B. The replacement flasher module has been designed for a different vehicle platform with fewer bulbs per side

C. The truck's turn signal circuit has an undetected open that reduces the load below the flasher's normal operating threshold

D. The replacement electronic flasher module has a different flash rate calibration or operating current range than the original unit specified for this vehicle

38. A heavy-duty truck's engine cranks at normal speed, but the scan tool shows 0 RPM during cranking — the ECM is not receiving a crankshaft position sensor signal. The engine does not start. What should the technician check?

A. The starter motor current draw to determine if the cranking RPM is below the sensor's minimum detection threshold

B. The crankshaft position sensor, its connector, and its wiring for an open circuit, a damaged sensor, or an excessive air gap that prevents signal generation

C. The engine timing to determine if the crankshaft is rotating without the sensor being in the correct timing position

D. The alternator output during cranking to verify adequate voltage is reaching the sensor

39. A commercial vehicle's scan tool shows the transmission control module has set a code for "Output Speed Sensor — Rationality Error." The sensor signal is present but the TCM has determined it does not correlate with other data. What does a rationality error mean?

A. The sensor has failed completely and is producing no output signal to the TCM

B. The sensor signal frequency does not match the expected value based on engine RPM, gear ratio, and input shaft speed — the TCM compares the output speed against calculated expectations and determines they do not agree

C. The sensor's wiring has developed a short-to-ground that is corrupting the signal with noise

D. The TCM's internal processor has a firmware error that produces false rationality calculations

40. A truck's dome light stays on at all times, even with the manual switch in the off position and all doors closed. The technician disconnects the body controller module connector and the dome light turns off. What does this test indicate?

A. The dome light relay is stuck closed and needs replacement

B. A door jamb switch is stuck closed, providing a continuous ground command to the BCM

C. The dome light wiring has a short-to-power that bypasses the BCM output and feeds battery voltage directly to the light

D. The BCM is the source of the fault — it is either commanding the dome light on due to an internal failure or is responding to an input signal that tells it to keep the light on

41. A heavy-duty truck's alternator produces 14.3 volts at the B+ terminal. A voltage drop test between the alternator B+ terminal and the battery positive post reads 0.2 volts. A voltage drop test between the alternator housing and the battery negative post reads 0.1 volts. Are these readings acceptable?

A. Yes — both readings are within specification: the output side at 0.2 volts is below the 0.5-volt maximum, and the ground side at 0.1 volts is below the 0.3-volt maximum

B. The output side is acceptable but the ground side is borderline and should be monitored

C. Both readings indicate excessive voltage drop that requires immediate repair

D. The readings are only valid if they were taken under maximum electrical load conditions

42. A truck's scan tool retrieves a DTC from the ECM indicating "Intake Air Heater Relay — Control Circuit Open." The relay clicks when 12 volts is applied directly to the coil terminals. The relay coil resistance is within specification. What should the technician check?

A. The intake air heater element resistance to determine if the element has failed and is preventing relay engagement

B. The relay contacts for excessive resistance that the ECM misinterprets as an open control circuit

C. The wiring between the ECM control output and the relay coil, including the coil ground circuit, for an open that prevents the ECM's command from reaching the relay

D. The ECM's internal relay driver circuit for a fault that prevents it from outputting the control signal

43. A commercial vehicle's driver reports that the right side mirrors — both the main mirror and the convex mirror — have no power adjustment. The left side mirrors adjust normally. Both sides share the same fuse, which is good. What is the most likely cause?

A. Simultaneously failed adjustment motors in both the main and convex right-side mirrors

B. A body controller module output fault affecting only the right-side mirror adjustment channel

C. A faulty mirror adjustment switch on the driver's control panel that does not send signals for the right mirror selection

D. An open in the common power feed or ground wire that serves both right-side mirror adjustment motors — since both right-side mirrors are inoperative while the left side works with the same fuse, the fault is in the shared circuit branch specific to the right side

44. A truck's headlights dim and brighten rhythmically approximately once per second while the engine idles. The alternator output voltage appears steady at 14.0 volts on a DMM. What is the most likely cause?

A. The alternator voltage regulator cycling between full-field and zero-field at an abnormally slow rate that the DMM averages but the headlights display as visible pulsing

B. An alternator with AC ripple at a frequency low enough to produce visible headlight modulation but high enough that the DMM's sampling rate averages it into an apparently steady reading

C. An engine misfire causing torsional vibration that momentarily slows the alternator belt during each misfire event

D. A loose alternator output cable that makes and breaks contact in rhythm with engine vibration at idle

45. A fleet technician is testing a truck's batteries with an electronic conductance tester. The tester reports: Battery 1 — "GOOD, 92% CCA." Battery 2 — "GOOD, 88% CCA." Battery 3 — "REPLACE, 45% CCA." Battery 4 — "CHARGE AND RETEST." What action should the technician take?

A. Charge Battery 4 to full state of charge and retest it, replace Battery 3 which has clearly failed, and evaluate whether Batteries 1 and 2 should be replaced as part of a matched set with the replacement for Battery 3

B. Replace only Battery 3 and return the others to service since Batteries 1 and 2 are good and Battery 4 just needs charging

C. Replace all four batteries immediately regardless of the tester's recommendations

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

46. A truck driver reports that the engine brake does not activate even though the engine brake switch is on. The scan tool shows the ECM receiving a valid engine brake switch input. The engine brake solenoid resistance tests within specification. What should the technician check next?

A. The engine brake relay for welded contacts that prevent the solenoid from de-energizing when commanded off

B. The exhaust backpressure sensor for a reading that may inhibit engine brake activation in the ECM's control strategy

C. The engine coolant temperature to verify the engine is warm enough for the ECM to allow engine brake activation

D. The wiring between the ECM engine brake output and the solenoid, and the solenoid's power supply and ground circuit, to verify the ECM's electrical command is actually reaching the solenoid

47. A commercial vehicle's right headlight works on low beam but is inoperative on high beam. The left headlight works on both beams. The high-beam fuse is good. The technician measures 12.1 volts at the right headlight connector on the high-beam terminal with high beams selected. What should the technician check next?

A. The right headlight reflector alignment, as a misaligned reflector can make the high beam appear inoperative

B. The right headlight bulb's high-beam filament and the socket contact for that filament, since power is reaching the connector but the light does not illuminate — either the filament has burned out or the socket contact is not engaging the bulb properly

C. The dimmer switch for an internal fault that sends reduced voltage to the right high-beam circuit

D. The headlight relay for a developing contact resistance fault that limits current to the right side

48. A heavy-duty truck's scan tool shows the ABS module reporting "System Configuration Error" after a replacement ABS module was installed. No wheel speed data is available and the ABS warning light is on. What is the most likely cause?

A. The replacement module has incompatible firmware that cannot communicate with the vehicle's existing wheel speed sensors

B. The vehicle's CAN bus requires a gateway module reset before the new ABS module can communicate

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

D. The ABS module connector pinout has changed between the original and replacement unit

49. A truck's power outlet in the sleeper is completely dead. The outlet fuse is good. The technician measures 12.3 volts at the fuse panel output for that circuit but 0 volts at the outlet socket. What does the voltage at the fuse panel with zero volts at the outlet confirm?

A. An open circuit in the wiring between the fuse panel and the sleeper outlet — a broken wire, a disconnected connector, or a failed intermediate relay or switch in the circuit path that prevents voltage from reaching the outlet despite being present at the fuse panel

B. The outlet socket has an internal short that is pulling all voltage to ground before it can be measured

C. The fuse panel is providing voltage but the wire gauge between the panel and the sleeper is too small to sustain voltage over the distance

D. The body controller module has disabled the sleeper outlet output due to a stored low-voltage fault

50. A fleet of trucks has a recurring issue where the electronic logging devices connected to the nine-pin diagnostic connector show intermittent "ECM Communication Lost" errors. The errors are brief — lasting one to three seconds — and occur more frequently during cold weather. All other module communications remain uninterrupted during these events. What is the most likely cause?

A. The ELD firmware is incompatible with the ECM's cold-start communication protocol

B. Cold-weather idle speed fluctuations cause the ECM to drop off the bus briefly during RPM transitions

C. The engine's glow plug cycle during cold weather creates voltage fluctuations that reset the ELD device

D. Thermal contraction of the nine-pin diagnostic connector pins or the ELD plug during cold temperatures creates momentary contact loss that briefly interrupts the ELD's connection to the ECM data stream

PRACTICE EXAM 14: ANSWER KEY

1. D — When no single fuse pull brings the draw within specification, the excessive current is flowing through a path that bypasses the fuse panel entirely. Always-hot circuits wired directly from the battery — main power feeds, fusible links, aftermarket accessories, or direct-wired modules — are not controlled by the fuses being pulled. The technician must investigate these unfused circuits by disconnecting them individually at the battery or power distribution point.

2. B — The ECM reports 195°F and the infrared thermometer confirms 193°F, proving the actual engine temperature is approximately 195°F. The cluster displaying 180°F despite receiving 195°F from the bus isolates the fault to the cluster's internal processing — either the temperature gauge stepper motor has a calibration offset or the cluster's software mapping between the received bus value and the needle position has an error.

3. A — In a parallel battery bank, all batteries are connected to the same bus and current flows from the higher-voltage batteries toward the lower-voltage battery until equilibrium is reached. The bank voltage settles at a level pulled down by the weakest battery because the stronger batteries expend energy trying to charge it. The small voltage differences between these three batteries indicate a minor imbalance that should be monitored.

4. C — Low and high speed working proves the wiper motor, its relay, the main power feed, and the switch's low and high contacts are all functional. The intermittent mode uses a separate timer module or delay circuit that pulses the wiper relay at intervals determined by the delay setting. A failed timer module, a broken wire in the intermittent control path, or a faulty intermittent output on the switch prevents the pulsed signal from reaching the motor.

5. A — Both technicians are correct. Rosin-core flux solder is the only type approved for electrical and electronic work because its flux residue is non-corrosive and non-conductive. Acid-core flux solder — designed for plumbing — leaves a corrosive residue that attacks copper conductors and component leads over time, creating progressive high-resistance connections and eventual circuit failure.

6. D — Morning moisture or light frost condensation on the belt surface reduces the coefficient of friction between the belt and pulleys. During the first few seconds of operation, the belt slips on the wet pulley surfaces until engine heat and friction dry the moisture. Once dry, the belt grips normally and the squeal stops. The belt and tensioner are functioning correctly — the noise is caused by the temporary surface condition.

7. B — The wiggle test at the bulb socket reproducing the flicker identifies the bulb-to-socket interface as the fault location. Spread socket contacts that do not grip the bulb base firmly, or corrosion on the contact surfaces, create an intermittent connection that maintains circuit under static conditions but

breaks and reforms under the vibration of driving. Replacing the socket or cleaning and re-tensioning the contacts resolves the intermittent flicker.

8. C — The sensor being fully seated in its bore eliminates mounting depth as the cause. The "air gap excessive" code means the distance between the sensor face and the reluctor ring teeth is greater than the module expects. A damaged reluctor ring with missing material, contamination buildup on the ring surface, or excessive hub bearing play that allows the ring to wobble away from the sensor all increase the effective air gap.

9. B — The key has been released from start and the ignition switch has returned to the run position, so the solenoid coil should be de-energized. The starter continuing to run for four seconds indicates the solenoid main contacts remain closed after the coil loses power. A relay with contacts that have welded together maintains the circuit from the relay output to the solenoid S terminal, keeping the solenoid engaged until the weld breaks or the relay is physically removed.

10. D — The same connector receiving different voltages depending on which beam is selected reveals that the low-beam and high-beam circuits follow different paths from the fuse panel to the headlight connector. The low-beam path — through its switch contacts, relay, and wiring — has more total resistance than the high-beam path, producing a greater voltage drop. The difference points to a connection, relay, or wire segment in the low-beam path with higher resistance.

11. A — A fleet-wide pattern of premature failure in one specific bulb location across multiple trucks indicates an environmental or installation factor rather than random bulb defects. Center-mounted high-mount stop lights are typically positioned on the cab roof or rear panel where they are exposed to more vibration, direct sunlight, rain, and temperature extremes than lights mounted on the body. These environmental stresses accelerate bulb failure.

12. C — The motor drawing 8 amps within its 6 to 10 amp specification means it is electrically healthy and receiving adequate current. Slow operation in both directions despite correct current draw indicates the motor is working against excessive mechanical resistance. A binding window channel, a worn regulator mechanism, or deteriorated weatherstrip forces the motor to convert its electrical energy into overcoming friction rather than producing window speed.

13. B — The ECM interprets a 22% throttle position signal as a driver demand for engine speed significantly above normal idle. The ECM's fuel injection strategy adds fuel to increase engine speed toward the commanded throttle position. The result is an elevated idle speed because the module believes the driver is requesting more power, even though the pedal is at rest.

14. D — Even with the ignition off, multiple electronic modules in a commercial vehicle draw standby current to maintain memory, clock functions, security monitoring, and keep-alive circuits. When the negative cable approaches the post, these modules' 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.

15. A — Normal operating oil temperature for heavy-duty diesel engines typically ranges from 210°F to 250°F depending on the manufacturer's specification and operating conditions. At 265°F, the oil temperature exceeds this range and warrants investigation. Extended idling in high ambient heat without adequate airflow across the oil cooler, a failing oil cooler, or an obstructed cooling system could all contribute to this elevated reading.

16. C — The left tail and marker lights extinguishing when the turn signal adds its current to the shared left-side ground indicates the ground cannot handle the combined current. The turn signal's added current creates a significant voltage drop across the high-resistance ground. This voltage drop raises the ground-side potential of the tail and marker lights high enough to eliminate the voltage differential needed to illuminate their lower-current filaments.

17. B — A reading of 12.72 volts immediately after charging includes surface charge — a temporary elevated voltage on the plate surfaces that does not represent the battery's true resting state. Applying a moderate load for 60 seconds dissipates the surface charge, and the two-minute rest allows the chemistry to stabilize. The subsequent reading provides an accurate open circuit voltage for determining whether the battery is at the 75% minimum needed for capacity testing.

18. D — A consistent 12% over-reading at all speeds indicates a calculation error in the cluster's speed formula rather than a sensor or bus fault. The replacement cluster calculates speed from the vehicle speed sensor's pulse frequency using programmed tire size and axle ratio. If these parameters do not match the actual vehicle — either because they were not transferred from the original cluster or were programmed incorrectly — the calculation produces a fixed percentage error.

19. A — Both technicians are correct. NTC (negative temperature coefficient) thermistors decrease in resistance as temperature increases — this is their defining characteristic. The specific values Technician B cites — 5,000 ohms at room temperature decreasing to 200 ohms at operating temperature — are consistent with a typical NTC coolant temperature sending unit's behavior, demonstrating the high-cold, low-hot resistance pattern.

20. C — The vehicle is not equipped with a timer feature, eliminating intentional delay circuits. A door jamb switch that takes several seconds to fully open after the door closes — due to a sluggish return plunger, contamination in the switch mechanism, or misadjustment — keeps the ground path to the dome light active for those extra seconds. The light extinguishes only when the switch finally opens completely and breaks the circuit.

21. B — All cables and connections pass voltage drop testing, eliminating the delivery path. Battery voltage dropping to 8.8 volts under the 350-amp draw is consistent with the excessive current demand. The starter drawing nearly double its specified current — 350 amps versus 180-220 amps — while producing inadequate torque for normal cranking confirms severe internal motor damage that forces it to consume far more energy than it converts to useful mechanical output.

22. D — The right tail light and turn signal working proves the socket, ground, and main connector are properly connected for those circuits. The left backup light working proves the reverse signal from

the transmission and the backup fuse are functional. Zero volts at the right backup socket with reverse selected confirms no power reaches that specific terminal — the backup wire was either not connected to the correct pin during installation or was left disconnected.

23. A — Voltage regulators are manufactured to a target set point within the acceptable 13.5 to 14.5 volt range, but individual units vary due to normal component tolerances. A 0.4-volt difference between two alternators of the same part number — one at 13.9 volts and one at 14.3 volts — falls within the expected manufacturing tolerance band. Both readings are within the normal charging range and neither indicates a fault.

24. C — The sensor testing good during slow, static manipulation at the connector but setting codes during driving points to a condition that only manifests under the vibration, heat cycling, and movement of actual vehicle operation. A cracked solder joint on the sensor's internal circuit board, a partially backed-out connector pin, or a chafed wire that intermittently opens during vibration produces the erratic signal the ECM detects.

25. B — The alternator maintaining 14.1 volts with no load proves its internal components and regulator are functional. The voltage dropping to 12.8 volts under heavy load at idle confirms the alternator simply cannot spin fast enough at idle RPM to produce the current demanded by headlights, blower, and heated mirrors simultaneously. Increasing RPM to 1,500 raises alternator speed and output, restoring voltage to 13.9 volts.

26. D — Visual headlight aim assessment from the driver's seat is unreliable because the driver sees the road illumination pattern, not the precise beam cutoff line that affects oncoming traffic. A headlight that appears correctly aimed to the driver may be directing its beam pattern slightly above the horizontal plane, blinding oncoming drivers. The manufacturer's specified aiming procedure using proper equipment provides the precise measurement needed.

27. C — The wipers operating normally on all speeds confirms the motor, linkage, and main circuits are healthy. The hesitation occurring only during the last few inches of the park stroke isolates the fault to the park switch mechanism. Worn or dirty park switch contacts at the end of the cam's rotation make and break connection erratically, sending intermittent power to the motor during the final portion of travel and producing the stuttering motion.

28. A — Both technicians describe valid diagnostic approaches. Checking voltage on both sides of a fusible link is the most reliable field test — battery voltage on the input side with zero volts on the output side confirms an internal open. Technician B's statement is equally important: fusible links can blow internally while the outer insulation remains intact, making visual inspection alone unreliable for diagnosing a suspected fusible link failure.

29. D — A historical DTC with a timestamp provides specific information about when the fault occurred without indicating the current system status. The charging system currently reading 14.2 volts confirms no active fault exists. The technician should investigate what conditions were present at

14:32 — heavy load transitions, engine speed changes, or a temporary regulator fault — and monitor the system for recurrence to determine if the event was isolated or part of a developing pattern.

30. B — The tractor's right turn/brake working normally proves the flasher, brake switch, multifunction switch, and tractor wiring up to the J560 connector are all functional. The trailer's other circuits working proves the cord, ground pin, and trailer power distribution are healthy. The fault is isolated to the trailer's green wire circuit — the specific path that carries the right turn/stop signal from the J560 connector to the right-side trailer lights.

31. C — An unsealed butt connector on the underside of a commercial vehicle chassis is exposed to the most severe environmental conditions — road salt spray, standing water, mud, chemical contamination, and constant debris bombardment. Moisture infiltrates the unsealed crimp joint, initiates corrosion on the copper conductor surfaces, and progressively increases resistance. Adhesive-lined heat shrink over a proper crimp creates the environmental seal needed for this location.

32. A — Many cruise control systems include a programmed engagement verification period where the module confirms that vehicle speed is stable, throttle position is appropriate, brake and clutch switches are open, and the vehicle meets all activation criteria before committing to the set speed. This one to two second delay is a designed safety feature that prevents the cruise from engaging during transient conditions that could produce unintended acceleration.

33. D — No trailer is currently connected, so the code cannot be caused by an active trailer circuit fault. However, the tractor's wiring between the BCM trailer marker output and the J560 connector remains energized when the BCM commands that output on. If this tractor-side wiring has a short-to-ground — a chafed wire touching the frame between the BCM and the connector — the overcurrent path exists regardless of whether a trailer is plugged in.

34. B — Both batteries read identical voltage, suggesting they should be in equilibrium. However, identical terminal voltage does not guarantee identical internal resistance. Slightly different internal resistance between the two batteries creates a circulating equalization current through the inter-connect cable as each battery attempts to charge the other. This continuous current flow through the cable's resistance generates heat even with the engine off.

35. A — Sealed beam headlights typically draw less current than halogen replacements. The original fuse was sized for the sealed beam current draw plus a safety margin. If the halogen bulbs draw more current than the sealed beams — even by a few amps — the total draw can exceed the original fuse rating during sustained operation. The fuse survives initially because it takes time for the thermal element to heat to its trip point, explaining the 30-minute delay.

36. C — Even identically equipped vehicles have minor differences in individual component characteristics. Each electronic module has a slightly different quiescent current draw within its design tolerance. Each connector has marginally different contact resistance. Each wire run has slightly different total resistance. These small variations compound across the entire vehicle's

electrical system, producing measurable differences in total parasitic draw between otherwise identical trucks.

37. D — An electronic flasher module designed for a different vehicle platform may have a different flash rate calibration, a different operating current range, or a different minimum load threshold than the original unit specified for this truck. If the replacement module's programmed flash rate is faster than the standard 60 to 120 flashes per minute, or if its current sensing range does not match the truck's bulb complement, the result is an incorrect flash rate.

38. B — The engine cranking at normal speed confirms the batteries, starter, and cables are functional. The ECM showing 0 RPM during cranking means it is not receiving the crankshaft position sensor signal needed to time fuel injection and initiate combustion. The sensor, its connector, and its wiring are the most likely failure points. An excessive air gap between the sensor and the reluctor ring could also prevent adequate signal generation.

39. C — A rationality error means the module received a signal but determined it does not make logical sense when compared against other known parameters. The TCM calculates what the output speed should be based on engine RPM, the current gear ratio, and input shaft speed. If the actual output speed sensor signal does not match this calculated expectation within the programmed tolerance, the module flags it as irrational — indicating a sensor drift, a reluctor ring fault, or a mechanical transmission issue.

40. D — Disconnecting the BCM connector and the dome light turning off proves the BCM is the source of the power keeping the light on. The light is receiving its power through the BCM's output circuit. The BCM may have an internal driver fault that permanently energizes the dome light output, or it may be responding to an input — such as a stuck door switch providing a continuous ground command — that tells it to keep the light on. Further diagnosis of the BCM's inputs identifies whether the fault is internal or input-driven.

41. A — The output-side voltage drop of 0.2 volts is below the 0.5-volt maximum, confirming the charging output cable and connections have low resistance. The ground-side voltage drop of 0.1 volts is below the 0.3-volt maximum, confirming the ground return path has low resistance. Both measurements are within specification, and the charging circuit is delivering current from the alternator to the battery efficiently.

42. C — The relay clicking when powered directly proves the coil is functional. The coil resistance within specification confirms no winding fault. The ECM setting a "control circuit open" code means the ECM attempted to provide the ground command to the relay coil but detected no current flow through its output driver. An open in the wire between the ECM output pin and the relay coil, or in the coil's ground return circuit, prevents the ECM's command from completing the coil circuit.

43. D — Both right-side mirrors — main and convex — being inoperative while the left side works eliminates the fuse, the main switch power supply, and the common mirror select switch as causes. The two right-side mirror motors share a dedicated power feed or ground branch that separates from

the common circuit after the mirror select switch. An open in this shared right-side branch prevents power or ground from reaching either right-side motor.

44. A — The DMM averaging 14.0 volts as a steady reading while the headlights visibly pulse indicates the voltage is actually oscillating above and below 14.0 volts at approximately a one-second cycle rate. The voltage regulator cycling between full-field and zero-field at an abnormally slow rate — instead of its normal rapid PWM frequency — produces voltage swings large enough to be visible in headlight brightness but averaged out by the DMM's sampling rate.

45. A — Battery 3 at 45% CCA has clearly failed and must be replaced. Battery 4's "CHARGE AND RETEST" result means its state of charge is too low for a valid capacity reading — it needs charging before condemnation. After charging Battery 4 and retesting to determine its actual condition, the technician should evaluate whether Batteries 1 and 2 should also be replaced to maintain a matched set with Battery 3's replacement.

46. D — The ECM receiving a valid switch input confirms the driver's command is reaching the module. The solenoid testing within resistance specification eliminates the solenoid component as the cause. The missing link is the electrical path between the ECM's output and the solenoid — the wiring, connectors, relay (if present), solenoid power supply, and ground circuit must be verified to confirm the ECM's command actually energizes the solenoid.

47. B — Voltage of 12.1 volts present at the high-beam terminal on the right headlight connector confirms the power feed, fuse, relay, and dimmer switch are all delivering power for the high beam. Despite adequate voltage at the connector, the right high beam does not illuminate. The bulb's high-beam filament may be burned out, or the socket contact that engages the high-beam filament is not making proper connection with the bulb.

48. C — 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 which modulator valve controls which wheel to correctly interpret speed data and manage brake pressure. Without this programming, the module cannot process any wheel speed data and defaults to a fault state.

49. A — Voltage present at the fuse panel output with zero volts at the outlet socket confirms the fuse is good and the panel is delivering power to the circuit. The voltage disappearing somewhere between the panel and the outlet means the circuit has an open — a broken wire, a disconnected connector in the cab-to-sleeper pass-through, or a failed intermediate relay or switch in the circuit path is preventing voltage from traveling the distance to the sleeper outlet.

50. D — The errors occurring more frequently in cold weather and affecting only the ELD-to-ECM communication — while all other module communications remain uninterrupted — points to a physical connection issue at the diagnostic connector where the ELD plugs in. Cold temperatures cause metal connector pins to contract slightly, reducing the contact pressure between the ELD plug

and the diagnostic connector terminals. This momentary contact loss briefly interrupts the ELD's data link.