PRACTICE EXAM 7: ASE T6 SIMULATION

1. A technician connects a DMM between the positive and negative posts of a truck battery with the engine off and all loads disconnected. The meter reads 12.22 volts. The technician then connects the DMM across the battery cable clamp-to-post connection on the positive terminal and reads 0.0 volts. What do these two measurements together tell the technician?

A. The battery is fully charged and the terminal connection is corroded

B. The battery is at approximately 50% state of charge and the terminal is making poor contact

C. The battery is at approximately 50% state of charge and the positive terminal connection has negligible resistance

D. The battery is fully charged but the cable connection is introducing resistance that drops 0.22 volts

2. A medium/heavy truck has an electrical fire that originates at a wiring harness bundle near the frame rail. Investigation reveals that an aftermarket circuit was added using 18-gauge wire protected by a 30-amp fuse. The circuit powers an auxiliary heater rated at 20 amps. What installation error caused the fire?

A. The auxiliary heater should have been fused at 10 amps instead of 30 amps

B. The fuse should have been mounted closer to the battery to reduce the wire run length

C. The 18-gauge wire should have been routed inside a conduit to contain any heat buildup

D. The 18-gauge wire is only rated for approximately 6 to 8 amps but the circuit draws 20 amps — the undersized wire overheated before the oversized fuse could blow

3. A technician is diagnosing a truck where the driver reports that the left side mirrors, marker lights, and clearance lights all dim together when the left turn signal is activated, then return to normal brightness when the turn signal flashes off. What single fault could cause all left-side circuits to interact this way?

A. A high-resistance shared ground connection for the left side of the vehicle, causing all left-side circuits to interact through a common return path

B. A faulty body controller module that reduces left-side voltage output during turn signal activation

C. A partially shorted left turn signal bulb drawing excessive current from the shared left-side power feed

D. A defective multifunction switch that bleeds voltage from the marker circuit into the turn signal circuit

4. During a routine fleet inspection, a technician tests a truck's batteries using an electronic capacitance tester. Battery 1 reads 920 CCA out of its 950 CCA rating. Battery 2 reads 480 CCA out of its 950 CCA rating. Both batteries show 12.6 volts open circuit. How should the technician proceed?

A. Replace Battery 2 because it has fallen well below the 70% replacement threshold at only 50% of rated CCA, and inspect Battery 1 for potential replacement as well since mixing a new battery with an aging one in a parallel bank is not recommended

B. Return both batteries to service because both show fully charged voltage at 12.6 volts

C. Slow-charge Battery 2 for 12 hours and retest, as the capacitance reading may improve after a thorough charge cycle

D. Replace both batteries immediately because any CCA variation between parallel batteries indicates a bank-wide failure

5. A truck's scan tool displays the following parameter from the ECM: "Battery Voltage: 11.2V" while the engine is running at idle with accessories on. A DMM at the battery terminals reads 13.9 volts. What is the most likely explanation for the lower ECM reading?

A. The scan tool is displaying a delayed voltage reading from before the engine started

B. The ECM measures voltage at its own power input pins, and excessive resistance in the power feed wiring between the battery and the ECM is dropping voltage before it reaches the module

C. The scan tool has a known calibration offset that reads 2.7 volts below actual on this vehicle platform

D. The ECM intentionally reports a lower voltage to prevent the alternator from entering an overcharge protection mode

6. Technician A says that Deutsch connectors use a wedge-lock system that secures all terminals simultaneously when the wedge is fully inserted. Technician B says that a backed-out terminal in a Deutsch connector can be detected by checking for proper wedge-lock engagement. Who is correct?

A. Technician A only

B. Technician B only

C. Neither Technician A nor Technician B

D. Both Technician A and Technician B

7. A commercial vehicle's starter motor draws 240 amps during a current draw test. The specification calls for 180 to 220 amps. The engine cranks slightly slower than normal but starts successfully. What does the elevated current draw indicate?

A. Normal variation within the acceptable range for cold-weather starting conditions

B. A charging system fault that is backfeeding current into the starting circuit during cranking

C. The starter motor has a developing internal fault — worn bushings, a dragging armature, or partially shorted windings — causing it to work harder than designed

D. The batteries are delivering excess current because they are slightly overcharged

8. A truck's brake light switch is being tested with a DMM. With the brake pedal released, the technician measures 12.4 volts on the switch input terminal and 0 volts on the output terminal. With the brake pedal depressed, both terminals read 12.4 volts. What do these readings indicate?

A. The brake light switch is open circuit and needs to be replaced

B. The brake light switch is functioning correctly — open when released and closed when depressed

C. The switch output terminal has a short-to-ground that only appears when the pedal is depressed

D. The switch is faulty because the output should read higher than the input when the pedal is pressed

9. A fleet of trucks equipped with electronic instrument clusters experiences a recurring issue where the fuel gauge reads full for the first half of fuel consumption, then drops rapidly through the second half. The fuel consumption rate is confirmed as linear by fuel island records. What is the most likely cause?

A. A body controller module software issue that affects fuel gauge scaling on this cluster model

B. An ECM fuel consumption algorithm error that broadcasts incorrect fuel data on the J1939 bus

C. An alternator voltage fluctuation that affects the cluster's gauge driver differently at different fuel levels

D. Fuel level sending units with a non-linear resistor element — either by design or due to wear — that produce a steeper resistance change in the lower half of the float travel than in the upper half

10. A technician measures the resistance of a starter solenoid pull-in winding and reads 0.4 ohms. The hold-in winding reads 2.8 ohms. Are these readings consistent with a properly functioning solenoid?

A. Yes — the pull-in winding has low resistance to draw heavy current for initial plunger engagement, while the hold-in winding has higher resistance to draw less current during sustained engagement

B. No — the pull-in winding resistance is too low, indicating a shorted coil that will draw excessive current

C. No — the hold-in winding resistance is too high, indicating a partially open coil that cannot maintain plunger engagement

D. Yes — both windings should have identical resistance values for balanced electromagnetic force

11. A commercial vehicle's license plate light is inoperative. The technician replaces the bulb, but the new bulb does not illuminate. The fuse is confirmed good. What should the technician check next?

A. The headlight switch for an internal fault on the license plate light output circuit

B. The body controller module for a stored open-circuit fault code on the license plate light output

C. Voltage at the license plate light socket with the tail lights activated to determine if power is reaching the fixture

D. The alternator output to confirm adequate system voltage is available for the license plate circuit

12. A heavy-duty truck driver complains that the truck's batteries seem weaker every Monday morning after the truck sits parked all weekend. The truck runs fine during the weekday driving schedule. Parasitic draw testing on Friday afternoon shows 42 milliamps — within the 50 milliamp specification. On Monday morning, the batteries read 11.6 volts. What should the technician investigate?

A. The charging system for an intermittent undercharging condition that fails to fully charge the batteries during Friday's final driving shift

B. Whether a timer-controlled system — such as a block heater, a battery warmer, or a telematics scheduled wake-up cycle — activates over the weekend and draws current that was not present during Friday's static parasitic draw test

C. The battery bank capacity to determine if the batteries are undersized for the vehicle's weekend standby requirements

D. The alternator diode trio for a reverse leakage condition that only occurs after extended key-off periods

13. A technician connects an oscilloscope to the output of a wheel speed sensor on a heavy-duty truck. With the wheel spinning at a steady speed, the waveform shows a consistent sine wave pattern with one spike that is noticeably lower in amplitude than the rest, occurring once per revolution. What does this single low spike indicate?

A. An intermittent open in the sensor winding that reduces output at one point in the rotation

B. A failing sensor magnet that is losing field strength on one side of its circumference

C. Normal variation in the reluctor ring tooth spacing that falls within acceptable manufacturing tolerances

D. A damaged, chipped, or missing tooth on the reluctor ring at the position corresponding to the low spike

14. Technician A says that when performing a voltage drop test on a starter circuit, the engine must be cranking to produce valid results. Technician B says that voltage drop testing can be performed with the engine off and no load on the circuit as long as a DMM with millivolt resolution is used. Who is correct?

A. Technician A only — voltage drop requires current flow through the circuit, and the starter circuit only carries current during cranking

B. Technician B only

C. Both Technician A and Technician B

D. Neither Technician A nor Technician B

15. A truck's electronic instrument cluster displays a "CHECK CHARGING SYSTEM" message and the voltmeter gauge reads 11.8 volts while the engine is running at highway speed. The driver reports the headlights have been getting progressively dimmer over the last hour. What immediate action should the driver take?

A. Pull over immediately and shut off the engine to prevent alternator damage from the fault condition

B. Increase engine RPM to above 3,000 to force higher alternator output and continue to the next exit

C. Turn off all non-essential electrical loads to conserve the remaining battery charge and proceed directly to the nearest safe service location

D. Flash the headlights to test whether they return to full brightness, which would indicate an intermittent fault

16. A heavy-duty truck has two batteries in parallel. One battery cable inter-connect shows green corrosion at the terminal connection. The technician cleans the terminals and applies protectant. The next day, the corrosion has returned. What underlying condition is causing the rapid corrosion recurrence?

A. The terminal protectant was applied before the terminal was fully tightened, trapping moisture beneath the protectant

B. Normal outgassing from the adjacent battery vent that cannot be prevented in a battery box environment

C. A cracked battery case or leaking cell vent cap near the inter-connect terminal that is continuously exposing the connection to acid vapor or liquid electrolyte

D. Galvanic corrosion between the copper cable terminal and the lead battery post accelerated by temperature cycling

17. A truck's body controller module controls the exterior lighting through switched high-side outputs. The technician activates the marker lights through the scan tool. The BCM output pin shows 12.3 volts, but the marker light connector 30 feet away shows 12.1 volts. With the markers energized, the technician measures 0.2 volts between the BCM output pin and the marker light connector power pin. What does this 0.2-volt reading represent?

A. Residual voltage from the BCM's internal PWM switching frequency

B. An error margin in the DMM that should be disregarded on circuits longer than 20 feet

C. Normal electromagnetic induction between the marker light wire and adjacent high-current circuits

D. The total voltage drop in the wire and connections between the BCM and the marker lights, which at 0.2 volts is within acceptable limits

18. A truck driver reports that the instrument cluster's high-beam indicator illuminates when the low beams are selected, and the low-beam indicator illuminates when the high beams are selected. The actual headlight beam output matches the switch position correctly — lows are on when selected, highs are on when selected. What is the most likely cause?

A. A multifunction switch with crossed internal indicator light contacts that route the indicator signals to the wrong cluster inputs

B. The indicator wires at the instrument cluster connector are swapped — the high-beam indicator wire is connected to the low-beam input pin and vice versa

C. A body controller module programming error that reverses the indicator logic commands sent to the cluster

D. A faulty instrument cluster module that has reversed the internal LED assignments for the beam indicators

19. A medium/heavy truck's alternator has been producing a squealing noise that increases in pitch with engine RPM. The noise is present immediately at startup and continues at all engine speeds. The drive belt is new and properly tensioned. What is the most likely cause?

A. Failed alternator bearings producing metallic noise that increases with rotational speed

B. A misaligned alternator pulley that causes the belt to track off-center and generate noise

C. A loose alternator mounting bracket that resonates at engine RPM frequencies

D. Belt dressing that was applied to the new belt creating a temporary glazed surface

20. A technician is diagnosing a truck where the windshield washer pump activates normally but the wipers do not automatically cycle during the wash sequence. The wipers work correctly on all manual switch positions. On this vehicle, the wash-to-wipe function is controlled by the body controller module. What should the technician check?

A. The wiper motor park switch for a fault that prevents BCM-commanded wiper activation

B. The wiper relay for a sticking contact that blocks the BCM's wiper activation signal

C. The washer pump for a missing feedback signal that the BCM requires to confirm pump operation

D. The BCM for the wash-to-wipe configuration parameter, as it may be disabled or incorrectly programmed

21. A heavy-duty truck is being prepared for a battery load test. The technician measures open circuit voltage at 12.65 volts. The batteries were disconnected from the vehicle 24 hours ago. Is the battery ready for load testing?

A. No — the battery must be connected to the vehicle and charged by the alternator for at least 30 minutes before load testing

B. Yes — the battery is at approximately 100% state of charge as indicated by the 12.65-volt reading, and the 24-hour rest period has eliminated any surface charge

C. No — the battery must have a load applied for 15 seconds to condition the plates before the formal load test begins

D. Yes — but only if the specific gravity in all cells reads exactly 1.265 without any variation

22. A commercial vehicle driver reports that the air horn does not sound but the electric city horn works normally. Both horns share the same steering wheel horn button. The air horn is controlled by an air solenoid valve that receives power through a separate relay from the city horn. What should the technician check first?

A. The air horn relay and its associated fuse, since the city horn working proves the horn button and common control circuit are functional

B. The air pressure supply to the air horn solenoid valve, since low air pressure prevents horn operation

C. The horn button contact resistance, since the air horn relay may require more current than the city horn relay to energize

D. The clock spring for an intermittent fault that affects the air horn relay signal but not the city horn relay signal

23. A truck's scan tool shows the ABS module reporting wheel speed for the left front, right front, and left rear wheels, but the right rear wheel speed shows zero at all vehicle speeds. No ABS warning light is illuminated. What is the most likely explanation?

A. The ABS module has deactivated the right rear channel to prevent false braking interventions

B. A faulty ABS module processor that cannot calculate the right rear speed from valid sensor data

C. A damaged CAN bus wire that prevents the right rear speed data from reaching the scan tool display

D. A failed right rear wheel speed sensor or an open in its wiring that prevents the signal from reaching the ABS module

24. A technician is diagnosing a truck where the dome light timer keeps the lights on for 30 seconds after the door is closed, as designed. However, the driver reports that the dome lights now stay on for approximately five minutes before turning off. No modifications have been made to the vehicle. What is the most likely cause?

A. A failing dome light relay with increased contact resistance that causes the timer circuit to miscalculate the delay period

B. A body controller module fault in the timer function — either a software glitch or a failing internal component — causing the extended delay

C. A parasitic draw from another circuit backfeeding into the dome light timer, keeping the light powered beyond the normal timeout

D. An aftermarket dome light bulb with higher wattage that draws more current and keeps the timer relay energized longer

25. A truck has a 12-volt circuit with a wire run of 35 feet from the fuse panel to the load and 35 feet back through the ground return. The load draws 10 amps. The wire is 14-gauge. Using the rule that maximum acceptable voltage drop is 3% of source voltage, what is the maximum allowable total voltage drop for this circuit?

A. 0.50 volts

B. 1.20 volts

C. 0.36 volts

D. 3.00 volts

26. A medium/heavy truck equipped with a diesel particulate filter (DPF) system has an amber warning light on the dash. The scan tool shows the DPF soot load is above the regeneration threshold. The driver asks whether this is an electrical fault. How should the technician explain the relationship between this warning and the electrical system?

A. The DPF warning is generated by the ECM based on exhaust pressure and temperature sensor data transmitted over the J1939 bus to the instrument cluster — it is an electronically communicated alert about an exhaust system condition, not a direct electrical system fault

B. The DPF warning indicates a failed soot sensor that is providing incorrect readings to the ECM

C. The DPF warning is unrelated to any electrical system and is a purely mechanical exhaust restriction issue

D. The DPF warning indicates a short-to-ground in the exhaust temperature sensor circuit

27. A technician is testing a truck's alternator after a customer complaint of intermittent dimming headlights. The alternator output voltage reads 14.1 volts with a DMM. The technician then measures AC voltage at the B+ terminal and reads 0.3 volts AC. Next, the technician performs a full-load output test and the alternator produces 155 amps against its 160-amp rating. Based on all three test results, what is the alternator's condition?

A. The alternator has a failing voltage regulator that will need replacement within the next service interval

B. The alternator has worn brushes that are causing the intermittent dimming under high electrical load

C. The alternator output is adequate but the high AC ripple confirms a developing diode fault

D. The alternator is functioning within specification on all three tests — the intermittent dimming is not caused by the alternator and the technician should investigate other circuit components

28. A commercial vehicle's electronic throttle position sensor uses a 5-volt reference from the ECM. The technician measures 5.01 volts at the sensor connector with the connector unplugged. When the connector is plugged back in, the reference voltage drops to 3.8 volts. What does this indicate?

A. The reference voltage circuit is within normal specification and no fault exists

B. The ECM's internal reference voltage regulator is weak and cannot maintain output under load

C. The sensor connector has corrosion that is introducing resistance into the reference voltage circuit

D. The sensor itself has a partial internal short that is loading down the reference voltage when connected

29. A heavy-duty truck's starter relay is located on the firewall. The technician can hear the relay click when the ignition key is turned to the start position, but the starter does not crank. Bypassing the relay by connecting a jumper wire between the relay's battery input terminal and its output terminal causes the starter to crank and start the engine normally. What does this test confirm?

A. The starter relay coil is open and cannot energize the relay contacts

B. The relay contacts are not closing properly or have excessive resistance, preventing adequate current from passing through to the solenoid

C. The ignition switch is not providing sufficient voltage to the relay coil circuit

D. The starter solenoid pull-in winding has excessive resistance that prevents proper engagement

30. A truck with a manual transmission has an intermittent no-start condition. The driver reports that the truck sometimes starts immediately and other times requires multiple attempts. When the fault occurs, there is no click and no cranking. The driver has discovered that pressing the clutch pedal harder or pumping it several times before turning the key resolves the issue. What is the most likely cause?

A. A worn or misadjusted clutch interlock switch that requires extra pedal travel to reach its activation point

B. A failing starter motor that draws excessive current and intermittently trips the clutch switch circuit protection

C. Air in the clutch hydraulic system causing inconsistent pedal travel on initial depression

D. A faulty ignition switch that intermittently drops out of the start position before the solenoid fully engages

31. A truck's trailer identification lights — the three red lights mounted across the top rear of the cab — are inoperative. All other cab-mounted lights including clearance lights and marker lights work normally. The ID lights share a fuse with the cab clearance lights. What is the most likely cause?

A. A blown shared fuse that affects only the ID lights due to their position in the parallel circuit

B. A faulty headlight switch output contact specifically for the identification light circuit

C. An open in the dedicated wire or connector that feeds the three identification lights after the point where it branches from the shared clearance circuit

D. A body controller module output driver fault affecting only the identification light channel

32. A truck's electronic cruise control sets and holds speed on flat terrain but surges — alternating between slight acceleration and deceleration — on level highway. The surging occurs at all set speeds. No DTCs are stored. What is the most likely cause?

A. A lazy or sticking electronic throttle actuator that cannot respond quickly enough to the cruise module's fine speed corrections

B. A worn engine mount that allows the engine to shift and create inconsistent throttle cable tension

C. Incorrect tire size programming in the ECM causing the speed signal to oscillate around the set point

D. A failing vehicle speed sensor generating a fluctuating signal that the cruise module interprets as speed changes requiring correction

33. A technician is diagnosing a truck with a completely dead electrical system — no lights, no cranking, no dash illumination. The battery bank reads 12.6 volts. What should be checked first?

A. The ignition switch for an internal open circuit that prevents any current flow to the vehicle

B. The main battery cable connections and fusible links between the battery bank and the vehicle's power distribution system

C. The alternator for a seized bearing that has stopped the engine from running and depleted the batteries

D. The body controller module for a total shutdown command that has disabled all electrical outputs

34. A driver reports that the truck's left turn signal works normally when the trailer is disconnected, but when the trailer is connected, the left turn signal on the tractor flashes at the normal rate while the left turn signal on the trailer does not flash at all. The right turn signals work correctly on both the tractor and trailer. What is the most likely cause?

A. An open in the yellow wire circuit on the trailer side — either in the trailer cord, the trailer connector, or the trailer's left-side wiring — preventing the left turn signal from reaching the trailer lights

B. A faulty turn signal flasher module that cannot handle the additional current load of the trailer's left-side bulbs

C. A corroded ground pin in the SAE J560 connector that only affects the left-side circuits

D. A grounded yellow wire on the trailer that is blowing the tractor's left turn signal fuse

35. A technician is testing a truck's coolant temperature sending unit by measuring its resistance at known temperatures. At 150°F, the sensor reads 450 ohms. At 200°F, the sensor reads 180 ohms. At 250°F, the sensor reads 80 ohms. What type of thermistor does this resistance pattern indicate?

A. A positive temperature coefficient (PTC) thermistor where resistance increases with temperature

B. A variable reluctance sensor that changes frequency rather than resistance with temperature

C. A negative temperature coefficient (NTC) thermistor where resistance decreases as temperature increases

D. A linear potentiometer that produces a directly proportional resistance-to-temperature ratio

36. A truck's body controller module reports an overcurrent fault on the headlight output. The technician tests the headlight circuit and finds normal current draw with correct bulbs installed. After clearing the code, the headlights operate normally and the code does not return during a road test. What could have caused the original fault?

A. A momentary current spike from engine cranking that was picked up by the BCM's headlight monitoring circuit

B. A brief headlight filament surge during cold-start bulb warm-up that exceeded the BCM's programmed current threshold

C. Radio frequency interference from a CB radio transmission that the BCM misinterpreted as an overcurrent event

D. A momentary short-to-ground in the headlight circuit — possibly from vibration shifting a wire against a ground surface — that has since lost contact

37. A commercial vehicle's electronic parking brake warning light stays illuminated even after the parking brake is fully released. The parking brake is confirmed mechanically released by vehicle movement. The scan tool shows no active parking brake DTCs. What should the technician check?

A. The instrument cluster for an internal LED fault that keeps the parking brake indicator powered continuously

B. The parking brake switch or sensor circuit for a fault that keeps the indicator signal active even though the brake is physically released

C. The BCM for a software error that locks the parking brake warning in the on state after a power cycle

D. The parking brake air pressure circuit for a slow leak that intermittently signals the brake as applied

38. A technician is troubleshooting a truck where a single headlight flickers intermittently. All wiring connections at the headlight connector test tight and show no corrosion. Voltage drop tests on both the power and ground sides are within specification when the headlight is steady. What diagnostic approach would best identify this intermittent fault?

A. Perform a wiggle test on the headlight connector, the bulb socket, the harness pass-throughs, and the inline connectors while monitoring the headlight operation or DMM voltage reading to reproduce the intermittent contact loss

B. Replace the headlight bulb, socket, and connector as a complete assembly to eliminate all potential contact points

C. Connect an oscilloscope to the headlight power feed and leave it recording for 24 hours to capture the intermittent event

D. Measure the headlight circuit resistance with the circuit de-energized to detect a hidden high-resistance fault

39. A truck has a 24-volt starting system with two 12-volt batteries in series. The technician measures 24.4 volts across the full series bank. The technician then measures each battery individually: Battery 1 reads 12.6 volts and Battery 2 reads 11.8 volts. What does the difference between the two readings indicate?

A. Battery 2 is at a lower state of charge than Battery 1, and the imbalance should be investigated — the weaker battery may need charging, testing, or replacement

B. Both batteries are within acceptable range for a series configuration since the combined voltage exceeds 24 volts

C. Battery 1 is overcharged and Battery 2 is normal, indicating the charging system is favoring one battery

D. The measurements are invalid because series-connected batteries must be disconnected from each other before individual voltage readings are taken

40. A truck's electronic instrument cluster occasionally displays garbled characters on the LCD information display for two to three seconds before returning to normal. The gauges and warning lights are unaffected during these episodes. What is the most likely cause?

A. A CAN bus communication error that corrupts the text data being sent to the cluster display

B. A failing alternator introducing voltage spikes that affect the cluster's LCD driver circuit

C. An intermittent fault in the instrument cluster's internal LCD display driver or its connection to the display panel

D. Electromagnetic interference from the ignition system affecting the cluster's digital display processor

41. A heavy-duty truck's charging system produces normal voltage and amperage during testing, but the technician notices that the alternator housing is significantly hotter than normal after a 30-minute road test. What condition could cause excessive alternator heat despite normal electrical output?

A. Worn drive belt tensioner allowing belt slip that generates friction heat on the alternator pulley

B. Normal heat generation for a heavy-duty alternator operating at high output during the test drive

C. An overcharged battery bank that is rejecting charging current, forcing the alternator to dissipate energy as heat

D. A failing alternator bearing generating friction heat internally, which adds to the normal electrical heat generation

42. A commercial vehicle's scan tool retrieves a code indicating "CAN Bus Off" from the transmission control module. All other modules communicate normally. What does a "Bus Off" condition mean?

A. The transmission module has been disconnected from the CAN bus by a relay controlled by the ECM

B. The transmission module has detected excessive bus errors on its transceiver and has disconnected itself from the network as a protective measure defined by the CAN protocol

C. The CAN bus backbone wire has an open at the transmission module's connection point

D. The transmission module's firmware has become corrupted and needs to be reflashed

43. A truck driver reports that the auxiliary power outlet in the cab occasionally loses power for a few seconds and then restores. The technician tests the outlet and it works normally. The fuse is tight and not blown. What should the technician investigate?

A. The fuse and fuse holder contacts for signs of heat discoloration, corrosion, or spread terminals that could cause an intermittent connection under vibration

B. The alternator for voltage fluctuations that intermittently drop below the outlet's operating threshold

C. The body controller module for a software fault that periodically cycles the auxiliary outlet output

D. The dashboard switch for the outlet circuit, as an internal contact fault could cause intermittent dropout

44. A heavy-duty truck's headlights have a noticeable flicker at idle that disappears above 1,200 RPM. The alternator output tests at 13.6 volts at idle and 14.3 volts at 2,000 RPM. Both battery connections are clean and tight. What is the most likely cause?

A. The headlight bulbs are old and have thinning filaments that oscillate visibly at the lower voltage present at idle

B. A marginal drive belt that slips slightly at idle speed, reducing alternator output to a level that produces visible headlight flickering

C. A worn alternator with reduced output at low RPM that marginally supports the headlight load

D. The alternator's idle-speed output of 13.6 volts is slightly below the point at which the headlights operate at full steady brightness, causing visible flicker that resolves at the higher 14.3 volts produced above 1,200 RPM

45. A truck's scan tool shows that the ECM is receiving a valid signal from the turbo boost pressure sensor. However, the ECM is commanding the turbocharger wastegate to remain fully open at all times, preventing boost pressure from building. No DTCs are stored related to the wastegate. What type of fault could cause this behavior?

A. A mechanical wastegate actuator stuck in the open position that does not respond to the ECM's electrical command

B. An electrical fault in the wastegate solenoid circuit — an open wire, a failed solenoid, or a disconnected connector — preventing the ECM's command from reaching the actuator

C. A faulty boost pressure sensor that is reading higher than actual pressure, causing the ECM to reduce boost

D. A clogged air filter that reduces intake airflow and prevents the turbocharger from generating boost pressure

46. A technician is inspecting the wiring harness on a heavy-duty truck and discovers that a previous repair used a butt splice connector crimped over the insulation of one wire rather than stripped copper conductor. The circuit currently works. What is the potential problem with this repair?

A. The connector will work indefinitely because the crimp has penetrated the insulation and made contact with the conductor strands

B. The butt splice will eventually corrode inside and create a high-resistance open circuit

C. The crimp on insulation creates a high-resistance connection that will generate heat under load and may eventually cause a circuit failure, a fire, or an intermittent open

D. The insulation acts as a dielectric that will block DC current but allow AC signals to pass

47. A truck's right-side exterior mirrors are equipped with both a heated glass element and a power adjustment motor. The heated element works but the power adjustment does not respond. Both functions share the same fuse and ground connection. What does this tell the technician about the fault location?

A. The shared fuse and ground are functional, isolating the fault to the power adjustment motor, its switch, or the dedicated wiring between the switch and the motor

B. The heated element is drawing all available current from the shared fuse, starving the adjustment motor

C. The mirror control module has disabled the adjustment function while the heater is active to prevent circuit overload

D. The shared ground connection has enough resistance to power the heater element but not the higher-draw motor

48. A truck's charging system has been diagnosed with a failed voltage regulator that was allowing 16.2 volts at the battery terminals. The regulator has been replaced and the system now charges at 14.1 volts. What additional components should be inspected for damage caused by the overcharging condition before returning the truck to service?

A. Only the alternator bearings, as high voltage accelerates bearing wear from increased rotational load

B. Only the drive belt, as overcharging causes the alternator to resist rotation more strongly, accelerating belt wear

C. The batteries for boiled electrolyte and plate damage, the light bulbs for premature failure, and the electronic control modules for voltage-related faults or stored DTCs

D. No additional inspection is needed since replacing the regulator resolved the root cause

49. A fleet technician discovers that a truck's aftermarket LED light bar was wired directly to the battery positive terminal without a relay, using only a toggle switch and a 30-amp fuse. The wiring runs approximately 15 feet from the battery to the switch inside the cab, then 10 feet from the switch to the light bar on the roof. What is the primary safety concern with this installation?

A. The LED light bar will overdrive the alternator and cause premature charging system failure

B. The 15-foot unfused wire between the battery and the fuse creates an unprotected section that could short to ground and cause a fire with no overcurrent protection

C. The toggle switch will overheat and melt because LED light bars require a relay for proper current control

D. The 30-amp fuse is undersized for the wire run length and will blow during normal LED operation

50. A medium/heavy truck's telematics system sends a diagnostic alert to the fleet management platform indicating "Low Battery Voltage Event — 11.2V" occurring every night at approximately 2:00 AM. The truck is parked and no driver is present. Daytime voltage readings are normal. What should the technician investigate?

A. The telematics module firmware for a known bug that generates false low-voltage alerts during overnight reporting cycles

B. Whether a timer-controlled or scheduled system — such as a block heater, a battery maintainer, a refrigeration unit, or a programmed module wake-up cycle — activates at approximately 2:00 AM and draws enough current to temporarily drop battery voltage below the telematics alert threshold

C. The alternator for an intermittent internal short that periodically drains the batteries through the stator windings

D. The battery bank for a weak cell that cannot maintain voltage during the lowest ambient temperature period of the night

PRACTICE EXAM 7: ANSWER KEY

1. C — An open circuit voltage of 12.22 volts corresponds to approximately 50% state of charge on a 12-volt lead-acid battery. The 0.0-volt reading across the positive cable clamp-to-post connection indicates zero voltage drop at that junction — meaning the connection has negligible resistance and is making excellent electrical contact. The battery needs charging, but the terminal connection is not a problem.

2. D — The 18-gauge wire is rated for only 6 to 8 amps of continuous current, but the auxiliary heater draws 20 amps. The 30-amp fuse will not blow until current exceeds 30 amps, so the wire overheats and melts long before the fuse ever reaches its trip point. The correct installation requires wire rated for at least 20 amps (10- or 12-gauge) with a fuse rated just above the load's draw but within the wire's capacity.

3. A — When multiple circuits on the same side of the vehicle interact — all dimming together when one circuit pulses — the common element is the shared ground return path. A high-resistance ground forces current from one circuit to influence the voltage available to other circuits sharing that return. The turn signal's pulsing current through the high-resistance ground modulates the voltage reference for the mirrors, markers, and clearance lights on that side.

4. A — Battery 2 at 480 CCA out of its 950 CCA rating is at approximately 50% of rated capacity — well below the 70% replacement threshold of 665 CCA. Despite showing 12.6 volts at rest, its internal plate capacity has deteriorated significantly. In a parallel bank, the weak battery drags down system performance and stresses the healthy batteries. Both batteries should be replaced as a matched set.

5. B — The DMM confirms the charging system is producing 13.9 volts at the battery terminals, which is within normal range. The ECM reading of 11.2 volts at its own power input pins means 2.7 volts is being lost in the wiring between the battery and the ECM. This excessive voltage drop in the ECM power feed circuit must be found and repaired, as the module may set DTCs or derate the engine due to perceived low system voltage.

6. D — Both technicians are correct. Deutsch connectors use a wedge-lock system where a plastic wedge is inserted after all terminals are in place, mechanically securing all terminals simultaneously. A terminal that has not been fully seated prevents the wedge from inserting completely, providing a visual and tactile indicator that a terminal is backed out. Checking wedge-lock engagement is a valid diagnostic step for Deutsch connector faults.

7. C — The specification of 180 to 220 amps represents normal current draw for this starter. Drawing 240 amps — 20 amps above the upper specification limit — indicates the motor is working harder than designed. Worn bushings allowing armature-to-field pole contact, partially shorted windings

increasing magnetic drag, or a dragging commutator all increase current draw while reducing cranking efficiency. The starter should be removed and inspected.

8. B — With the pedal released, the switch is open — voltage is present on the input side but does not pass through to the output, confirming 0 volts on the output terminal. When the pedal is depressed, the switch closes, connecting input to output and showing 12.4 volts on both terminals. This is exactly how a normally open brake light switch should behave — open at rest and closed when the brake is applied.

9. D — A fuel level sending unit's resistor element may have a non-linear resistance curve — either by original design or due to wear and contamination that affects different portions of the resistor track differently. If the upper half of the float travel produces minimal resistance change while the lower half produces rapid change, the gauge reads full for an extended period during the first half of consumption and then drops quickly through the second half.

10. A — The starter solenoid has two coils that serve different purposes. The pull-in winding has very low resistance (0.4 ohms) to draw heavy current and generate the strong magnetic force needed to physically move the plunger against spring tension. The hold-in winding has higher resistance (2.8 ohms) to maintain the plunger in position with less current during sustained cranking. This dual-coil design is standard for heavy-duty starter solenoids.

11. C — The fuse being good only confirms power is available up to the fuse. The next diagnostic step is to determine whether that power is reaching the light fixture. Testing for voltage at the license plate light socket with the tail lights energized confirms whether the wiring between the fuse and the fixture is intact. If voltage is present, the socket or ground is faulty. If voltage is absent, an open exists in the wiring.

12. B — The parasitic draw test on Friday showed 42 milliamps — within specification for a static key-off condition. However, a timer-controlled device that activates over the weekend — such as a block heater on a timer, a scheduled telematics wake-up cycle, or a battery warmer — would draw additional current at specific intervals that were not captured during Friday's static test. Monitoring parasitic draw over a full weekend cycle reveals the intermittent load.

13. D — A consistent sine wave with one recurring low-amplitude spike at the same position each revolution indicates a physical defect at that specific location on the reluctor ring. A chipped, damaged, or missing tooth reduces the magnetic flux change as it passes the sensor, producing a weaker signal at that position. The fault repeats once per revolution because the damage is at a fixed location on the ring.

14. A — Technician A is correct. Voltage drop testing measures the voltage consumed by resistance as current flows through it. Without current flow, there is no voltage drop — even a severely corroded connection reads zero if no current is passing through it. The starter circuit only carries significant current during cranking, so the engine must be cranking to produce valid voltage drop measurements across the cables and connections.

15. C — With the charging system failed and the vehicle running on battery power alone, the priority is preserving the remaining battery charge long enough to reach a safe service location. Turning off headlights (if daylight permits), the blower motor, heated mirrors, and other non-essential loads reduces the drain on the batteries. Continuing to drive at highway speed keeps the remaining charge available longer than idling or stopping.

16. C — Rapid corrosion recurrence within 24 hours of cleaning indicates a continuous source of acid exposure. Normal outgassing alone does not typically produce corrosion this quickly. A cracked battery case or leaking vent cap near the inter-connect terminal is continuously depositing acid on the connection, causing immediate re-corrosion regardless of cleaning and protectant application. Replacing the damaged battery stops the acid source.

17. D — The 0.2-volt reading between the BCM output pin and the marker light connector represents the total voltage drop across the 30-foot wire run and all its connections. At 0.2 volts, this is well within the 0.5-volt maximum acceptable voltage drop for the power side of the circuit. The wire and connections are carrying current with minimal resistance, and no repair is needed.

18. B — The headlights themselves operate correctly — lows are on when selected and highs are on when selected — confirming the multifunction switch and the headlight power circuits are functioning properly. The only fault is the indicator lights on the cluster showing the opposite of what is selected. The most likely cause is the two indicator wires being swapped at the cluster connector, routing each indicator signal to the wrong cluster input pin.

19. A — A squealing noise that is present from startup and increases in pitch linearly with engine RPM — with a new, properly tensioned belt — points to an internal alternator fault rather than a belt issue. Failed alternator bearings produce a metallic whine or squeal that tracks directly with the alternator's rotational speed. The bearing noise will worsen progressively and the alternator should be replaced before the bearing seizes.

20. D — The washer pump operates, the wipers work on all manual speeds, and the BCM controls the wash-to-wipe function on this vehicle. The wash-to-wipe feature is a programmable parameter in the BCM — it may have been disabled during a previous service event, reset to defaults, or incorrectly configured during a module replacement. Checking the BCM configuration for the wash-to-wipe parameter is the logical diagnostic step.

21. B — A battery reading 12.65 volts indicates approximately 100% state of charge, meeting the minimum 75% requirement (12.4 volts) for load testing. The 24-hour rest period since disconnection ensures any surface charge has fully dissipated, providing a true open circuit voltage reading. The battery is ready for an immediate load test without further preparation.

22. A — The city horn working normally when the horn button is pressed proves the horn button, clock spring, and common control circuit are all functional. The air horn uses a separate relay and fuse from the city horn. Since the shared control circuit is proven good, the fault is in the air horn's dedicated

components — its relay, its fuse, the air solenoid valve, or the wiring between the relay and the solenoid.

23. D — Three wheels reporting valid speed data while one wheel shows zero at all speeds indicates the ABS module is not receiving a signal from that specific sensor. The most common cause is a failed wheel speed sensor or an open in the wiring between the sensor and the module — a broken wire, a disconnected connector, or a corroded pin. The module, bus, and other sensor channels are functioning normally.

24. B — The dome light timer function is controlled by the body controller module on this vehicle. An extended delay from the designed 30 seconds to approximately five minutes — with no modifications to the vehicle — indicates the BCM's internal timer logic has developed a fault. This could be a software glitch triggered by a power interruption, a failing internal capacitor used in the timing circuit, or a processor error that has altered the timeout calculation.

25. C — Maximum acceptable voltage drop is 3% of the 12-volt source voltage: 12 × 0.03 = 0.36 volts. This 0.36-volt maximum must accommodate the total round-trip wire length of 70 feet (35 feet out and 35 feet return) plus all connections and terminals in the circuit. If measured voltage drop exceeds 0.36 volts, the wire gauge is inadequate for the combination of current and distance.

26. A — The DPF warning is not an electrical system fault but it is communicated through the electrical system. Exhaust pressure and temperature sensors generate electrical signals that the ECM processes to determine soot load. The ECM broadcasts this data on the J1939 bus to the instrument cluster, which displays the warning. The electrical system is the messenger — the underlying condition is an exhaust aftertreatment issue requiring regeneration.

27. D — All three tests indicate a healthy alternator. Voltage output of 14.1 volts is within the 13.5 to 14.5 volt normal range. AC ripple of 0.3 volts is below the 0.5-volt threshold, confirming the rectifier bridge is intact. Full-load output of 155 amps against a 160-amp rating represents 97% capacity — well within specification. The intermittent dimming is caused by something other than the alternator, and the technician should investigate circuit wiring and connections.

28. D — The reference voltage reading 5.01 volts with the sensor unplugged confirms the ECM's reference voltage supply is producing correct output. The voltage dropping to 3.8 volts when the sensor is reconnected indicates the sensor is loading down the reference — drawing more current than normal through an internal partial short. The excessive current through the sensor's reduced internal resistance pulls the reference voltage down below its designed level.

29. B — The relay clicking confirms the coil is energizing and the control circuit is complete. Bypassing the relay contacts with a jumper and the starter working confirms the solenoid and starter motor are functional. The fault is specifically in the relay's contacts — they are either not closing fully, have excessive resistance from burned or pitted contact surfaces, or have welded in a partially open position that limits current flow to the solenoid.

30. A — The symptom resolving when the driver applies extra pedal pressure or pumps the clutch pedal is the key diagnostic clue. The clutch interlock switch requires the pedal to reach a specific position to close the circuit. A worn switch, a misadjusted switch mounting, or a worn pedal pivot that has increased the distance between the pedal and the switch activation point requires extra effort to reach the switch. Adjusting or replacing the switch resolves the intermittent no-start.

31. C — The identification lights and clearance lights share a fuse, which is confirmed good. The clearance lights working proves the fuse, power feed, and headlight switch output are functional. The three identification lights are wired on a dedicated branch that splits from the shared circuit at some point. An open in this dedicated branch — a disconnected connector, a broken wire, or a corroded splice — prevents power from reaching the ID lights while the clearance circuit remains unaffected.

32. D — Cruise control surging — rhythmic acceleration and deceleration at a set speed on level terrain — indicates the cruise module is constantly making corrections because it perceives the speed is changing. A failing vehicle speed sensor that produces a fluctuating signal tricks the module into alternating between adding and reducing throttle to maintain the set speed. A stable, accurate speed signal is required for smooth cruise operation.

33. B — A completely dead electrical system with fully charged batteries (12.6 volts) means power is available but not reaching any circuit. The most upstream failure point is the physical connection between the batteries and the vehicle — the main battery cables and the fusible links that connect the battery bank to the power distribution system. A disconnected cable, a severely corroded terminal, or a blown main fusible link cuts power to the entire vehicle.

34. A — The right turn signals working correctly on both tractor and trailer eliminates the trailer cord, connector ground, and flasher module as causes. The left turn signal working on the tractor proves the flasher and multifunction switch are functional. The fault is isolated to the yellow wire path on the trailer side — the wire that carries the left turn signal from the J560 connector through the trailer cord to the trailer's left-side lights.

35. C — The resistance pattern — 450 ohms at 150°F, 180 ohms at 200°F, 80 ohms at 250°F — shows resistance decreasing as temperature increases. This is the defining characteristic of a negative temperature coefficient (NTC) thermistor. NTC thermistors are the standard sensor type used in commercial vehicle coolant temperature sending units, allowing the gauge or ECM to interpret lower resistance as higher temperature.

36. D — The code not returning after clearing suggests the overcurrent condition was momentary and is no longer present. A brief short-to-ground caused by a wire vibrating against a ground surface — then losing contact as the vehicle's position changed — produces exactly this pattern. The BCM detected the momentary overcurrent and stored the code, but the physical condition resolved on its own. The harness should be inspected for potential contact points.

37. B — The parking brake is physically released and the truck moves freely, confirming the mechanical brake function is correct. The warning light staying on indicates the switch or sensor that reports brake

status to the instrument cluster is still signaling the brake as applied. A stuck, misadjusted, or failed parking brake position switch or its wiring is providing a false applied signal to the cluster even though the brake is fully released.

38. A — When static testing shows no faults but an intermittent condition exists, the fault likely requires physical manipulation to reproduce. A wiggle test involves systematically moving each connector, wire section, and pass-through point while monitoring the headlight or a DMM reading. When manipulating a specific connection reproduces the flicker, the intermittent contact point is identified and can be repaired.

39. A — In a series battery configuration, both batteries carry the same current and should maintain similar charge levels under normal conditions. Battery 2 reading 0.8 volts lower than Battery 1 indicates it is at a lower state of charge or has reduced capacity. This imbalance causes Battery 1 to work harder, accelerating its degradation. Battery 2 should be individually charged, tested, and replaced if it cannot hold a full charge.

40. C — Gauges and warning lights operating normally during the LCD episodes confirms the cluster's main processor and data bus communication are functional. The garbled characters appearing only on the LCD display — briefly and intermittently — point to an internal fault specific to the LCD driver circuit or its physical connection to the display panel. A failing ribbon cable connector between the circuit board and the LCD panel is a common cause of intermittent display corruption.

41. D — The alternator producing normal voltage and amperage confirms the electrical components are functioning correctly — the output meets specification. Excessive housing heat beyond normal levels, despite correct electrical performance, indicates an additional heat source. A failing bearing generates friction heat that is added to the normal heat from electrical energy conversion, making the housing noticeably hotter than expected for the operating conditions.

42. B — The CAN protocol includes an error management system where a module that detects excessive bus errors incrementally increases its error counter. When the counter reaches a defined threshold, the module enters a "Bus Off" state and disconnects itself from the network to prevent it from disrupting communication for other modules. This is a self-protective measure built into the CAN specification, and the module must be reset or power-cycled to rejoin the bus.

43. A — An intermittent power loss at an outlet that tests good during static testing points to a connection that is good under stable conditions but loses contact under vibration. The fuse and fuse holder contacts are the most common intermittent contact point in accessory circuits — spread fuse holder terminals, corroded contact surfaces, or a slightly undersized fuse blade can make and break contact with vehicle movement. Inspecting for heat discoloration confirms intermittent arcing has been occurring.

44. D — The alternator produces 13.6 volts at idle — below the ideal 14.0-volt midpoint — and 14.3 volts above 1,200 RPM. The 13.6-volt idle output is just barely sustaining the headlight load without sufficient margin. The slight voltage fluctuation inherent in the alternator's output at this marginal level

produces visible flicker in the headlights. At 14.3 volts, the output is comfortably above the threshold and the headlights operate at stable full brightness.

45. B — The scan tool confirms the ECM receives a valid boost pressure signal and commands the wastegate open, but the wastegate does not respond. An electrical fault in the wastegate solenoid circuit — an open wire, a failed solenoid coil, or a disconnected connector — prevents the ECM's electrical command from reaching the mechanical actuator. The actuator remains in its default position because it never receives the control signal.

46. C — A crimp made over wire insulation instead of stripped conductor creates a connection that relies on the crimp barrel penetrating the insulation to contact the copper strands. This contact is unreliable, high in resistance, and worsens over time. Under current load, the resistance generates heat at the connection point. The connection may work intermittently but will progressively deteriorate, eventually causing a circuit failure or fire hazard.

47. A — The heated element working proves the shared fuse and ground are delivering power and completing the return path. Since both functions share these common components, the fault must be in the components unique to the power adjustment function — the adjustment motor itself, the adjustment switch, or the dedicated wiring between the switch and motor. The heater circuit's functionality eliminates every shared component.

48. C — Sustained overcharging at 16.2 volts causes widespread damage beyond just the regulator. Battery electrolyte boils, damaging the plates and reducing capacity. Light bulbs experience accelerated filament degradation from the elevated voltage. Electronic control modules may have sustained voltage damage or stored DTCs related to over-voltage conditions. All of these components must be inspected before the truck is returned to service.

49. C — The critical safety issue is the 15-foot wire run from the battery positive terminal to the cab-mounted toggle switch. This entire length of wire has no fuse protection — the fuse is located at the switch inside the cab, 15 feet from the battery. If this unprotected wire shorts to ground anywhere along its 15-foot path — from abrasion, a pinch point, or contact with a sharp edge — unlimited current flows directly from the battery with no fuse to interrupt it, creating a fire.

50. B — The low-voltage event occurring at the same time every night — 2:00 AM — strongly suggests a scheduled or timer-controlled system is activating and drawing enough current to temporarily drop battery voltage below the telematics module's alert threshold. Block heaters on timers, scheduled telematics data uploads, refrigeration unit monitoring cycles, or programmed module wake-up routines are all candidates for the consistent nightly activation pattern.